Phase II Management Plan – Final Touches

Tuesday, March 25, 2003

University Center (MAP)
University of Texas at Arlington campus
Red River Room

Registration **8:00**

Introduction **8:30**

Panelist Presentations ..... **8:45 to 11:30**

MS4 representatives from the DFW area present their experiences in SWMP development

Topics from the panelists will include:

-- Examples of completed and draft management plans
-- How to include the building/construction industry in the BMP selection process, ordinance development, and enforcement guide
-- Working with an organized special interest group to include special water quality concerns
-- The Advisory Committee - Bringing public and private sector into the committee for the long term
-- Incorporating an existing proactive monitoring program into a general permit
-- Including the local government structure in SWMP implementation

(Break at 9:45)

Lunch – (reserved box lunch) **12:00**

TCEQ Guidance (invited) **12:45**

Discussion of compliance issues

- The 7th Minimum Measure
- Construction enforcement requirements
- How to manage in the interim before the final permit

Regional Approach to Meeting the Regulatory Requirements **1:30**

The impact of Phase II on Regional Storm Water Management

- Looking forward to the next 5 years
- Pre-approved MEP concept

iSWM – Construction and Post Construction Water Quality **2:00**

Kenny Calhoun, NCTCOG Senior Environmental Planner

- iSWM as the Post Construction BMP for Phase II Management Plans
- Water quantity and quality - comprehensive design management
- The iSWM concept of Compatible Design Across The Region

Adjourn **2:45**

North Central Texas Council of Governments
for information on the Forum contact Derin Warren at dwarren@nctcog.org or (817) 695-9215

John Promise –

David Gattis City of Benbrook

- Created an Ordinance first
- Appointed Citizens Advisory
  Parks & Rec Board supplemented with volunteers
  met with staff monthly Sept'02 – Feb'03
- Staff Support from Community Develop. & Public Svcs

? Maintenance of Ponds - on private property

Kerry Wacker - Sherman

? Car Washing

? Leaf Blowing

? Storm water Reuse

Kenny Bank - Denton - monitoring - Clam activity monitoring system
940-349-7165

$220K Budget www.ecoplex.unt.edu

pH, TDS Conductivity, Turbid. Temp. Metals Nutrients NH_3
BOD_5 coliforms etc. Use locals & monitor after training

Have a stormwater fee. $2.50/person

#7 Min. Measure - Municipal Construction

Check with County Extension Agent for Storm Water related programs, presentations, etc.

Sharon Snyder TCEQ - Working on Comments - There will be changes
Will have 90 days to make any final changes. Issued
Early Summer - will have 90 days

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TARRANT COUNTY

DRAFT #

TPDES General Permit # TXR040000

(2002 & 2007)

(Don't have a permit)

Storm Water Permit Application

Gene Latham

DRAFT

Last revised 2/10/03

Tarrant County TPDES Permit Application
Table of Contents

Counties cannot pass ordinances
Home Rule cities are primary

SECTION I – NOTICE OF INTENT (NOI), OVERVIEW and DEFINITIONS

Section I.1 - NOI/Application

See attached TCEQ forms.

Section I.2 - Overview

Phase I of the U.S. Environmental Protection Agency's (EPA) municipal storm water program was promulgated in 1990 under the authority of the Clean Water Act (CWA). Phase I relied on the National Pollutant Discharge Elimination System (NPDES) permit coverage to address storm water runoff pollutants from medium and large municipal separate storm sewer systems (MS4s), serving populations of 100,000 or greater.

The Storm Water Phase 2 Final Rule (promulgated December 8, 1999) was the next step in the EPA's efforts to protect the nation's water resources from polluted storm water runoff. The Phase 2 program requires local governments (small MS4s in urbanized areas) to implement programs and practices to control pollution in storm water runoff, through the NPDES permit program. The program also requires Phase 2 local governments to obtain a permit. There are significant penalties (up to $27,500 per day) for non-compliance with permit provisions.

The Texas Commission on Environmental Quality (TCEQ) is now authorized by EPA to issue and enforce the Texas Pollutant Discharge Elimination System (TPDES) storm water permit, in lieu of a federal permit. Phase 2 local governments in Texas must obtain their permits from TCEQ by March 10, 2003. The permit term is not to exceed 5 years (Dec. 02 – Dec. 07).

Section I.3 - Definitions

Best Management Practices (BMPs) – schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of "waters of the United States." BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Illicit Discharge – any discharge to a municipal separate storm sewer that is not composed entirely of storm water except discharges pursuant to a NPDES permit (other than the municipal separate storm sewer) and discharges resulting from fire fighting activities.

Maximum Extent Practicable (MEP) – level of effort required of a local government when implementing a BMP. This is a technology-based discharge standard for MS4s to reduce pollutants in storm water discharges that was established by CWA § 402(p). A discussion of MEP as it applies to small MS-4s is found at 40 CFR 122.34.

Municipal Separate Storm Sewer System (MS4 or small MS4) – a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch

basins, curb, gutters, ditches, man-made channels, or storm drains): (i) Owned or operated by the United States, a state, city, town, borough, county, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of storm water; (ii) Designed or used for collecting or conveying storm water....

NPDES (National Pollutant Discharge Elimination System) Permit – National program for issuing, modifying, revoking and reissuing, terminating, imposing and enforcing requirements, under sections 307, 402, 318, and 405 of the Clean Water Act (Federal Water Pollution Control Act, as amended in 1977).

Outfall – Locations where a municipal separate storm sewer discharges to waters of the United States or waters in the State (Texas).

Surface Water in the State - Lakes, bays, ponds, impounding reservoirs, springs, rivers, streams, creeks, estuaries, wetlands, marshes, inlets, canals, the Gulf of Mexico inside the territorial limits of the state, and all other bodies of surface water, natural or artificial, inland or coastal, fresh or salt, navigable or non-navigable, and including the beds and banks of all water-courses and bodies of surface water, that are wholly or partially inside or bordering the state or subject to the jurisdiction of the state; except that waters in treatment systems which are authorized by state or federal law, regulation, or permit, and which are created for the purpose of waste treatment are not considered to be water in the state.

TPDES (Texas Pollutant Discharge Elimination System) Permit - State of Texas version of the NPDES Permit , which is authorized by the USEPA. Cities and Counties are currently required to obtain storm water permits from the Texas Commission on Environmental Quality (TCEQ) and comply with State storm water rules.

Redevelopment – alterations of a property that change the footprint of a site or building in such a way that there is a disturbance of equal to or greater than 1 acre of land. This term does not include such activities as exterior remodeling.

Urbanized Area – An area of high population density, which may include multiple MS4s, as defined and used by the U.S. Census Bureau in the 2000 decennial census.

SECTION II - PERMIT APPLICABILITY AND COVERAGE

Urbanized Area

The TPDES Permit is applicable and covers only that portion of unincorporated Tarrant County that is identified as an urbanized area. The TCEQ website, *Storm Water Permit Area Locator,* will be used to identify these areas. The map may be viewed at http://gis.tnrcc.state.tx.us/website/irwwp0/viewer.htm . The Tarrant County SWMP

covers only the unincorporated urbanized area portion of the county, but elements of the SWMP may be voluntarily implemented over a larger unincorporated area.

Regulatory Mechanism Restrictions for Counties
State law does not grant most Texas counties the ability to create and enforce ordinances, such as the ones that cities are required to create to meet the TPDES permit requirements.

SECTION III – STORM WATER MANAGEMENT PLAN (SWMP)

Overview Statement
To the extent allowable under State and local law, Tarrant County's SWMP was developed and will be implemented according to requirements of Part III of TPDES General Permit TXR040000, for storm water discharges that reach surface water in the state. This SWMP was developed to prevent pollution in storm drainage systems to the maximum extent practicable, with control measures being phased in during the 5 year permit term. The SWMP addresses six minimum control measures (MCMs) as required by state regulations. Additionally, Tarrant County elects to use the optional minimum control measure 7, Authorization for Municipal (County) Construction Activities. MCMs will be implemented in urbanized areas of unincorporated Tarrant County and may be voluntarily implemented over a larger unincorporated area if staff determines that implementation is both cost and environmentally effective. MCMs will be evaluated based upon the accomplishment of individual activities listed under each MCM. Tarrant County storm water staff from two departments (see below) will monitor MCM activities.

Participants in developing/implementing Tarrant County's SWMP
Tarrant County's SWMP was developed by County staff with storm water experience. Responsibilities for implementing the SWMP are divided between two County departments: Transportation Services and Public Health. Each MCM contains the name, department, mailing address, phone number and email of the staff primarily responsible for that specific MCM. They are available to answer questions regarding the SWMP.

Section III. 1 – Public Education and Outreach MCM

Tarrant County will inform the public about water quality issues regarding storm water runoff and illicit discharges by providing informational materials and documenting related public presentations conducted by the Tarrant County/Texas Cooperative Extension

(a) Activity, Measurable Goal and Date – ***Texas SmartScape* CD**
Assist in developing the *Texas SmartScape CD* and also distribute CDs in Tarrant County. This interactive CD will educate the public and county employees about the use of native and adapted plants which require less pesticide and fertilizer to thrive in Texas. Additional storm water education and water conservation

messages are contained in the CD. At least 2000 CDs will be (already have been) distributed by 4/1/03.

(b) Activity, Measurable Goal and Date – **Texas SmartScape Website**
Assist in developing an interactive internet version of the *Texas SmartScape*, which will be available at www.txsmartscape.com This site will be maintained by the North Central Texas Council of Governments (NCTCOG). Website will be active by 4/15/03. Also assist NCTCOG in designing the promotional bookmarks. Distribute at least 1000 website promotional bookmarks in Tarrant County by 12/1/03.

(c) Activity, Measurable Goal and Date – **Tarrant County Sub-Courthouses**
Distribute either storm water related information sheets, brochures, bookmarks or other educational material at selected Tarrant County Sub–Courthouses. Materials will be available at the Tax Assessor/Collector's offices, or other suitable locations at 5 or more Sub–Courthouses. At least 500 copies will be made available for this effort on an annual basis, beginning on 7/1/03 and continuing through the permit term, which ends December, 2007.

(d) Activity, Measurable Goal and Date – **Cooperative Extension**
The Texas Cooperative Extension, Tarrant County, conducts a variety of environmental educational activities (speeches, TV shows, radio programs and newspaper stories, training, etc.) throughout Tarrant County. Storm water staff will coordinate with Cooperative Extension staff to report annual educational activities that are storm water related. This will be accomplished annually, beginning 12/30/03.

(e) Activity, Measurable Goal and Date – ***Tarrant County News***
The *Tarrant County News* section in the Star Telegram newspaper (approximately 75,000 daily copies) is published on a monthly basis. Annually, storm water staff will prepare an article for the *Tarrant County News* that targets the TCEQ public education and outreach groups. The County's Public Information Officer will determine whether it can be used. If not, documentation will be provided that at least 2 storm water related articles from other sources have been published in other sections of the newspaper during the permit year. This annual activity will be started by 7/15/03.

(f) Activity, Measurable Goal and Date – **NCTCOG Participation**
Participate in the NCTCOG's Storm Water Education Task Force and the Regional Storm Water Management Coordinating Council, to develop storm water educational materials which can be used by MS-4s in the North Central Texas region (and sometimes other regions). Participation is currently in effect and will continue throughout the permit term, unless the Task Force and/or Council is dissolved.

(g) Activity, Measurable Goal and Date – **Texas Association of Counties**
Continue to work with the Texas Association of Counties to identify opportunities to develop or provide informational or educational materials. This activity will continue through the permit term, unless the TAC discontinues the Storm Water Committee.

(h) Activity, Measurable Goal and Date – **Identify Innovative/Effective Material**
Continue to identify innovative, as well as cost and environmentally effective, means of providing storm water education to the public. Where practicable, any new means or projects will be shared with other counties, cities and/or the TCEQ. This activity is currently in effect and will continue throughout the permit term.

(i) Activity, Measurable Goal and Date – **Public Health Department Website**
Post storm water information on the Tarrant County Public Health Dept's website, www.tarrantcounty.com/publichealth . This activity is currently in effect and will continue throughout the permit term. Also a link to www.txsmartscape.com will be provided.

Staff contact:
Gene Rattan
Tarrant County Public Health Department
1800 University Dr. # 222
Fort Worth, TX 76107
Phone: (817) 871-7511
Email: generattan@tarrantcounty.com

Section III. 2 – Public Involvement/Participation MCM

Tarrant County will rely upon open public meetings at the North Central Texas Council of Governments (NCTCOG) and the Tarrant County Commissioners' Court to receive public input into the storm water program development and implementation. Also a questionnaire will be distributed through the Sub-Courthouses to seek public involvement in the storm water program. Unlike cities, unincorporated areas of counties don't typically have a network of home owners associations or similar groups that could be readily utilized as an advisory group.

(a) Activity, Measurable Goal and Date – **Open Meetings**
Staff will verify that NCTCOG meetings are open to the public and include that information in annual reports to TCEQ. Open meetings are already in effect and will continue throughout the permit term.

(b) Activity, Measurable Goal and Date – **Questionnaire**
Staff will devise and distribute a storm water questionnaire which seeks comments concerning on-going and future program activities. The questionnaires will be placed at the Tarrant County Sub-Courthouse locations that are selected for public information activities. This will start by 4/30/03 and be accomplished by 8/1/03.

Staff contact: Gene Rattan (see previous section)

Section III. 3 – Illicit Discharge Detection and Elimination MCM

To the extent allowable under State law, Tarrant County will develop and implement an illicit discharge program. Since Texas counties do not have the rule/ordinance making authority that cities have, illicit dischargers that Tarrant County cannot enforce against, after seeking voluntary compliance regarding no-storm water discharges, will be referred to the TCEQ Region 4 Office in Fort Worth. Malfunctioning on-site sewage facilities, such as septic systems, are subject to County corrective actions and enforcement, as necessary.

Another county characteristic that impacts the development of this MCM is the actual structure of the MS4 system. County MS4s typically are composed of open drainage ditches, as opposed to underground pipe systems and outfalls found in urbanized cities. This means that illicit connections/discharges to underground systems, which are often an important source of illicit discharges for cities, are not appropriate for counties. Tarrant County's development of this MCM will be mostly based upon a MS4 structure of aboveground, unlined, open channel drainage ditches.

(a) Activity, Measurable Goal and Date – **Monitoring Drainage System**

Illicit discharge detection will be accomplished by visually monitoring critical locations within representative drainage ditch systems. Staff will devise a system for identifying critical locations, in lieu of outfalls or major outfalls – which are difficult to identify in an open, above ground drainage system. When deemed appropriate by staff, chemical testing or toxicity testing (minnow in a bottle) may also be accomplished to confirm the presence of an illicit discharge. Annually, at least 20 locations will be visually monitored. This activity will begin 1/1/04, near the start of the second permit year.

(b) Activity, Measurable Goal and Date – **Citizen Reports and Other Investigations**

In addition to monitoring for illicit discharges, citizen reporting of apparent water pollution in neighborhood creeks is a reasonable means of detecting illicit discharges in unincorporated areas of Tarrant County. Also during the performance of other duties, such as mosquito collections and road or drainage maintenance, staff may see signs of illicit discharges. Within 30 days, in the urbanized area, Tarrant County staff will investigate 100% of citizen reports and staff discovered illicit discharges. Staff may exclude from the % calculations any recurrent, unsubstantiated illicit discharge reports at a specific site. Record keeping for this activity will begin no later than 1/1/04. It should be noted that Tarrant County is restricted in the types of enforcement actions it can use. See the preceding SectionIII.3 summary. TCEQ's Regional Field Office will be notified of illicit dischargers that fall under TCEQ enforcement jurisdiction.

(c) Activity, Measurable Goal and Date – **On-Site Sewage Facilities**

The Tarrant County Public Health Department, Environmental Health Division staff will maintain records, for the storm water program, of actions taken

regarding malfunctioning on-site sewage facilities. These records will be readily available by 1/1/04 and will be contained in subsequent annual reports to TCEQ.

(d) Activity, Measurable Goal and Date – **Storm Drainage Map**
A storm sewer map of unincorporated Tarrant County, containing sufficient detail to support an illicit discharge tracing program will be developed. The map will contain streets, which are adjacent to drainage ditches; critical location monitoring sites, as identified in (a) above; names and locations of significant water bodies; and other selected features that will be of use in identifying illicit discharges. It is anticipated that the map will be either a GIS based map, USGS Quad Sheets or local Mapsco Street Guide and Directory ®, which were all allowed in Phase 1 illicit discharge mapping. The map will be available by 1/1/04 and will be updated annually.

(e) Activity, Measurable Goal and Date – **Illegal Dumping Team**
The Tarrant County Sheriff's Department Illegal Dumping Team is a group of deputies that investigate illegal dumping in the county. Storm water staff will coordinate with the Sheriff's Department team to report annual activities (number of dump locations, cleanups, enforcement actions, etc) that occurred in the county's storm water drainage right of ways. This will be accomplished annually, beginning 12/30/03.

(f) Activity, Measurable Goal and Date – **Household Hazardous Waste**
The Tarrant County Transportation Department will continue to partner with the City of Fort Worth to offer residents of unincorporated Tarrant County the opportunity to dispose of household hazardous waste at the City's Environmental Collection Center. Tarrant County will continue to fund the use of this regional facility, as long as it's economically feasible. This is a current program and is planned to continue during the permit term.

(g) Activity, Measurable Goal and Date – **NCTCOG Illegal Dumping Hotline**
Tarrant County will continue to partner with the North Central Texas Council of Governments to offer residents of unincorporated Tarrant County the opportunity to report illegal dumping to the regional *Stop Illegal Dumping Hotline,* 1-888-335-DUMP. This is number is monitored by NCTCOG and calls are referred to local governments. Tarrant County will follow up on reports from this hotline. This is a current activity and will continue to operate during the permit term.

Staff contact:
Gene Rattan
Tarrant County Public Health Department
1800 University Dr. # 222
Fort Worth, TX 76107
Phone: (817) 871-7511
Email: generattan@tarrantcounty.com

Section III. 4 – Pollution Prevention/Good Housekeeping for Municipal Operations MCM

Tarrant County will establish a program to conduct its general operations in a manner that prevents or reduces pollution in storm water runoff to the maximum extent practicable. This MCM requires a local government to examine multiple internal operations to see if they can be maintained or modified to prevent or minimize storm water pollution or illicit discharges. As stated by TCEQ, examples of local government operations include, but are not limited to: park and open space maintenance; street, road or highway maintenance; fleet and building maintenance; storm water system maintenance; new construction and land disturbances; parking lots; vehicle and equipment maintenance and storage yards; waste transfer stations; and salt/sand storage locations.

(a) Activity, Measurable Goal and Date – **County Operations Survey**
Identify Tarrant County operational activities that have a potential to impact storm water quality or generate illicit discharges. This will be accomplished by conducing site surveys of County facilities and discussing issues with County administration, departmental representatives and/or storm water staff. The site surveys will be begin on 2/1/03 and will be completed by 10/1/03.

(b) Activity, Measurable Goal and Date – **Select Good Housekeeping BMPs**
Devise appropriate BMPs to address the operational activities identified in (a) above. Consult with County Administration, departmental representatives and storm water staff to determine BMPs. The listing of BMPs will be started by 10/1/03 and completed by 5/1/04.

(c) Activity, Measurable Goal and Date – **Start Good Housekeeping BMPs**
Implement appropriate BMPs (except any with funding issues, which will be presented for Commissioners Court or County Administration consideration). At a minimum, BMPs will include educating County staff at all Precinct Garages about potential storm water quality impacts and illicit discharges [see below – (e) Employee Training)]. Implementing BMPs that don't have significant budget conflicts will be accomplished by 12/1/04 and remain in effect during the remainder of the permit term, 12/10/07.

(d) Activity, Measurable Goal and Date – **Proper Waste Disposal**
A report, to become part of the SWMP, will be developed to document the proper disposal of waste generated from County MS-4 related operations or maintenance. The report will address dredge spoil, accumulated sediments and floatables (trash and debris in storm drain system). The report will be completed and added to Tarrant County's copy of the SWMP no later than 2/1/04.

(e) Activity, Measurable Goal and Date – **Employee Training**
Based upon information from the County Operations Survey, a training program will be developed for County employees who have the potential to impact storm water quality. Beginning in calendar year 2004, employees with the potential to impact storm water will receive pollution prevention training. During the

remainder of the permit, annual pollution prevention training will be performed for new employees whose operational duties have been identified as having potential to impact storm water quality.

Staff contact:
Robert Berndt
Tarrant County Transportation Services
100 E. Weatherford, #401
Fort Worth, TX 76196
Phone: (817) 884-2634
Email: rberndt@tarrantcounty.com

Section III. 5 – Construction Site Storm Water Runoff Control MCM

To the extent allowable under State law, the County will develop and implement a modified construction inspection program in the urbanized area of unincorporated Tarrant County. Since Texas counties do not have the rule/ordinance making authority that cities have, the County cannot enforce a program to reduce pollutants in storm water runoff from construction sites. The County will participate in this MCM by providing information about the TCEQ requirements to small construction site (1 – 4.99 acres) operators, conducting voluntary inspections and maintaining a file of Notices of Intent (NOI) for operators to be covered under the TCEQ General Storm Water Permit for small construction sites. This file will be readily accessible to TCEQ staff. Any required enforcement will be conducted by TCEQ.

(a) Activity, Measurable Goal and Date – **NOI File for Construction**

Since TCEQ requires NOIs from the construction site operators to be submitted directly to MS4s, the County will set up a file for this material prior to actually starting its construction MCM activities. This file will be divided into two sections: urbanized area NOIs and non-urbanized area NOIs. Urbanized areas will be determined by using the TCEQ website http://gis.tnrcc.state.tx.us/website/irwwp0/viewer.htm . In year three of the permit this file will be used by Country staff to conduct voluntary inspections. TCEQ may access this file at any time after it is established to obtain information about small construction sites in unincorporated Tarrant County, since they do not require that the NOI to be sent to TCEQ offices. The file will be operational by

_____.

(b) Activity, Measurable Goal and Date – **Public Submittal of Information**

Prior to implementing a voluntary construction inspection and enforcement referral program, the County will address public submittals of information (phone calls, etc.) regarding storm water quality issues associated with small construction sites. The County will receive information and evaluate an appropriate response. The response may include a voluntary construction site visit to observe conditions and resolve issues, a direct referral to TCEQ, periodic site surveys or other response to address public submittal of information. Records will be maintained.

Procedures for receipt and consideration of information submitted by the public will be initiated by [redacted].

(c) Activity, Measurable Goal and Date – **Site Plan Review**
The site plan review requirement will be evaluated to determine if State law allows for county site plan reviews "which incorporate consideration of potential water quality impacts". If so, then an appropriate activity will be devised and implemented by the end of permit year three (12/1/05). If there is not State authorization for counties to consider storm water quality impacts, then this activity will not be addressed. Evaluation of the County's authority to address the site plan review requirement will be completed by [redacted].

(d) Activity, Measurable Goal and Date – **Site Inspection and Enforcement**
The County will begin conducting voluntary small construction site inspections in urbanized areas of unincorporated Tarrant County, unless there is a determination by County legal staff that counties do not have the authority to conduct these types of inspections. If implemented, at least 25% of sites in the urbanized areas of unincorporated Tarrant County will be inspected. Site operators will be checked for NOI submittal, the presence of a functional Storm Water Pollution Prevention Plan (SW3P) and general compliance with TCEQ requirements. If, after initial inspections, there are significant violations which have not been corrected, then the TCEQ will be notified that the County is discontinuing its voluntary inspections at the site. Also, if entrance to a site or a request to review records is denied, then the County will notify TCEQ that it will not be performing inspections at the site. Barring any legal authority issues, the County will begin its voluntary small construction site inspections by [redacted].

Staff contact:
Robert Berndt
Tarrant County Transportation Services
100 E. Weatherford, # 401
Fort Worth, TX 76196
Phone: (817) 884-2634
Email: rberndt@tarrantcounty.com

Section III. 6 – Post Construction Storm Water Management in New Development and Redevelopment MCM

The intent of this MCM is to minimize storm water pollutants associated with new growth and development. The goal of this MCM is to use a variety of techniques to lessen the impacts of runoff pollutants after a new development (or redevelopment) has been built. This may be accomplished by encouraging/requiring the builder/developer, and possibly the resident, to use methods that can improve storm water quality runoff. Examples of these types of methods may include: slowing down or detaining storm water runoff by building ponds or using grassy berms or swales to allow storm water a greater opportunity to be absorbed into the soil; using less impervious material, such as concrete, which could be accomplished by not using as much concrete drainage channels or

underground storm drain systems; allowing narrower streets, sidewalks, etc; require grassy buffer zones beside creeks and other water bodies; promote landscaping with native and adapted plants that require less pesticide and fertilizer use; etc.

To the extent allowable under State law, the County will develop and implement a modified program to address storm water runoff from new development and redevelopment projects that disturb 1 or more acres. Since Texas counties do not have the rule/ordinance making authority that cities have, the County cannot enforce a program to reduce storm water pollutants in new developments or redevelopments. Tarrant County already promotes a significant BMP by allowing developers, home builders and residents in unincorporated areas to install open, grassy storm drainage ditches next to streets.

(a) Activity, Measurable Goal and Date – **Allow Pervious Drainage Systems**
Instead of requiring impervious concrete curb and gutter systems, Tarrant County will generally allow developers, home builders and residents in unincorporated areas to use open, unlined storm drainage ditches next to streets. This is an example of a policy that is both cost effective to the construction community and environmentally effect for the County's storm water permit. Specific legal agreements with some adjacent cities may supercede this policy, but overall the policy will continue to be allowed. This activity is currently in effect and will remain in effect during the permit term (12/02 – 12/07).

(b) Activity, Measurable Goal and Date – **Texas SmartScape**
Tarrant County will continue to support *Texas SmartScape* activities both in the County and in the North Texas region. New home owners and others will be encouraged to use native and adapted plant landscaping by providing CDs, promotional bookmarks and providing links (from either the Tarrant County's main website or the Tarrant County Public Health Department's webpage) to www.txsmartscape.com which will be maintained by NCTCOG. The CDs, bookmarks and the NCTCOG website activities are detailed in Tarrant County's Public Education and Outreach MCM [Section III.1(a) and (b)]. At least 2000 CDs will be (already have been) distributed by 4/1/03. At least 1000 bookmarks will be distributed by 12/1/03.

(c) Activity, Measurable Goal and Date – **New County Facilities**
New County facilities will be encouraged to plant *Texas SmartScape* landscapes, which require less pesticides and fertilizers to thrive. The new Tarrant County Public Health Department, which is currently under construction, will plant and maintain a *Texas SmartScape*. Storm water staff will cooperate with Tarrant County Cooperative Extension staff to promote the use of native and adapted plants in landscaping. A list of County facilities that use *Texas Smartscape* will be maintained during the permit term. This activity will be initiated by 7/30/03.

(d) Activity, Measurable Goal and Date – ***iSWM* (integrated Storm Water Management)** Tarrant County will participate in a regional initiative that will link storm water quantity (flood control) and storm water quality (storm water permits). A considerable amount of time and money (approximately $480,000)

will be spent by 56 local governments in North Central Texas to produce an innovative product, *iSWM (*formally *Comprehensive Drainage Criteria and Design* Manual). Tarrant County staff will evaluate the deliverables from this project and determine to what extent it will be applicable to the County's SWMP. If elements are appropriate, the selected activities will be implanted during permit year 4, no later than 12/1/06.

Staff contacts:
This section will be the responsibility of both Tarrant County employees, Gene Rattan and Robert Berndt, who are involved in developing and implementing elements of the SWMP. See previous sections for contact information.

Section III. 7 – Authorization for Municipal (County) Construction Activities Optional MCM

This is an optional MCM that Tarrant County is electing to use. Instead of Tarrant County applying for multiple construction permits under the TPDES general permit TXR 150000, the County will be covered under its storm water general permit TXR 040000. Additionally, contractors working with the County are not required to obtain separate permits as long as the County meets the status of "construction site operator" and remains compliant with the conditions of general permit TXR 150000.

(a) Activity, Measurable Goal and Date – **Conducting construction activities and consideration of local conditions (soil, weather, etc)**
Tarrant County's construction activities will generally be conducted following the local guidelines listed in the most current edition of "Storm Water Quality Best Management Practices for Construction Activities" prepared by the North Central Texas Council of Governments. The manual addresses both EPA and TCEQ requirements for local construction BMPs. The BMP Manual was published 1993, revised in 1999 and is currently being updated for phase 2 permittees. The updated BMP Manual should be available by July 1, 2003. This is activity is currently in place and will continue throughout the permit term.

(b) Activity, Measurable Goal and Date – **Area of coverage**
Tarrant County's construction activities will always be within the county's corporate boundary. The County performs construction projects, primarily road building, in the unincorporated county and within municipal boundaries of some cities. The county performs maintenance and/or construction projects for cities within the county after signing interlocal agreements to provide manpower, equipment and/or materials. This activity is currently in place and will continue throughout the permit term.

(c) Activity, Measurable Goal and Date – **Determining site operator's status**
The vast majority of Tarrant County construction projects are performed and

supervised by County personnel. A written procedure will be developed to maintain oversight over contractor activities or to ensure the contractor receives separate authorization to discharge storm water if county personnel are not performing the actual construction work. This activity will be implemented by 12/1/05.

(d) Activity, Measurable Goal and Date – **Developing a SWPPP for each site** Tarrant County will follow the SWPPP development guidelines listed in the most current edition of "Storm Water Quality Best Management Practices for Construction Activities" prepared by the North Central Texas Council of Governments. The guide contains specific details and examples of how a SWPPP shall be developed, in accordance with Part VII E of the TCEQ general permit TXR150000. The six elements addressed in developing each SWPPP are: (1) developing a SWPPP according to the general permit that covers the entire site and implementing the plan prior to commencing construction activities; (2) posting a signed copy of the notice, contained in Attachment 1 of the general permit, in a location at the construction site where it is readily available for viewing prior to commencing construction activities and maintaining the notice in that location until completion of the construction activity and final stabilization of the site; (3) implementing the SWPPP prior to beginning construction activities; (4) ensuring the project specifications allow or provide that adequate BMPs may be developed and modified as necessary to meet the requirements of the general permit and the SWPPP; (5) ensuring all contractors are aware of the SWPPP requirements, are aware that County staff are responsible for the day-to-day operations of the SWPPP, and who to contact concerning SWPPP requirements; and (6) ensuring that the SWPPP identifies the County staff who is responsible for implementing control measures described in the plan. This activity is currently in place and will continue throughout the permit term.

Staff contact:
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SECTION IV – RECORDKEEPING and REPORTING

Section IV. 1 – Recordkeeping
Tarrant County will maintain all records, a copy of the TPDES general permit and all data used to complete the application (NOI) for this permit, for a period of at least three years, or for the term of this permit, whichever is longer. A current/updated copy of the Storm Water Management Program (SWMP) and a copy of the permit language/requirements will be maintained at both the Tarrant County Public Health

Department and the Tarrant County Transportation Services Department. See the above SWMP for both site locations.

Tarrant County will make the records, including the NOI and SWMP available to the public, if requested to do so in writing. The SWMP will be available within two working days following the request from the public. Other records will be provided within 10 working days, unless the request requires an unusual amount of time or effort to assemble. In which case, Texas law regarding the Public Information Act will be followed. Reasonable charges, in accordance with Texas law, may be levied by the County for researching and preparing any requested materials.

Section IV. 2 – Annual Report

Tarrant County will submit a concise annual report to the Executive Director of TCEQ by March 31 (covering the previous permit year's activities ending on December 31st). This will allow a maximum of 90 days to prepare and submit the annual report. The annual report will address the requirements listed in the TPDES Phase 2 MS-4 general permit rules. The County will also maintain copies of annual reports at both the Tarrant County Public Health Department and the Tarrant County Transportation Services Department. See the above SWMP for both site locations.

NPDES STORM WATER PHASE II PROGRAM

City of Sherman, Texas
Storm Water Management Program

Cary Wacker
3-25-03

March 6, 2003
Prepared by City of Sherman Public Services Department

Printed on recycled paper

Table of Contents

Storm Water Phase II Program
Texas Pollution Discharge Elimination System (TPDES)
City of Sherman, Texas, Storm Water Management Program

I. Introduction

Polluted storm water runoff is often transported to municipal separate storm sewer systems (MS4s) and ultimately discharged in local rivers and streams without treatment. The Environmental Protection Agency's National Pollutant Discharge Elimination System (NPDES) Storm Water Program is intended to improve the Nation's waterways by reducing the quantity of pollutants that storm water picks up and carries into storm sewer systems during storm events. Under the NPDES program, the Storm Water Phase II Rule extends coverage to small MS4s in "urbanized areas" as designated by the U.S. Census Bureau. MS4 operators are required to design storm water management programs to:

- Reduce the discharge of pollutants to the "maximum extent practicable" (MEP);
- Protect water quality; and
- Satisfy the appropriate water quality requirements of the Clean Water Act.

II. Program Overview

In Texas, the authority to enforce the storm water program has been delegated to the Texas Commission on Environmental Quality (TCEQ). The State has issued General Permit No. TXR040000 to allow small MS4s to discharge directly to the surface waters of the state in accordance to monitoring requirements and other conditions set forth in the permit. The City of Sherman, which must obtain permit coverage under the Phase II Rule, is submitting a Notice of Intent (NOI) to comply with the conditions of the general permit, and must develop and submit a Storm Water Management Program (SWMP) to manage eligible discharges that reach the Waters of the United States.

The SWMP must be developed to prevent pollution in storm water to the maximum extent practicable and must prohibit illicit discharges into the system. The City of Sherman must develop a menu of Best Management Practices (BMPs) that are specific actions to be implemented during the five-year permit period. These BMPs must follow a prescribed list of six Minimum Control Measures (and an optional seventh) that, when implemented, will significantly reduce pollutants discharged into receiving waterbodies.

Those Minimum Control Measures (MCMs) are:

❶ *Public Education and Outreach*
Distributing education materials and performing outreach to inform citizens about the impacts polluted storm water runoff discharges can have on water quality.

❷ *Public Participation/Involvement*
Providing opportunities for citizens to participate in program development and implementation, including effectively publicizing public hearings and/or encouraging citizen representatives on a storm water management panel.

❸ *Illicit Discharge Detection and Elimination*
Developing and implementing a plan to detect and eliminate illicit discharges to the storm sewer system (includes developing a system map and informing the community about hazards associated with illegal discharges and improper disposal of waste).

❹ *Pollution Prevention/Good Housekeeping for Municipal Operations*
Developing and implementing a program with the goal of preventing or reducing pollutant runoff from municipal operations. The program must include municipal staff training on pollution prevention measures and techniques.
❺ *Construction Site Storm Water Runoff Control*
Developing, implementing, and enforcing an erosion and sediment control program for construction activities that disturb one or more acres of land.
❻ *Post-Construction Storm Water Management in New Development and Redevelopment*
Developing, implementing and enforcing a program to address discharges of post-construction storm water runoff from new development and redevelopment areas.
❼ *Authorization for Municipal Construction Activities*
The City may develop a seventh minimum control measure for authorization to discharge storm water runoff from each construction activity performed by the City that results in a land disturbance of one or more acres of land, if this MCM is included within the SWMP that is initially submitted with the NOI.

The City of Sherman must evaluate the effectiveness of its chosen BMPs annually to determine whether they are reducing the discharge of pollutants from the MS4 systems to the maximum extent practicable. The City also must assess the progress in achieving the program's measurable goals, as set forth in the Storm Water Management Plan.

III. Background on Sherman, Texas

The City of Sherman is a community of 36,000, and is included in a designated Urbanized Area by the U.S. Census Bureau. The City must comply with Phase II Storm Water Rules for regulation of discharges from a regulated MS4.

The natural hydrology of the region is described as follows in the City's 1988 Comprehensive Plan, prepared by Schrickel, Rollins and Associates of Arlington, Texas:

> The present city area extends across the Choctaw, Sand, and Post Oak Creek drainage system from a series of drainageways that are tributaries of Iron Ore Creek located north of Sherman. Iron Ore Creek is a northern tributary of the Choctaw Creek system. Calf Creek, which flows generally eastward to Choctaw Creek, also drains the northeast portions of the study area. The entire area is part of the Red River drainage system.
>
> Sherman's creeks are divided by a system of ridges that delineate the land area that drains into each creek or drainageway. The ridges and creeks are of major importance in storm water drainage during periods of heavy runoff and as routes for the primary gravity sewer mains making up the wastewater system.

Sherman's unique hydrology has been considered in developing this Storm Water Management Program. In preparing this Program, the City of Sherman Public Services Department has conducted meetings with several departments within the City, including Engineering & Utility Services, Development Services, and Community Services & Maintenance Services. The Program defines a menu of best management practices (BMPs) to address the pollutants identified as most prevalent in the watershed served by the MS4. This list of pollutants was developed from observation and from review of records of violations and/or complaints concerning water quality. Those pollutants are:

- Floatables [litter, yard debris]
- Oils & Grease [hydrocarbons from parking lots, grease from food service operations]

Input from Stakeholders

- Pollutants from wastewater [Sanitary Sewer Overflows]
- Household hazardous wastes [paint, automotive chemicals, lawn products]
- Suspended solids [sediment]

The Plan has been made available for public comment prior to submittal to the State of Texas by the specified deadline for the Phase II Storm Water Program. The public comment period was February 3-28, 2003.

IV. Storm Water Management Program Minimum Control Measures

1.0 Public Education and Outreach

This Minimum Control Measure will target various stakeholder groups in the community by providing information about the City's pollution problems through educational materials and use of local media. The goal of each activity is to inform the public - citizens and businesses - about issues of environmental stewardship related to storm water and to encourage behavior to eliminate or clean up pollution.

The educational materials will include, but not be limited to, the following:

- Brochures
- Alternative information sources (websites, promotional items, etc.)
- Storm Drain marking
- Television and radio messages
- Posters and billboards

The Public Education and Outreach program will use a variety of strategies to reach a diverse audience, including information presented in English and Spanish. School education programs will target children in grades K-12. Other audiences, such as college students, various categories of businesses, industry and special interest groups (recreation groups, etc.) will be reached through appropriate material with specific messages about the kinds of pollution prevention activity to be encouraged or required.

BMPs & Measurable Goals - Public Education and Outreach

Best Management Practices	Target Date	Measurable Goals
1.1 Organization and planning for outreach activities	**Year 1**	A. Establish yearly calendar for activities B. Send letters to selected organizations to invite participation in appropriate storm water education activities C. Appoint Citizen task force (See BMP 2.1)
	Year 2	D. Establish yearly calendar for activities E. Hold two volunteer educator training workshops to assist with school education F. Complete work with Citizen task force (see BMP 2.1)
	Year 3-4	G. Establish yearly calendar for activities H. Develop and/or promote volunteer training activities
	Year 5	I. Review Public Education/Outreach BMPs and revise for next permit term
1.2 Texas SmartScape™ Program implementation	**Year1**	A. Promote & distribute 500 Texas SmartScape™ CDs to citizens B. Participate in Texas SmartScape Month, working with area nurseries
	Year 2-3	C. Develop Texas SmartScape™ Awards program and promote Texas SmartScape™ to citizens through area nurseries
	Year 4-5	D. Continue to promote Texas SmartScape™ education
1.3 Improved landscape management	**Year 1**	A. Set up municipal compost demonstration site B. Provide two composting education workshops for citizens, using area Master Gardeners to present workshops
	Year 2	C. Provide composting and landscape management education for citizens at least once yearly D. Continue to work with Master Gardeners on joint education opportunities
	Year 3-5	E. Partner with Keep Sherman Beautiful on educational opportunities

		F. Continue to work with Master Gardeners on joint education opportunities
1.4 Litter and Illegal Dumping Education	**Year 1**	A. Implement multi-media Anti-Litter campaign "Don't Trash Texoma/Don't Trash Sherman" B. Establish anti-litter partnership with six businesses through "Don't Trash Sherman" C. Conduct annual Litter Index with Keep Sherman Beautiful volunteers and publish results D. Conduct a minimum of one Illegal Dumping Enforcement workshop and establish "No Dumping" sign program
	Year 2	E. Add four new partners to Anti-Litter business partnership program and maintain current partners in "Don't Trash Sherman" F. Conduct annual Litter Index with Keep Sherman Beautiful volunteers and publish results
	Year 3-5	G. Conduct at least one Illegal Dumping Enforcement workshop and continue "No Dumping" sign program H. Publish report on illegal dumping in region I. Review and revise Anti-Litter partnership program (Don't Trash Sherman) and continue as appropriate
1.5 Public education in pollution prevention	**Year 1**	A. Promote household and business recycling options through various media B. Develop and distribute household hazardous waste (HHW) disposal options brochure for public C. Distribute Keep Texas Beautiful's "Please Don't Feed the Storm Drain" literature in conjunction with storm drain marking (see BMP 2.3) D. Develop and air two cable TV programs on storm water management E. Develop Power Point presentation and schedule presentations to four civic organizations F. Provide Storm Water Program information on City website
	Year 2	G. Develop series of Pollution Prevention brochures for distribution to area businesses, targeting groups such as automobile businesses, service stations, and waste management companies H. Promote household and business recycling options through various media I. Distribute Keep Texas Beautiful's Please Don't Feed the Storm Drain" literature in conjunction with storm drain marking J. Provide educational material for at least one community event K. Develop and air one new cable TV program L. Provide Storm Water Program information on City website
	Year 3	M. Develop specialized brochure for pollution prevention education for public distribution N. Survey citizens to determine effectiveness of Storm Water education O. Distribute Keep Texas Beautiful's Please Don't Feed the Storm Drain" literature in conjunction with storm drain marking
	Year4-5	P. Continue brochure distribution to target audiences Q. Develop and air one new cable TV program R. Review public education literature and revise as needed
1.6 Business outreach in pollution prevention	**Year 1**	A. Develop brochure for restaurants on good housekeeping practices and distribute to 50% of restaurants B. Develop mailing list of businesses to be targeted for Pollution Prevention education
	Year 2-3	C. Identify and evaluate reported problems with storm water pollution from area businesses and prioritize list for educational efforts D. Develop informational letter and mail to 30% of businesses on target mailing list
	Year 4-5	E. Develop additional outreach materials for businesses identified as having storm water pollution problems F. Mail informational letter to additional 50% of identified target businesses
1.7 Construction site education in erosion control and pollution prevention	**Year 1**	A. Develop and distribute brochure for construction site management BMPs; to be given to all building permit applicants B. Provide educational workshops for developers and builders on storm water

		management at construction sites, including ordinance development process
	Year2-5	C. Continue to provide construction site BMP information to all building permit applicants D. Provide at least one additional educational workshop for developers and builders on storm water management
	Year 5	E. Conduct assessment of effectiveness of erosion control measures enacted during permit period
1.8 Student outreach activities	**Year 1**	A. Provide educational material for at least one community event B. Develop and present storm water education material in six local elementary schools C. Develop partnership program with Sherman Independent School District for educational opportunities for secondary students
	Year 2-3	D. Continue education activities in elementary schools and add junior high school education component E. Provide two opportunities per year for secondary student involvement in Storm Water Program
	Year 4-5	F. Continue education activities in public schools G. Provide at least one opportunity per year for secondary student involvement in Storm Water Program
1.9 Building media partnerships	**Year 1**	A. Cultivate media partnerships and provide Storm Water information packet to local media
	Year 2-5	B. Provide updated Storm Water information packet to local media and organize opportunities for news stories C. Schedule at least one television news show appearance per year D. Place at least one newspaper story per year on relevant storm water topics
1.10 Municipal employee Education	**Year 1-5**	See BMP 4.2

2.0 Public Participation/Involvement

The City of Sherman encourages public participation in the storm water management process, as citizen support is a critical component of building a successful program. To achieve results under this minimum control measure, a variety of opportunities for involvement are provided for citizens.

Strategies include public meetings to provide input in the decision-making process, community clean-up projects, training and recognition for specific groups and businesses in pollution prevention, and developing communication systems for reporting and monitoring water quality and environmental concerns. New programs such as an expanded household hazardous waste event will target pollutants and reduce improper disposal. Implementing volunteer monitoring programs such as Texas Watch will provide citizens of all ages the opportunity to experience the local environment first-hand.

BMPs & Measurable Goals – Public Participation/Involvement

Best Management Practices	Target Date	Measurable Goals
2.1 Planning & Communication	**Year 1**	A. Establish calendar for activities and provide bilingual public notice of planned meetings in various print media B. Appoint Citizen Storm Water Program Review Task Force C. Establish storm water hotline D. Develop process for input in land use planning review in conjunction with groups such as Citizens Comprehensive Plan Committee or Planning &

		Zoning Commission E. Hold a minimum of one public meeting on land use planning & post-construction runoff control
	Year 2	F. Establish calendar for activities and provide bilingual public notice of planned meetings in various print media G. Review of Storm Water Program completed by Citizen Task Force and final report presented to City Council H. Document the number of calls received by hotline I. Document the number of problems/incidents resolved as a result of hotline J. Review process for input in land use planning review
	Year 3-5	K. Establish calendar for activities and provide bilingual public notice of planned meetings in various print media L. Document the number of calls received by hotline M. Document the number of problems/incidents resolved as a result of hotline N. Hold a minimum of one public meeting on land use planning & post-construction runoff control
	Year 5	O. Review and revise Public Involvement BMPs and prepare plan for next permit term
2.2 Water Quality Monitoring	**Year 1**	A. Implement Texas Watch volunteer water quality monitoring program
	Year 2	B. Water sample report from Texas Watch published and problem areas prioritized C. Develop Adopt-a-Stream program D. Develop plan for watershed organization in conjunction with Texoma Council of Governments
	Year 3-5	E. Continue Texas Watch program and address a minimum of one identified problem each year with appropriate action F. Participate in establishing watershed organization and help with plan implementation
2.3 Storm Drain Marking	**Year 1**	A. Volunteer groups complete marking of 25% of storm drains with "No dumping-drains to creek" message
	Year 2	B. Volunteer groups complete marking of 50% of storm drains with "No dumping" message
	Year 3-5	C. Volunteers complete marking of storm drains to 80% total goal with "No dumping" message D. Inspect 25% of storm drains per year for repair of marking if needed
2.4 Household Hazardous Waste Collection	**Year 1**	A. Hold household hazardous waste (HHW) annual collection event in partnership with Texoma Council of Governments
	Year 2	B. Hold household hazardous waste annual collection event C. Establish additional disposal options for certain HHW material and promote to public through various media
	Year 3-5	D. Continue promoting HHW disposal options
2.5 Litter & Illegal Dumping Mitigation	**Year 1**	A. Increase number of volunteers doing litter collection through partnership with Adopt-a-Highway program
	Year 2	B. Establish illegal dumping reporting program in cooperation with area agencies and citizens
	Year 3	C. Document amount of illegal dumping cleaned up and number of violators prosecuted through illegal dumping reporting program
2.6 Student Education & Involvement	**Year 1**	A. Develop and implement plan for partnership with Austin College on student projects and internship program
	Year 2	B. Develop Outdoor Classroom in conjunction with Sherman Independent School District
	Year 3-5	C. Continue partnership programs with local colleges and schools
2.7 Volunteer Development	**Year 1**	A. Recruit volunteers to help with public education events such as Earth Day or Texas Recycles B. Document number of volunteers and hours spent on clean-up projects

	Year 2-5	C. Develop plan to expand volunteer recruitment for education, monitoring and clean-up activities D. Document number of volunteers and hours spent on clean-up projects
2.8 Business Outreach	**Year 1**	A. Develop Landscaper Certification program in conjunction with Parks Department and Grounds Maintenance Department
	Year 2	B. Maintain Landscaper Certification program C. Develop Restaurant training and certification for good housekeeping practices in conjunction with Laboratory Services Department
	Year 3-5	D. Maintain Landscaper Certification program E. Maintain Restaurant Certification program F. Develop automobile-related business Pollution Prevention training program and implement throughout community
2.9 Recycling Activities	**Year 1-5**	A. Continue City recycling program for residents and businesses B. Document the amount of materials recycled and publish result

3.0 Illicit Discharge Detection

Water quality problems previously identified in the City of Sherman include contamination by grease and oils from poor housekeeping practices at restaurants, and pollution from sanitary sewer overflows which sometimes are caused by grease slugs in the sanitary sewer system. The plan for this minimum control measure will address these two items as top priorities, as well as identify other pollution problems from illicit discharges.

The plan includes the following four components:

- procedures for locating priority areas likely to have illicit discharges
- procedures for tracing the source of an illicit discharge
- procedures for removing the source of the discharge
- procedures for program evaluation and assessment.

During the permit term, the City will develop an ordinance that prohibits illegal discharges to the storm sewer system. Procedures for sanctions will be included.

A Geographic Information System (GIS) is a major purchase to be considered by the City to map the location of all storm sewer outfalls and all the waters that receive storm water discharges. The City has already begun mapping inlets, catch basins, pipes, culverts and other storm water structures using a Global Positioning System (GPS) with sub-meter accuracy.

In addition, the City will develop procedures for visually screening outfalls during dry weather and conducting field tests for selected pollutants as part of the procedures for locating priority areas. The City will access historical sampling data to identify areas of the city that may have high pollutant levels. Community volunteers will be enlisted to further help identify water quality programs through the Texas Watch program (see Section II Public Involvement). During the course of the permit term, the City will develop procedures for field monitoring to measure progress in reducing pollutants that adversely affect water quality.

Illicit discharge education actions may include storm drain marking; a program to promote, publicize and facilitate public reporting of illicit connections or discharges; and distribution of outreach materials.

Local industrial facilities currently are required to submit copies of TPDES permit applications to the City for documentation of compliance with the Clean Water Act. Annual inspections of industry pretreatment programs, already conducted by the City's Laboratory personnel, will continue as currently conducted, and any problems identified will be addressed as appropriate.

BMPs & Measurable Goals – Illicit Discharge Detection

Best Management Practice	Target Date	Measurable Goals
3.1 Develop plan to detect and address illicit discharges	Year 1-5	A. Respond to public complaints concerning blockages in sewer lines and mains and document number of complaints taken and results of action taken B. Continue current plan of regular smoke testing, dye testing, video camera inspection and visual inspection for identification of illicit or faulty connections between sanitary sewer and MS4 C. Identify inflow and infiltration through ongoing routine inspection process as described in 3.1.B D. Identify residential and business connections to sanitary sewer system E. Document number of inspections conducted per item (B) F. Document number of inspections conducted per item (C) G. Perform dry weather inspections at minimum of 30% of outfalls per year to screen for pollution problems H. Provide field-based staff with water quality observation cards to be completed if dry weather flows, illegal dumping, sewage overflows, or unusual conditions are observed
	Year 2	I. Identify businesses with potential for illicit connections (automotive shops, restaurants, others) J. Establish inspection program for identified business sectors (see BMP 3.7)
	Year 3-5	K. Conduct routine inspections of identified businesses as established in 3.1.H (see BMP 3.7)
3.2 Reduction of Sanitary Sewer Overflows (SSOs)	Year 1-5	A. Continue current activities of routine inspection and treatment of sewer mains with history of grease or root problems B. Continue current activities to identify sewer main sections needing replacement through continual assessment of tracking daily work orders, routine cleaning and maintenance C. Inspect, repair and replace manholes on a routine basis D. Monitor for SSOs during rain events E. Coordinate activities with City departments to address specific problems, including roof drains identified by inspections
	Year 2-3	F. Budget for major sewer system upgrades or repairs (Capital Improvement Projects)
	Year 4-5	G. Continue to address SSOs in Capital Improvements Program
3.3 Development of ordinance governing illicit discharges and connections	Year 1	A. Research and review other community ordinances addressing illicit discharges and connections to the MS4 B. Involve Citizen Storm Water Program Review Task Force to identify priorities for review and enforcement through ordinance
	Year 2	C. Develop and adopt storm water discharge ordinance, including provisions for sanctions for illicit discharges
	Year 3-5	D. Enforce ordinance and review in Year 5 for effectiveness and appropriateness
3.4 Elimination of illicit connections	Year 1	A. Prioritize areas for commercial business inspection process
	Year 2	B. Establish inspection schedule and begin inspection process C. 10% of determined illicit sources disconnected
	Year 3-5	D. 50% of determined illicit sources disconnected
3.5 Illegal dumping control		See BMP 1.4.[Litter & Illegal Dumping Education] & BMP 2.5 [Litter & Illegal Dumping Mitigation]
3.6 Mapping of the MS4	Year 1	A. Continue current mapping project and complete to 20% of MS4, including outfalls, using GPS technology if budget permits.
	Year 2-3	B. Research options for GIS software and prepare budget C. Continue mapping project and complete up to 75% of MS4

	Year 4	D. Complete 100% mapping of MS4
	Year 5	E. Consider purchase of GIS system
3.7 Education of stakeholders	Year 1	A. See BMP 1.5 [Public Education in Pollution Prevention] and BMP 2.8 [Business Outreach] B. Develop storm water quality guidance materials specific to commercial activities identified as having impact on water quality in the community (utilize list developed in BMP 3.1.H)
3.7 Management of industrial and business storm water connections	Year 1-2	A. Continue requiring TPDES-permitted industries to submit a copy of their discharge monitoring reports to the City B. Include storm water inspection with industrial pre-treatment program inspections already conducted by the City's Laboratory Services department C. Develop an inspection protocol for non-permitted industries that have potential for storm water impact (utilize list developed in BMP 3.1.H)
	Year 3-5	D. Locate industrial discharges to the municipal storm sewer system or local waters using GPS equipment, storm drain monitoring, visual observation, and pipeline schematics and include information in GIS database as it is developed E. Document the testing and eliminating of industrial/business illicit connections, including recording the location of the connection, the date of testing, and the method used to remove the connection. F. Include storm water inspection with industrial pre-treatment program inspections already conducted by the City's Laboratory Services department
3.8 Water quality monitoring		See BMP 2.2 [Water Quality Monitoring]

4.0 Pollution Prevention & Good Housekeeping

The goal of this minimum control measure is to reduce pollutant runoff from municipal operations. Accordingly, the City of Sherman will develop an integrated environmental management strategy that addresses issues of pollution prevention, taking into account the range of effectiveness associated with each single practice, the costs of each practice, and the resulting overall cost and effectiveness.

Environmental management strategies should be based on a national model for Environmental Management Systems (EMS) such as the EPA's National Environmental Performance Track. During the permit term, the City will strive to:

- Develop a written environmental policy
- Develop a strategic plan for reducing environmental impact
- Implement procedures to achieve goals of the EMS
- Evaluate performance and take corrective action in areas of non-conformance
- Adopt a commitment to continued improvement
- Provide information to the public regarding environmental performance

In setting up an Environmental Management System, the City will focus efforts on environmental improvement in these areas of operation:

- Maintenance activities, including City vehicle and equipment maintenance, building maintenance, and municipal structures such as streets and storm drainage systems
- Grounds Maintenance/Landscape Practices on municipal property, using strategies that encourage pesticide and fertilizer reduction, water conservation, and soil conservation
- Source Reduction/Waste Management strategies used in municipal operations, including recycling and proper disposal of materials, good housekeeping at waste transfer stations,

disposal of sediments and floatables cleaned from structures, and disposal of street sweeping trash

- Municipal employee training, focusing first on employees with responsibilities in maintenance areas, then expanding to include other employees who may communicate with the public
- Communication with the public, including development of a strategy to share BMPs and promote pollution prevention activities with both other government entities and the private business sector

Note: attachments to be submitted for this section:

- List of all municipal operations subject to O&M, training, permit conditions
- Copy of No Exposure Certification for Sherman Municipal Airport
- Copy of training materials

BMPs & Measurable Goals – Pollution Prevention & Good Housekeeping

Best Management Practice	Target Date	Measurable Goals
4.1 Planning for Pollution Prevention	**Year 1**	A. Form internal committee to draft Environmental Management System (EMS) Plan B. Complete first draft of EMS Plan
	Year 2	C. Hold regular meetings of internal committee to continue work on Environmental Management System Plan D. Complete final draft of EMS Plan E. Provide final report on EMS Plan to elected officials
	Year 3-5	F. Hold regular meetings of EMS Committee and involve City employees as specified by plan G. Provide annual report on EMS Plan to elected officials/public
4.2 Training	**Year 1**	A. Provide training in spill prevention and clean-up to all employees in cost centers which have a preventative and/or repair maintenance program for vehicles, equipment or machinery B. Provide pollution prevention and waste management training for City employees in all cost centers which handle potential pollutants C. Have appropriate City staff participate in at least two cooperative training opportunities such as North Central Texas Council of Governments training D. Document hours of employee training and materials used E. Provide annual report to Sherman elected officials regarding pollution prevention program
	Year 2-5	F. Provide refresher training for current employees and basic training for new employees in spill prevention and clean-up in cost centers which have a preventative and/or repair maintenance program for vehicles, equipment or machinery G. Provide refresher training or basic training as appropriate in pollution prevention and waste management for City employees in all cost centers which handle potential pollutants H. Have appropriate City staff participate in at least one cooperative training opportunity such as North Central Texas Council of Governments training I. Document hours of employee training and materials used J. Provide annual report to Sherman elected officials regarding pollution prevention program
	Year 5	K. Review all aspects of training program and revise as needed for permit renewal

4.3 Material Handling/Spill Response	**Year 1**	A. Implement City spill prevention plan and prepare notebooks with appropriate documentation for each cost center B. Identify individuals responsible for implementing the plan C. Specify how to notify appropriate authorities in case of spills D. Perform annual inventory of municipal facilities at risk for spills E. Inspect containers for signs of leaks or corrosion annually and replace as needed or budget for replacement F. Track preventive maintenance procedures performed on tanks, valves, pumps, pipes and other equipment G. Develop inventory of materials stored at each facility, including lawn chemicals, cleaning chemicals, automotive products, street repair materials, solid waste, and other materials H. Identify locations needing spill response kits I. Develop list of spill response materials to be purchased and plan for budgeting purchase of materials J. Document number of spills at municipal facilities
	Year 2-5	K. Review and update spill prevention plan notebooks, including lists of individuals responsible for implementing the plan and list of authorities for notification in spills L. Perform annual inventory of municipal facilities at risk for spills M. Inspect containers for signs of leaks or corrosion annually and replace as needed or budget for replacement N. Track preventive maintenance procedures performed on tanks, valves, pumps, pipes and other equipment O. Perform annual inventory of materials stored at each facility, including lawn chemicals, cleaning chemicals, automotive products, street repair materials, solid waste, and other materials P. Begin purchase of spill response kits as budget permits Q. Document number of spills at municipal facilities and review procedures in place to prevent spills R. Reduce number of stored chemicals at each facility
	Year 5	S. Complete purchase of any remaining spill response kits needed
4.4 Vehicle & Equipment Maintenance *Any City of Sherman maintenance facility implementing a preventative and/or repair maintenance program for vehicles, equipment or machinery shall implement these steps*	**Year 1**	A. Conduct routine inspections of work areas and maintain orderly vehicle/equipment areas B. Conduct routine inspections of all fleet vehicles to monitor for fluid leaks C. Continue to recycle used oil, antifreeze & add other fluids if feasible D. Provide drip pans or use absorbent materials for all vehicle maintenance activities E. Develop program to reclaim, recycle or dispose of obsolete equipment, vehicles, parts and storage containers stored outdoors F. Designate approved wash areas for vehicles/equipment/machinery and provide appropriate containment of wash water if needed G. Initiate routine cleaning and maintenance of vehicle service areas H. Develop checklist of proper storage procedures for all materials, including used rags, used batteries, etc.
	Year 2-3	I. Conduct routine inspections of work areas quarterly and maintain orderly storage of lubricants, fluids, etc. in vehicle/equipment areas J. Conduct routine inspections of all fleet vehicles to monitor for fluid leaks K. Continue to recycle used oil, antifreeze & add other fluids if feasible L. Provide drip pans or use absorbent materials for all vehicle maintenance activities M. Implement program to reclaim, recycle or dispose of obsolete equipment, vehicles, parts and storage containers stored outdoors and reduce inventory by 25% N. Conduct routines inspections of approved wash areas for vehicles/equipment/machinery O. Provide routine cleaning and maintenance of vehicle service areas P. Track proper storage procedures for all materials, including used rags, used batteries, etc.

	Year 4-5	Q. Continue items I, J, K, L listed above R. Continue program to reclaim, recycle or dispose of obsolete equipment, vehicles, parts and storage containers stored outdoors and reduce inventory by 75% from initial inventory S. Inspect, on monthly basis, approved wash areas for vehicles/equipment/machinery T. Provide routine cleaning and maintenance of vehicle service areas U. Prepare plan and budget for upgrade of vehicle wash area at Street Department
4.5 Maintenance of buildings and structures	**Year 1**	A. Conduct annual survey of all City properties to identify existing or potential pollution problems B. Develop list of alternate, less toxic chemicals such as biodegradable soaps, cleaners and solvents for use in maintenance activities C. Develop protocol for handling and disposal of paint, painting equipment, and clean-up from painting D. Develop protocol for litter removal from all municipal facilities including parking areas E. Install containment systems for storage of street maintenance oils F. Continue existing schedule of street sweeping and inlet maintenance G. Document the number of miles of streets cleaned and the amount of trash removed from the streets H. List the number of outfalls cleaned and the amount of trash removed I. Eliminate chlorinated water discharges from municipal swimming pools
	Year 2-5	J. Conduct annual survey of all City properties to identify existing or potential pollution problems K. Update site maps as needed for all City facilities showing storm drain inlets, pipes and outfalls, and site drainage L. Continue to use alternate, less toxic chemicals such as biodegradable soaps, cleaners and solvents for use in maintenance activities M. Track handling and disposal of paint, painting equipment, and clean-up from painting as developed in year 1 of plan N. Track litter removal from all municipal facilities including parking areas O. Regularly inspect containment systems for storage of street maintenance oils P. Continue existing schedule of street sweeping and inlet maintenance Q. Document the number of miles of streets cleaned and the amount of trash removed from the streets R. List the number of outfalls cleaned and the amount of trash removed S. Identify storm water structures needing repair/replacement and prioritize for budget T. Continue repair/replacement of previously identified outfalls as budget permits
4.6 Grounds Maintenance and Landscape Practices	**Year 1**	A. Develop a pesticide and herbicide plan for each landscape the City maintains, using Integrated Pest Management principles and Texas SmartScape principles for landscape management B. Provide training for City Park & Recreation and Grounds Maintenance staff on Texas SmartScape program C. Introduce soil erosion control techniques for City landscaping, grounds maintenance and construction D. Develop long-term plan to utilize native and adapted vegetation to reduce water, fertilizer and pesticide needs E. Identify and prioritize areas to reduce mowing by planting wildflowers, native grasses or groundcover F. Initiate a municipal composting pilot to produce mulch/compost for City properties
	Year 2-3	G. Utilize pesticide and herbicide plan for each landscape the City maintains, using Integrated Pest Management principles and Texas SmartScape principles for landscape management H. Provide training and review as needed for City Park & Recreation and Grounds Maintenance staff on Texas SmartScape program I. Utilize soil erosion control techniques for City landscaping, grounds maintenance and construction J. Continue municipal composting program to produce mulch/compost for City

		properties K. Implement long-term plan to utilize native and adapted vegetation to reduce water, fertilizer and pesticide needs L. Implement plan to reduce mowing by planting wildflowers, native grasses or groundcover
	Year 4-5	M. Continue items F, G, H, I as listed above N. Continue using long-term plan to utilize native and adapted vegetation to reduce water, fertilizer and pesticide needs O. Continue plan to reduce mowing by planting wildflowers, native grasses or groundcover
4.7 Solid Waste Management *Improve waste management practices for all City departments*	**Year 1**	A. Prepare report on recycling activities at City facilities, including parks B. Initiate program to monitor dumpsters for open lids, spilled trash and debris, and pollutant discharge C. Investigate alternatives for disposal of street sweeping debris D. Properly contain and dispose of clean-up materials (rags, absorbents, etc) E. Investigate options for upgrading storm water collection system at Transfer Station F. Participate in regional Household Hazardous Waste events sponsored by Texoma Council of Governments G. Track the number of gallons of used oil collected from municipal operations. H. Track the volume of other automotive wastes collected for recycling from municipal operations
	Year 2-5	I. Prepare annual report on recycling activities at City facilities, including parks J. Track problems with dumpsters for open lids, spilled trash and debris, and pollutant discharge K. Make changes as needed of disposal methods of street sweeping debris L. Properly contain and dispose of clean-up materials (rags, absorbents, etc) M. Budget for upgrading storm water collection system at Transfer Station N. Participate in regional Household Hazardous Waste events sponsored by Texoma Council of Governments O. Track the number of gallons of used oil collected from municipal operations. P. Track the volume of other automotive wastes collected for recycling from municipal operations
	Year 5	Q. Upgrade storm water collection system at Solid WasteTransfer Station as budget permits
4.8 Flood Damage Reduction Activities	See BMP 6.6	

5.0 Construction Site Storm Water Runoff Control

Construction sites can be a significant source of sediment for MS4s, especially when installation and maintenance of erosion and sediment controls are not required or adequately enforced. Experience has shown that construction sites and associated activities can deposit a significant amount of silt, sediments and debris in a short time, causing localized flooding, property damage and natural resource harm, and potentially leading to costly clean-ups and repairs to the storm sewer system, local waterways and private property.

During the first year of the permit term, the City will adopt an ordinance to reduce construction site pollutant runoff. The ordinance will require that land disturbance of one or more acres is regulated, including lots that are part of a larger common plan of development or sale. The City will work to educate contractors and require implementation of erosion and sediment control best management practices, and control of waste such as discarded building materials, concrete truck washout water,

chemicals, litter, and sanitary waste at the construction site that may cause adverse impacts to water quality.

The City will achieve these goals through development of procedures for projects that require formal site plan review at construction sites, procedures to receive and respond to information submitted by the public, and routine site inspection and enforcement of control measures.

Additionally, during the permit term the City will examine options to reduce impervious cover and investigate smart growth initiatives to encourage preservation of green space and natural drainage.

BMPs & Measurable Goals – Construction Site Storm Water Runoff Control

Best Management Practice	Target Date	Measurable Goals
5.1 Ordinance and policy review & development	Year 1	A. Prepare draft of Construction Site Erosion Control ordinance B. Prepare draft of Construction Site Waste Control ordinance C. Provide for receipt of public comment regarding new ordinances D. Adopt Construction Site Erosion Control ordinance E. Adopt Construction Site Waste Control ordinance F. Conduct staff review of North Central Texas Council of Governments Storm Water Quality BMP Manual for use as guidance document for erosion control measures
	Year 2-4	G. Conduct development activities according to ordinances
	Year 5	H. Review effectiveness and appropriateness of ordinances
5.2 Requirements for construction site contractors	Year 1	A. Implement Erosion & Sediment Control (ESC) training materials for construction site operators (see BMP 1.7.A) B. Provide ESC training for contractors (see BMP 1.7.B) C. Document the number of contractors that have gone through ESC training
	Year 2-5	D. Continue to provide materials and training for construction site operators
	Year 5	E. Review effectiveness of training and materials, and recommend changes as appropriate
5.3 Site Inspection & enforcement	Year 1	A. Designate City personnel to perform site inspections B. Train designated City employees in construction site inspection C. Establish and implement procedures for site inspections, including frequency, priorities based on probable impact of construction activities, and procedures for notification of violations D. Document number of inspections performed E. Document number of stop work orders given
	Year 2-5	F. Document number of inspections performed G. Document number of stop work orders given H. Perform biannual review of Inspection reports to identify problem areas and address problems through improved inspections schedules, communication and other measures as appropriate I. Provide refresher training as needed for City inspectors
	Year 5	J. Review inspection and enforcement program and revise as appropriate
5.4 Receipt of information from the Public	Year 1	A. Implement procedures for information to be submitted by public
	Year 2-5	B. Document number of complaints received and number of problems addressed
5.5 Site Plan Review	Year 1	A. No activity for this BMP in Year 1
	Year 2	B. Implement a Development Review process to review applicable plans to ensure compliance with erosion and sediment control process C. Provide an information packet outlining storm water requirements to developers D. Require notification of construction activity prior to commencement of activity
	Year 3-5	E. Follow procedures set forth in Development Review Process

		F. Continue to provide information packet to developers
5.6 Improvement of water quality and preservation of vegetative cover in the watershed	Year 1	A. No activity for this BMP in Year 1
	Year 2	B. Measure water clarity in local water bodies affected by new development and redevelopment (Coordinate with TexasWatch volunteer monitoring program) C. Perform a tree survey in watershed D. Document the amount of naturally vegetated cover altered due to current year's construction activities
	Year 3-5	A. Perform comparative water studies to baseline year to measure change in water quality (see BMP 2.2) B. Consider development of tree ordinance C. Document annually the amount of naturally vegetated cover altered due to construction activity

6.0 Post Construction Storm Water Management in New Development and Redevelopment

The City of Sherman proposes to address this Minimum Control Measure with structural and non-structural BMPs. Many studies indicate that prior planning and design for the minimization of pollutants in post-construction storm water discharges is the most cost-effective approach to storm water quality management. BMPs chosen for the City's plan are appropriate for the local community, minimize water quality impacts, and attempt to maintain pre-development runoff conditions.

The City will seek to participate in locally-based watershed planning efforts which involve a diverse group of stakeholders including interested citizens. The planning process should:

- Identify the City's program goals (e.g., minimize water quality impacts resulting from post-construction runoff from new development and redevelopment)
- Identify implementation strategies (e.g., adopt a combination of structural and/or non-structural BMPs)
- Identify operation and maintenance policies and procedures, and enforcement procedures.

Examples of non-structural BMPs are preventative actions that involve management and source controls such as: policies and ordinances that provide requirements and standards to direct growth to identified areas, protect sensitive areas such as wetlands and riparian areas, maintain and/or increase open space (including a dedicated funding source for open space acquisition), provide buffers along sensitive water bodies, minimize impervious surfaces, and minimize disturbance of soils and vegetation; policies or ordinances that encourage infill development in higher density urban areas, and areas with existing infrastructure; education programs for developers and the public about project designs that minimize water quality impacts; and measures such as minimization of percent impervious area after development and minimization of directly connected impervious areas. These will be evaluated through a cooperative effort involving a diverse group of stakeholders and appropriate measures adopted by the end of the first permit period.

Structural BMPs include: storage practices such as wet ponds and extended-detention outlet structures; filtration practices such as grassed swales, sand filters and filter strips; reductions in street widths and use of porous pavements for parking areas; and infiltration practices such as infiltration basins and infiltration trenches. These also will be evaluated and appropriate measures adopted by the end of the first permit period.

Guidance provided by the EPA recommends assurance of appropriate implementation of the structural BMPs by considering some or all of the following: pre-construction review of BMP designs; inspections during construction to verify BMPs are built as designed; post-construction inspection and maintenance of BMPs; and penalty provisions for the noncompliance with design, construction or operation and maintenance. Storm water technologies are constantly being improved, and requirements should be responsive to these changes, developments or improvements in control technologies.

BMPs & Measurable Goals – Post Construction Storm Water Management

Best Management Practice	Target Date	Measurable Goals
6.1 Planning & Community Participation	Year 1	A. Include storm water discussion in meetings or activities of relevant City committees and boards so as to synchronize post-construction storm water management goals in new development requirements B. Involve Citizen Storm Water Program Review Task Force to identify goals and strategies for protecting open space and sensitive environmental areas
	Year 2	C. Participate with regional watershed organization activities (see BMP 2.2.D, F)
	Year 3-5	D. Conduct at least one meeting annually with each City department involved in development activities to review storm water policy effectiveness, and solicit developer comments
6.2 Ordinance and policy review & development	Year 1	A. Review City's current Developers Ordinance, Storm Drainage Design Manual, Floodplain Ordinance and other relevant documents for consistency with TPDES storm water requirements B. Develop draft criteria and standards for post-construction storm water management for all regulated entities
	Year 2	C. Establish a Storm Water Review Committee to review applicable plans to ensure compliance with post-construction storm water management requirements D. Prepare procedures for Storm Water Review Committee
	Year 3	E. Prepare and adopt ordinance requiring regulated development and redevelopment projects to comply with storm water management standards adopted by City
	Year 4-5	F. Review Storm Water Quality Manual for Construction BMPs and update to include new storm water technologies
6.3 Common Drainage Criteria and Design (CDCD) Manual Development and Implementation	Year 1-2	A. Participate financially in the development of the NCTCOG Common Drainage Criteria Design (CDCD) Manual
	Year 3	B. Review CDCD Manual for synchronization with current City ordinances
	Year 5	C. Adopt CDCD Manual for use in all construction regulated by City code
6.4 Minimize impervious surface	Year 1	A. Review options for reduction of impervious surface, including reducing street widths, allowing alternate paving material, reducing parking lot sizes
	Year 2	B. Adopt changes to Developers Ordinance to allow options to reduce impervious surface
	Year 3-5	C. Document amount of reduction of impervious surface
6.5 Preserve streams and floodplains	Year 1-2	A. Document the number of stream miles modified due to new construction or reconstruction
	Year 2-3	B. Conduct an Environmental Inventory of natural features within the city limits, including streams, wetlands, wooded areas, soils and geologic features
	Year 4-5	C. Enforce requirements described in ordinances, CDCD manual, and other documents to preserve streams, wetlands, riparian areas and floodplains D. Improve the percentage of stream miles preserved from inventory taken in years 1-2
6.6 Flood Damage Reduction Activities	Year 1	A. Use the new City Drainage Control Manual adopted December 2002 and require all new development to adhere to guidelines to the maximum extent practicable
	Year 2-5	B. Require all new development to adhere to guidelines in Sherman Drainage Control Manual to the maximum extent practicable
	Year 4-5	C. Begin inspection of all publicly owned storm water and floodplain management facilities and features annually and require inspections of all privately-maintained facilities

		D. In year 5, review Drainage Control Manual for any changes needed
6.7 Land use review	Year 1	No activity in this BMP in year 1
	Year 2-3	A. Participate with Comprehensive Planning Committee to coordinate storm water management goals in long-term land use planning
	Year 4-5	B. Consider adoption of ordinance to preserve open space, trees, or other identified in Environmental Inventory (BMP 5.5.B)
6.8 Education and communication of post-construction storm water management goals	Year 1-2	A. Promote Texas SmartScape™ goals (see BMP 1.2)
	Year 3	B. Develop and distribute brochure with guidelines for post-construction storm water management in new development or redevelopment
	Year 4-5	C. Continue to provide information to developers

7.0 Municipal Construction Site Permitting

The City of Sherman is including the optional seventh Minimum Control Measure to cover all eligible municipal construction operations under the state's general permit.

Construction activities will be conducted in accordance with appropriate Best Management Practices listed in the *Storm Water Quality Best Management Practices for Construction Activities Manual*, published by the North Central Texas Council of Governments and adopted by the Sherman City Council. BMPs for City activities will be selected according to how effectively they address conditions of weather, soils, and other site specific conditions. Information on these environmental parameters is quantified in the City of Sherman Comprehensive Drainage Study adopted by the City in December 2002.

Under this MCM, the City will ask for permit coverage for all municipal projects occurring within the Extra Territorial Jurisdiction of the City of Sherman.

On-site inspections for compliance with storm water regulations will be conducted on a routine schedule by a designated City staff member with knowledge of storm water rules. Written reports will be filed for each construction project. Documentation will be included in the City's annual report.

A template for a Storm Water Pollution Prevention Plan (SWP3) will be developed during Year One of the permit term. The template will be drafted through the collaborative effort of Engineering & Utility Services, Development, and Public Services staff. The resulting document also will serve as a model document for the City's use in implementing storm water rules under *Section IV Construction Site Runoff Control* of this SWMP.

Measurable Goals – Municipal Construction Site Permitting

Best Management Practice	Target Date	Measurable Goals
7.1 Development of Storm Water Pollution Prevention Plan	Year 1	A. Develop template for SWP3 B. Designate personnel to supervise municipal construction activities
	Year 2	C. Adopt SWP3 template and use for project management D. Monitor projects according to SWP3 plan
	Year 3-5	E. Modify template as needed to reflect current technologies F. Monitor projects according to SWP3 plan
7.2 Development of	Year 1	A. Develop project inspection form for documentation of compliance

inspection protocol		B. Monitor projects according to inspection protocol C. Document number of problems observed
	Year 2-5	D. Monitor projects according to inspection protocol E. Document number of problems observed at municipal construction sites F. Implement measures to correct violations of SWP3 plan
7.3 Training for municipal staff	Year 1	A. Send designated personnel to participate in regional training for storm water inspection school B. Provide training and checklists for engineering and other staff involved in municipal construction activities
	Year 2-5	C. Provide refresher training or new employee training as needed for designated inspection personnel
7.4 Recordkeeping for municipal construction activities	Year 1-5	A. Document number of municipal construction projects and submit written reports on each project Monitor projects according to SWP3 plan

Last Reviewed 3/24/2003

Rob Armstrong

CITY OF McKINNEY
DRAFT STORM WATER MANAGEMENT PLAN

1.0 EXECUTIVE SUMMARY

The City of McKinney has developed a storm water management plan (SWMP) as required for coverage under the Texas Pollutant Discharge Elimination System General Permit No. TXR04000. The SWMP includes a listing of Best Management Practices (BMP's) that will be implemented by the City in order to achieve the regulatory standard of reducing pollutants in the City's storm water to the "maximum extent practicable." Existing City of McKinney storm water programs and activities designed to protect the City's water quality will be supplemented with new BMP activities. Measurable goals and an implementation schedule were developed for each of the BMP's in the SWMP. The BMP's, measurable goals, implementation schedule, and final SWMP were developed with input from the City's Storm Water Committee, a public meeting, and review by the City Council. BMP's, measurable goals, and the implementation schedule were selected based upon their ability to meet specific permit requirements and to reduce pollutants in the City's storm water to the maximum extent practicable. They were also selected based upon a general assessment of BMP effectiveness, applicability to McKinney, and costs associated with implementation of the BMP's . Effectiveness of the selected BMP's, and success in achieving the selected measurable goals will be reviewed annually.

2.0 PLAN DEVELOPMENT PROCESS

2.1 Purpose and Scope

The City of McKinney (City) has developed a storm water management plan (SWMP) in accordance with Texas Pollutant Discharge Elimination System (TPDES) requirements for obtaining authorization for storm water discharges and certain non-storm water discharges. This SWMP has been developed in accordance with guidelines published by the Texas Commission on Environmental Quality (TCEQ) for coverage under TPDES General Permit TXR040000 (General Permit). The SWMP has been developed to facilitate the City's efforts in reducing storm water pollutants from the City's municipal separate storm sewer system to the maximum extent practicable as required by the TPDES General Permit.

The SWMP describes specific actions that will be taken over a five-year period to reduce pollutants and protect the City's storm water quality. The specific activities to be implemented are referred to as "Best Management Practices" (BMP's). Various BMP's have been developed for each of the six "Minimum Control Measures" (MCM's) required by the General Permit. The SWMP also sets measurable goals and provides a schedule for the implementation of the BMP's. Implementation of the selected BMP's is expected to result in reductions of pollutants discharged into McKinney's streams, ponds, and lakes.

2.2 BMP Selection

A storm water committee was formed to provide guidance in the selection of BMP's and the development of McKinney's SWMP. A listing of the members of the committee is included in Appendix A.

Various structural and non-structural BMP's will be implemented throughout the five-year permit term authorized under the General Permit. A two-step process was utilized to select the BMP's to be included in McKinney's SWMP.

Step One

The City of McKinney has historically implemented various storm water related BMP's intended specifically to protect the City's storm water quality. An important aspect of developing an effective, compliant, and cost efficient TPDES Phase II SWMP is to "take credit" for these on-going programs. Details of the City's existing storm water-related programs were collected, summarized, and categorized into one of the six MCM's required by the General Permit. Some of the City's existing programs meet specific General Permit requirements, while others contribute toward fulfilling the General Permit mandate of reducing pollutants to the maximum extent practicable.

Step Two

Additional BMP's were selected to supplement the City's existing programs and to fulfill the requirements of the General Permit. Alternative BMP's were evaluated for each of the six MCM's. The evaluation process involved developing general assessments of various alternative BMP's. Some of the alternative BMP's were developed and tailored to the specific needs of McKinney, while other alternative BMP's were developed from general BMP "menus" published by the North Central Texas Council of Governments (NCTCOG) and the Environmental Protection Agency. Alternative BMP's were generally assessed in relation to the following criteria:

- Does the BMP fulfill General Permit requirements?
- What is the perceived effectiveness of the BMP?
- Is the BMP appropriate for McKinney?
- What is the estimated cost of implementing the BMP?

2.3 Selection of Measurable Goals and Implementation Schedule

Specific measurable goals have been developed for each BMP selected for inclusion into the City's SWMP. In accordance with the General Permit requirements, measurable goals have been developed to provide a mechanism for measuring the success of the City's SWMP toward reaching the goal of protecting the City's water quality and reducing pollutants to the maximum extent practicable. As provided under the General Permit, the City may phase in the implementation of the SWMP over a five-year period. Accordingly, a reasonable progression of measurable goals was developed for each of the selected BMP's. The goals were selected with a consideration toward developing a

logical progression of implementation, assessing the ability to measure and track progress, and working within budgetary constraints.

2.4 Development and Review Process

Storm water committee meetings were held on October 30, 2002, November 12 and 21, 2002, and December 2, 2002. The storm water committee meetings culminated in the development of a Draft Storm Water Management Plan. The draft plan was then made available for general public comment at a Public Meeting held at City Hall on December 12, 2002. Further review and comment was provided by the McKinney City Council during a Council work session on January 6, 2002.

3.0 LIST OF BMP'S, MEASURABLE GOALS, AND IMPLEMENTATION SCHEDULE

In accordance with TCEQ's General Permit requirements, McKinney's SWMP includes an implementation plan for BMP's in each of six Minimum Control Measures. The six minimum control measures are:

1. Public Education and Outreach on Storm Water Impacts
2. Public Participation and Involvement
3. Illicit Discharge Detection and Elimination
4. Construction Site Runoff Control
5. Post Construction Runoff Control, and
6. Pollution Prevention and Good Housekeeping

Specific requirements of each MCM are provided below. Following each listing of MCM requirements, a table is provided that lists the BMP's selected for that MCM, along with a description of the BMP and its measurable goals and implementation schedule.

3.1 Public Education and Outreach on Storm Water Impacts

Specific requirements:

> (a) A public education program to distribute educational materials to the community or conduct equivalent outreach activities that will be used to inform the following groups within the MS4 area:
>
> (1) residents;
>
> (2) visitors;
>
> (3) public service employees;
>
> (4) businesses;

(5) commercial and industrial facilities; and

(6) construction site personnel.

The outreach must inform the public about the impacts polluted storm water run-off can have on water quality, hazards associated with illegal discharges and improper disposal of waste, and ways they can minimize their impact on storm water quality.

(b) Via documentation, the MS4 operator must ensure that a reasonable attempt was made to reach all constituents within the MS4 area to meet this measure.

Public Education and Outreach on Storm Water Impacts

Best Management Practices	BMP Description	Implementation Schedule	Measurable Goals
Residents			
BMP 1.1 Utility Bill Insert	Distribute educational material to residents via utility bill inserts. The inserts will include storm water education in general per the TCEQ general permit guidelines. Various inserts will also include information specifically relating to fertilizer, herbicide, and pesticide usage, proper disposal of household hazardous waste and oils, and other educational and particpitory opportunities.	Year 1	* Develop an outline of the information to be communicated over a 5 year period. * Distribute one educational flyer as a utility bill insert.
		Year 2 - 5	* Distribute educational flyer as a utility bill insert one time per year. * Make inserts available at the City's public library.
BMP 1.2 Smartscape CD Distribution	Purchase and distribute the Smartscape CD developed by NCTCOG.	Year 1	* Develop a 5-year distribution plan.
		Year 2	* Distribute a minimum of 500 CD's. * Make CD's available at public library.
		Year 3	* Distribute a minimum of 500 CD's or post CD material on web site.
		Year 4	* Distribute a minimum of 500 CD's or post CD material on web site.
		Year 5	* Distribute a minimum of 500 CD's or post CD material on web site.
BMP 1.3 "McKinney Cares" Storm Water Web Site	Develop a storm water web site for the city. The web site will include storm water education in general per the TCEQ general permit guidelines. The web site will also provide specific information regarding the City's NPDES Phase II program, educational and participatory opportunities, and links to other local, state, and national storm water web sites.	Year 1	* Begin building the web site.
		Year 2	* Web site up and running
		Year 3 - 5	* Web site revised/updated as needed. * Feedback regarding McKinney's storm water program solicited via the web site.

BMP 1.4 "Seeds for Thought" Classroom Education	Provide classroom education and curriculum materials to the McKinney Independent School District (MISD). Materials and curriculum will be assessed and selected from existing, readily available programs, and through discussions with MISD staff.	Year 1 - 5	* Discuss City's Phase II storm water education goals with MISD. * Provide information on available stormwater educational material to MISD.
BMP 1.5 Storm Water Book Covers	Provide storm water book covers to MISD for their distribution.	Year 1 - 5	Each year, develop, create, and provide storm water book covers to MISD for their distribution. Each year, provide enough covers to supply all MISD school children with a book cover, or provide a quantity requested by MISD.
BMP 1.6 "Stencil Town" Storm Drain Markers	Place storm drain markers on local storm drains in an effort to increase awareness and to prevent dumping into the storm drain system.	Year 1	* Assess the number of storm drain inlets not currently marked. Determine the number of inlets that would need to be marked in order to attain a goal of having 25% of all of the City's inlets marked, excluding inlets on arterial roads and highways. * Develop an implementation plan that will result in attaining the City's goal of having 25% of all inlets marked by the end of the permit term.
		Year 2 - 5	* Continue implementation of the City's plan for installing storm drain markers, achieving the 25% marked goal by the end of the 5th year.

BMP 1.7 "Public Reference"	Provide educational material for reference at the Public Library. Materials to be provided will include copies of educational materials used for other educational BMPs, access to McKinney's storm water website, information regarding McKinney's storm water program, and other miscellaneous storm water educational material as deemed appropriate.	Year 1 - 5	* Provide copies of educational materials at the Public Library.
BMP 1.8 Storm water video	Develop or acquire storm water videos for display on McKinney's Public Access Channel. Copies of video will also be made available for checkout at the Public Library and will be made available to MISD for use in classroom education.	Year 1	* Begin development or acquisition of a storm water education video.
		Year 2 - 5	* Air a minimum of three storm water educational videos, developed or acquired by the City, on the City's public access channel.

Visitors	
See BMP 1.6 (Stencil Town)	*Refer base to pervious BMP for specific details and time*
See BMP 1.8 (Public Reference)	*Refer base to pervious BMP for specific details and time*

Public Service Employees			
BMP 1.9 City Employee Education	City Employees will receive storm water education on general storm water topics in accordance with TCEQ educational guidelines and will also receive information relating to McKinney's Phase II program, with a focus on good housekeeping measures.	Year 1 - 5	* Conduct employee education during regularly scheduled "key-up" meetings a minimum of once per year. * Provide educational material on the City's intranet.
BMP 1.10 Education For Elected Officials	City Employees will receive storm water education on general storm water topics in accordance with TCEQ educational guidelines and will also receive information relating to McKinney's Phase II program.	Year 1 - 5	* Provide educational material and Phase II program status reports a minimum of 2 times per year. * Provide educational material on the City's intranet.

Businesses			
BMP 1.11 Partnerships for McKinney	Develop a partnership program for providing educational material to McKinney's businesses.	Year 1	* Develop a partnership program and conduct a minimum of one.
		Year 2	* Distribute educational material to local businesses a minimum of 1 time.
		Year 3 - 5	* Solicit feedback once per year and revise partnership program if appropriate. * Distribute educational material a minimum of 1 time per year.
See BMP 1.2 (Smartscape CD)	*Refer to referenced BMP for specific goals and schedule*		
See BMP 1.3 (Web Site)	*Refer to referenced BMP for specific goals and schedule*		

Commercial and Industrial Facilities

BMP 1.12 Commercial and Industrial Education	Develop a partnership program for providing educational material to McKinney's commercial and Industrial businesses.	Year 1	* Develop a partnership program by sending personalized letters to all commercial and industrial businesses within McKinney at least once. The letters will provide information on McKinney's stormwater program and will solicit feedback from the business community. * Request e-mail addresses and establish an e-mail distribution group to facilitate communication on stormwater-related issues between the City and commercial and industrial enterprises.
		Year 2	* Distribute educational material tailored to local commercial and industrial businesses a minimum of 1 time. * Continue e-mail distribution as appropriate.
		Year 3 - 5	* Solicit feedback once per year and revise partnership program if appropriate. * Distribute educational material a minimum of 1 time per year. * Continue e-mail distribution as appropriate.
See BMP 1.2 (Smartscape CD)	*Refer to referenced BMP for specific goals and schedule*		
See BMP 1.3 (Web Site)	*Refer to referenced BMP for specific goals and schedule*		

Construction Site Personnel			
BMP 1.13 City Inspector Training	Train City construction site erosion control inspectors.	Year 1 - 5	* Provide a minimum of 8 hours of construction site erosion control training to inspection personnel at least once every three years. * Provide a minimum of 8 hours of construction site erosion control training to new inspection employees within 6 months of the employee's start date.
BMP 1.14 Developer/Builder/Engineer Education and Training	Provide educational material to the development community and offer training opportunities.	Year 1	* Provide educational material and/or training during at least once with builders, once with developers, and once with engineers that are active in McKinney. * Develop, or adopt, a construction site erosion control training program for the development community.
		Year 2 - 5	* Provide educational material and/or training during at least once with builders, once with developers, and once with engineers that are active in McKinney. * Provide developers, builders, and engineers with the opportunity to participate in construction site erosion control training at least once every 2 years.

3.2 Public Involvement/Participation

Specific Requirements:

(a) Identify and implement a public involvement and participation program. This must include provisions to allow opportunities for all constituents within the MS4 area to participate in the storm water management program development and implementation.

(b) The MS4 operator must, at a minimum, comply with State and local public notice requirements when implementing a public involvement/participation program.

(c) The MS4 operator must, via documented efforts, ensure that sufficient opportunities were allotted to involve all constituents interested in participating in the program process to meet this measure. Correctional facilities will not be required to implement this MCM.

Public Participation and Involvement

Best Management Practices	BMP Description	Implementation Schedule	Measurable Goals
BMP 2.1 "Stencil Town" - Storm Drain Marker Installation	Solicit public involvement in the installation of storm drain markers for installation per BMP 1.6.	Year 1 - 5	* Make up to 12 contacts per year (or until goals are met) to solicit assistance from the public in placing storm drain markers in accordance with BMP 1.6.
BMP 2.2 Public Meetings	Conduct public meetings to present and to solicit feedback on McKinney's storm water management program.	Year 1 - 5	* Conduct a minimum of 1 public meeting per year. * Advertise and conduct the meetings in accordance with local and state public notice requirements.
BMP 2.3 Citizens Advisory Committee	Form a citizen's advisory committee to solicit input on McKinney's storm water management program.	Year 1	* Form the committee from representatives representing various constituencies within the community. * Conduct a minimum of 1 citizen's advisory committee meeting.
		Year 2 - 5	* Conduct a minimum of 1 citizen's advisory committee meeting per year.
BMP 2.4 Stormwater hotline	Develop and advertise a dedicated storm water hotline to solicit information related to illicit discharges and illegal dumping, complaints, and general comments regarding McKinney's storm water management program.	Year 1 - 5	* Set up the hotline and advertise the hotline's existence through various Public Education BMP's as appropriate.
BMP 2.5 McKinney Cleanup	Continue McKinney's existing community cleanup program in order to reduce floatables, etc., that make their way to the stormwater conveyance system.	Year 1 - 5	* Continue sponsoring McKinney's existing cleanup program a minimum of once per year.

3.3 Illicit Discharge Detection and Elimination

Specific Requirements:

(a) Illicit Discharges

A section within the SWMP must be developed to establish a program to detect and eliminate illicit discharges to the MS4. The SWMP must include
the manner, ordinance or other regulatory mechanism, used to effectively prohibit illicit discharges.

(1) Detection

The SWMP must list the techniques used for detecting illicit discharges.

(2) Elimination

The SWMP must include appropriate enforcement procedures and actions for removing the source of an illicit discharge.

(b) Non-Storm Water Discharges

A section within the SWMP must be developed to establish a program to detect and address non-storm water discharges and illegal dumping to the MS4. All non-storm water flows, including those listed in Part II.B. and Part VII.B., must be considered by the permittee to determine if they are a significant contributor of pollutants to the MS4. All non-storm water discharges that significantly contribute pollutants to the MS4 must be effectively prohibited. The prohibition must be done through an ordinance, or other regulatory mechanism unless the MS4 operator does not have the authority to develop ordinances or other regulatory mechanisms. The regulations must include appropriate enforcement procedures and actions. Fire fighting activities are excluded from being prohibited and only need to be addressed if they are determined to be a significant contributor of pollutants to the MS4.

(c) Incidental Non-Storm Water Discharges

A list of occasional incidental non-storm water discharges that will not be addressed as illicit discharges may also be developed. If developed, the listed discharges must not be reasonably expected to be significant sources of pollutants, because of either the nature of the discharge or the conditions that have been established for allowing these discharges to the MS4. Any local controls or conditions placed on these discharges must be

documented in the SWMP. The SWMP must also include a provision prohibiting any individual non-storm water discharge that is determined to be contributing significant amounts of pollutants to the MS4.

(d) Storm Sewer Map

(1) A map of the storm sewer system must be developed and must include the following:

(i) the location of storm sewer pipes, ditches, and other conveyances owned by the permittee, or at a minimum, the drainage area for each outfall;

(ii) the location of all major outfalls; and

(iii) the names and locations of all waters of the U.S. that receive discharges from the outfalls.

(2) The SWMP must include the source of information used to develop the storm sewer map, including how the outfalls were verified and how the map will be regularly updated.

Illicit Discharge Detection and Elimination

Best Management Practices	BMP Description	Implementation Schedule	Measurable Goals
Illicit Discharge Detection and Elimination			
BMP 3.1 Dry Weather Screening	Conduct visual dry weather screening of the City's storm water outfalls.	Year 1	* Develop dry weather screening procedures and train appropriate personnel. * Assess the City's outfalls and determine target areas for outfall inspections. Target areas will include all outfalls that discharge to creeks.
		Year 2 - 4	* Conduct visual dry weather screening of 33% of the City's storm water outfalls per year for all outfalls in target areas.
		Year 5	* Begin an annual rotation program of screening 20% of the City's targeted outfalls per year.
BMP 3.2 Illicit Discharge Inspections	Conduct inspections to determine the source of illicit connections and illegal dumping activities.	Year 1	* Assess regulatory authority and adopt new ordinances if needed to provide the City with the authority to inspect suspected sites of illicit connections or illegal dumping activities in accordance with TCEQ requirements. * Develop standard inspection procedures and train appropriate personnel, including building inspectors.
		Year 2 - 5	* Conduct inspections in accordance with inspection procedures for identified or suspected sources of illicit discharges or illegal dumping as identified from dry weather screening, smoke testing, and from tips received from the City's storm water hotline.
BMP 3.3 Sanitary Sewer Smoke Testing	Conduct smoke testing of sanitary sewers in order to identify potential cross-connections with the City's storm sewer system.	Year 1 - 5	* Conduct sanitary sewer smoke testing as a part of the City's on-going SSES program. The number of lines to be tested will vary from year to year based upon the goals and budget available for the City's SSES program.

BMP 3.4 Elimination of Illicit Connections	Eliminate illicit connections.	Year 1	* Assess regulatory authority and adopt new ordinances if needed to provide the City with the authority to require the elimination of illicit connections or illegal dumping activities in accordance with TCEQ requirements. * Develop standard verification procedures and train appropriate personnel.
		Year 2 - 5	* Require and verify the elimination of all identified illicit connections.
BMP 3.5 Spill Response	Continue implementation of existing spill response procedures and training.	Year 1 - 5	* Continue implementation of existing spill response procedures and training. (Attached as Appendix D)

Non-Storm Water Discharges and Illegal Dumping			
See BMP 2.4 (Storm Water Hotline)	*See Public Involvement MCM for goals and schedule...*		
BMP 3.6 Household Hazardous Waste Collection and Recycling	Provide opportunities for collection and recycling of hazardous materials from local residents.	Year 1	* Advertise and conduct a single household hazardous waste collection and recycling event.
		Year 2	* Evaluate the success of the previous year's collection and recycling activities. * Develop an ongoing household hazardous waste collection and recycling program tailored to McKinney's needs.
		Year 3 - 5	* Implement the household hazardous waste collection and recycling program as developed in Year 2. A permanent collection center program may be implemented.

Storm Sewer Map			
BMP 3.7 Storm Sewer System Map	Develop a storm sewer map in accordance with TCEQ requirements.	Year 1	* GIS mapping information for the City's storm sewer system has been collected. A storm sewer map will be prepared from this data and in accordance with TCEQ guidelines.
BMP 3.8 Update Storm Sewer System Map	Update the City's storm sewer system map as needed to record new pipes/systems created by new development.	Year 1 - 5	* Continue the existing program of triggering/completing storm sewer mapping changes as permits and as-built plans are filed for new construction activities.

3.4 Pollution Prevention/Good Housekeeping for Municipal Operations

Specific Requirements:

A section within the SWMP must be developed to establish an operation and maintenance program. The operation and maintenance program must have the ultimate goal of identifying methods and practices for conducting municipal operations in a manner to prevent or reduce pollution in storm water runoff.

(a) Good Housekeeping and Best Management Practices

Controls must be used to reduce or eliminate the discharge of pollutants when runoff from municipal operations is determined to be a significant contributor of pollution to the MS4. Examples of municipal operations and municipally owned areas include, but are not limited to:

(1) park and open space maintenance;

(2) street, road, or highway maintenance;

(3) fleet and building maintenance;

(3) storm water system maintenance;

(5) new construction and land disturbances.

(4) municipal parking lots;

(7) vehicle and equipment maintenance and storage yards;

(5) waste transfer stations; and

(9) salt/sand storage locations.

(b) Training

A training program must be developed for all employees responsible for municipal operations subject to the pollution prevention/good housekeeping program. The training program must include training materials directed at preventing and reducing storm water pollution from municipal operations. Examples or descriptions of training materials being used must be included in the SWMP.

(c) Structural Control Maintenance

If best management practices include structural controls, maintenance of the controls must be performed at a frequency determined by the MS4 operator and consistent with maintaining the effectiveness of the BMP. The SWMP must list all of the following:

(1) maintenance activities;

(2) maintenance schedules; and

(3) long-term inspection procedures for controls used to reduce floatables and other pollutants.

(d) Disposal of Waste

Waste removed from the MS4, from structural controls, or collected as a result of municipal operations and maintenance activities must be properly disposed. A section within the SWMP must be developed to include procedures for the proper disposal of waste, including:

(1) dredge spoil;

(2) accumulated sediments; and

(3) floatables.

(e) Municipal Operations and Industrial Activities

The SWMP must include a list of all:

(1) municipal operations that are subject to the operation, maintenance, or training program developed under the conditions of this section; and

(2) municipally owned or operated industrial activities that are subject to TPDES storm water regulations.

The SWMP must include an individual permit number, general permit authorization number, or a copy of a signed NOI or NEC (no exposure certification form for TPDES General Permit TXR050000) for each industrial activity conducted by the MS4 and subject to TPDES storm water regulations. If an NOI or NEC has been submitted, but an acknowledgment has not yet been received from the TCEQ, a copy of the submitted NOI or NEC Form may be made readily available.

Pollution Prevention/Good Housekeeping for Municipal Operations

Best Management Practices	BMP Description	Implementation Schedule	Measurable Goals
Good Housekeeping			
BMP 4.1 Storm Sewer Cleaning	Remove floatables, debris, sediment, etc. from inlets and pipes as needed to maintain capacity and to reduce stormwater pollution.	Year 1	* Develop a schedule for conducting a visual inspection of the City's storm sewer inlets. * Develop a system to monitor and track storm sewer cleaning activities. * Begin implementing the inspection schedule. Clean inlets as necessary. * Clean system as needed in response to complaints or reported problems.
		Year 2 - 5	* Implement the inspection schedule. Clean inlets as necessary. * Clean system as needed in response to complaints or reported problems.
BMP 4.2 Street Sweeping	Continue existing street sweeping program.	Year 1 - 5	Sweep major arterials once per quarter, collectors twice per year, and residential streets once per year.
BMP 4.3 Herbicide Management	Continue existing herbicide management program.	Year 1 - 5	* Implement McKinney's existing herbicide management program (Attached in Appendix E). * Evaluate appropriateness of program every 2 years.

BMP 4.4 Pesticide Management	Continue existing pesticide management program.	Year 1 - 5	* Implement McKinney's existing pesticide management program (Attached in Appendix E). * Evaluate appropriateness of program every 2 years.
BMP 4.5 Safe Material Storage	Continue existing material storage management program.	Year 1 - 5	* Implement McKinney's existing material storage program (Attached in Appendix F). * Evaluate appropriateness of program every 2 years.
BMP 4.6 Fleet Service Center BMP's	Review existing fleet service center operations and infrastructure. Develop and implement structural and non-structural controls.	Year 1	* Perform a detailed assessment of existing fleet center operations and infrastructure. * Develop a storm water management plan, including an implementation plan for structural and non-structural controls.
		Year 2 - 5	* Implement the stormwater management plan.
Training			
BMP 4.7 Employee Training	Add good housekeeping and pollution prevention training to existing employee training programs.	Year 1	* Develop or adopt a good-housekeeping /pollution prevention employee training module.
		Year 2 - 5	* Add the new training module to existing street department and public works department training programs. * Train all new employees within six months of the employee's start date.

Industrial Activities			
BMP 4.8 Airport SWPPP	Continue to implement the existing airport SWPPP	Year 1 - 5	* Continue to implement the existing airport SWPPP. (TPDES Industrial Multi-sector General Permit Attached in Appendix B).

Additional Good-Housekeeping Activity:

Training
Detailed training programs and materials for City personnel have not yet been developed. Development of the employee good-housekeeping training program is listed as a BMP to occur during the first year of the permit. The SWMP will be revised to include the training materials after they are developed.

Structural Control Maintenance
No structural controls have been identified under the current SWMP. However, additional structural controls may be identified during the first year of the permit term through the implementation of BMP 4.6, "Fleet Service Center BMP's". Maintenance activities, schedules, and inspection procedures will be identified and incorporated into the SWMP at that time as appropriate.

Waste Disposal
Dredge spoil, accumulated sediment, and floatables collected through the implementation of storm sewer cleaning activities (BMP 4.1), street sweeping activities (BMP 4.2), and other routine city operations will be properly disposed of at a nearby landfill. Disposal of such materials will be tracked in conjunction with tracking efforts for the implementation of the individual BMP's.

Municipal Operations and Industrial Activity
The municipal operations that are subject to the operation, maintenance, or training program developed under the conditions of good-housekeeping/pollution prevention MCM include:

- Park and open space maintenance;
- Street, road, or highway maintenance;
- Fleet and building maintenance;
- Storm water system maintenance;
- vehicle and equipment maintenance and storage yards;
- salt/sand storage locations.

The City of McKinney's Municipal Airport operates under the TPDES multi-sector general permit number TXR05L684. A copy of the permit is provided in Appendix B.

3.5 Construction Site Storm Water Runoff Control

Specific Requirements:

The MS4 operator must develop, implement, and enforce a program to reduce pollutants in any storm water runoff to the MS4 from construction activities that result in a land disturbance of greater than or equal to one acre or if that construction activity is part of a larger common plan of development or sale that would disturb one acre or more. The MS4 operator is not required to develop, implement, and/or enforce a program to reduce pollutant discharges from sites that the TCEQ has waived the permitting requirements for storm water discharges associated with small construction activities.

(a) The program must include the development and implementation of, at a minimum, an ordinance or other regulatory mechanism to require erosion and sediment controls, as well as sanctions to ensure compliance, to the extent allowable under State and local law.

(b) Requirements for construction site contractors to, at a minimum:

(1) implement appropriate erosion and sediment control best management practices; and

(2) control waste such as discarded building materials, concrete truck washout water, chemicals, litter, and sanitary waste at the construction site that may cause adverse impacts to water quality;

(c) The MS4 operator must develop procedures for:

(1) site plan review which incorporate consideration of potential water quality impacts;

(2) receipt and consideration of information submitted by the public; and

(3) site inspection and enforcement of control measures.

Construction Site Runoff Control

Best Management Practices	BMP Description	Implementation Schedule	Measurable Goals
BMP 5.1 Controlling Ordinances	The City of McKinney has a thorough, existing construction site erosion control program. Specific ordinances and guidance documents describing the existing program are attached.	Year 1 - 5	* Continue implementation of existing programs. (Attached as Appendix G)
BMP 5.2 Requirements for Construction Site Contractors			
BMP 5.3 Site Plan Review			
BMP 5.4 Site Inspection and Enforcement			

BMP 5.5 Receipt and Consideration of Information from Public	Develop and implement a program for the receipt and consideration of public comments regarding erosion control.	Year 1	*Develop a system for receiving, considering, and tracking comments from the public regarding the City's erosion control program and for specific project-related complaints. * Begin implementation of the system.
		Year 2 - 5	* Implement system.
BMP 5.6 Review Erosion and Sediment Control Program	Review the effectiveness, appropriateness, and cost-effectiveness of the existing erosion control program.	Year 1 - 2	* No formal review. Continue existing programs.
		Year 3	* Review the City's existing erosion control program. * Revise the existing program, including ordinances, if appropriate.
		Year 4 - 5	* No formal review. Continue existing and/or revised programs.

3.6 Post-Construction Storm Water Management in New Development and Redevelopment

Specific Requirements:

The MS4 operator must develop, implement, and enforce a program to address storm water runoff from new development and redevelopment projects that disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale that will result in disturbance of one or more acres, that discharge into the small MS4. The program must ensure that
controls are in place that would prevent or minimize water quality impacts;

(a) Develop and implement strategies which include a combination of structural and/or non-structural BMPs appropriate for your community;

(b) Use an ordinance or other regulatory mechanism to address post-construction runoff from new development and redevelopment projects to the extent allowable under State and local law; and

(c) Ensure adequate long-term operation and maintenance of BMPs.

Post-Construction Storm Water Management in New Development/Redevelopment

Best Management Practices	BMP Description	Implementation Schedule	Measurable Goals
BMP 6.1 CDCD Manual Development & Implementation	Participate in the development of the North Central Texas Council of Governments' Comprehensive Drainage Criteria and Design (CDCD) Manual. Adopt manual as appropriate.	Year 1 - 3	* Continue to participate financially in the development of the NCTCOG-sponsored regional manual per the attached agreement.
		Year 3 - 4	* Review, assess, and adopt the regional CDCD manual in part or in whole, as determined appropriate.
		Year 4 - 5	* Facilitate implementation of the manual (or portions thereof) through ordinances (revised if necessary) and the City's existing plan review process.
BMP 6.2 Engineering Design Review	Continue existing design review process.	Year 1 - 5	* Continue existing design review process of all construction projects, one acre in size, or larger, to verify compliance with the city's stormwater ordinance. (Existing review process is attached in Appendix H).
BMP 6.3 Land Use Plan	Continue to utilize the City's existing land use plan.	Year 1 - 5	* Continue the existing process of assessing proposed zoning changes in relation to the City's existing land use plan. * Update the City's land use plan once during the first permit period.

4.0 MEASURABLE GOAL EVALUATION PROCESS

The selected measurable goals for each BMP will be evaluated on an annual basis. Implementation of each BMP will be tracked as appropriate during each permit year in order to provide documentation of the BMP activities. Relative success at achieving the measurable goals, as well as an assessment of the effectiveness of each BMP, will also be evaluated on an annual basis.

Multiple City departments will be responsible for implementing portions of the SWMP and for tracking and evaluating the City's success in meeting the plan's measurable goals. It is anticipated that the following City departments will be involved in the implementation and verification process:

(a) Public Works
(b) Engineering
(c) Public Information
(d) Community Development
(e) Sanitation
(f) Parks and Recreation
(g) Building Services
(h) Fleet
(i) Planning
(j) Airport

5.0 PARTICIPATING ENTITIES

Implementation of portions of the City of McKinney's SWMP relies upon activities to be performed by the NCTCOG. A copy of the agreement between the City of McKinney and the NCTCOG for performance of the activities described within the SWMP is provided in Appendix C. NCTCOG activities that the City is relying on include the distribution of the Smartscape CD,s and the development of a Comprehensive Drainage Criteria and Design manual that will be applicable for implementing the Post-Construction MCM.

6.0 ASSESSMENT OF NON-STORM WATER DISCHARGES

In accordance with the requirements of the General Permit, the following non-storm water discharges were assessed in order to determine whether they are known to be significant contributors of pollutants to the City's waterbodies:

(a) water line flushing;
(b) runoff or return flow from landscape irrigation, lawn irrigation, and other irrigation utilizing potable water, groundwater, or surface water sources;

(c) discharges from potable water sources;
(d) diverted stream flows;
(e) rising ground waters and springs;
(f) uncontaminated ground water infiltration;
(g) uncontaminated pumped ground water;
(h) foundation and footing drains;
(i) air conditioning condensate;
(j) water from crawl space pumps;
(k) individual residential vehicle washing;
(l) flows from wetlands and riparian areas;
(m) dechlorinated swimming pool discharges;
(n) pavement and exterior building wash water conducted without the use of detergents or other chemicals; and
(o) discharges or flows from fire fighting activities.

Non-storm water discharges from the list above were discussed by the storm water committee to ascertain if any known, significant, water quality impacts were created as a result of the discharges. There is no knowledge of adverse impacts to the City's water quality from any of the listed discharges.

Texas Pollutant Discharge Elimination System (TPDES)
Phase II Program Overview

What is the Phase II Program Mandate?

Under this program, McKinney is required to:

- Reduce the discharge of pollutants to the "maximum extent practicable" (MEP);
- Protect water quality; and
- Satisfy the appropriate water quality requirements of the Clean Water Act.

What are the Phase II Program Requirements?

McKinney is required to develop a Storm Water Management Plan (SWMP) that describes specific actions that will be taken over a five-year period to reduce pollutants and protect the City's storm water quality. The specific activities to be implemented are referred to as "Best Management Practices" (BMP's). The SWMP must also set measurable goals and provide a schedule for the implementation of the BMP's. Various BMP's must be developed for each of six "Minimum Control Measures" that, "when implemented in concert, are expected to result in significant reductions of pollutants discharged into receiving waterbodies." The six required Minimum Control Measures are described below.

➢ ***Public Education and Outreach***
Distributing educational materials and performing outreach to inform citizens about the impacts polluted storm water runoff discharges can have on water quality.

➢ ***Public Participation/Involvement***
Providing opportunities for citizens to participate in program development and implementation, including effectively publicizing public hearings and/or encouraging citizen representatives on a storm water management panel.

➢ ***Illicit Discharge Detection and Elimination***
Developing and implementing a plan to detect and eliminate illicit discharges to the storm sewer system (includes developing a system map and informing the community about hazards associated with illegal discharges and improper disposal of waste).

➢ ***Construction Site Runoff Control***
Developing, implementing, and enforcing an erosion and sediment control program for construction activities that disturb 1 or more acres of land (controls could include silt fences and temporary storm water detention ponds).

➢ ***Post-Construction Runoff Control***
Developing, implementing, and enforcing a program to address discharges of post-construction storm water runoff from new development and redevelopment areas. Applicable controls could include preventative actions such as protecting sensitive areas (e.g., wetlands) or the use of structural BMPs such as grassed swales or porous pavement.

➢ ***Pollution Prevention/Good Housekeeping***
Developing and implementing a program with the goal of preventing or reducing pollutant runoff from municipal operations. The program must include municipal staff training on pollution prevention measures and techniques (e.g., regular street sweeping, reduction in the use of pesticides or street salt, or frequent catch-basin cleaning).

What Kind of Program Evaluation/Assessment Is Required?

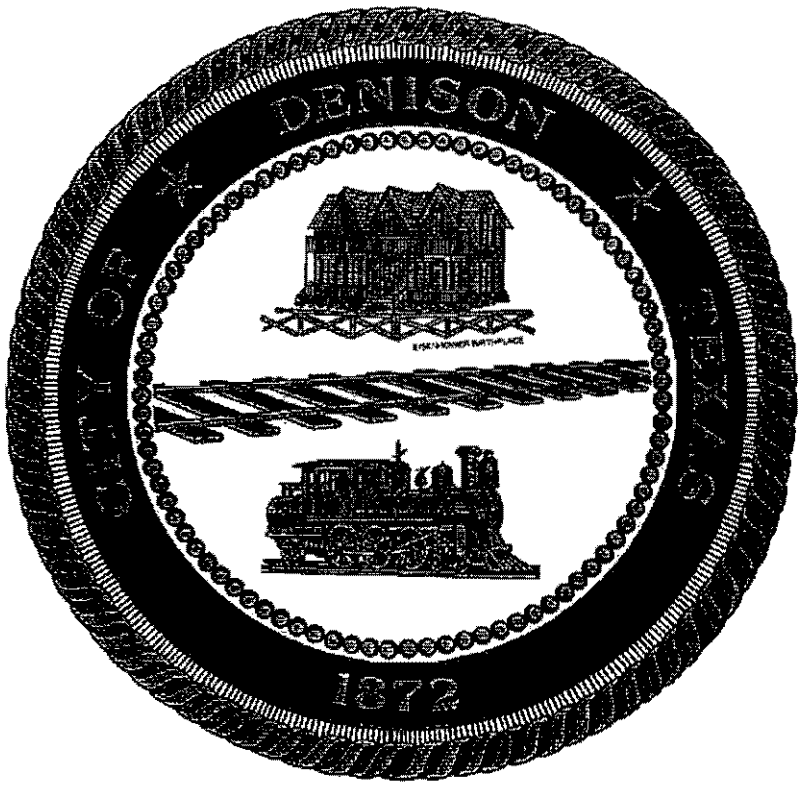
McKinney is required to evaluate the effectiveness of the selected BMPs to determine whether the BMPs are reducing the discharge of pollutants into storm water to the "maximum extent practicable" and to assess their progress in achieving the program's measurable goals. McKinney is required to submit an annual report to TCEQ that describes the program's status, provides evidence that the SWMP is being followed, assess the effectiveness of the selected BMP's, and describes any proposed changes to the plan.

David

CITY OF DENISON

PHASE II STORM WATER MANAGEMENT PLAN

DRAFT



4.2.1 BMP1 Evaluate and Update Regulatory Authority and Procedures

Denison will evaluate the existing legal authority to enforce the requirements for erosion and sediment controls and proper waste management at construction sites. Ordinances and other regulatory mechanisms will be updated to provide the formal authority, as well as appropriate sanctions to ensure compliance. City procedures will be modified to require site plan review, site inspection, and enforcement.

4.2.1.1 Measurable Goals

The measurable goal for implementation of this BMP is to evaluate existing legal authority in permit year 1. An ordinance and other regulatory mechanism and procedures will be developed and adopted in permit year 2.

4.2.1.2 Schedule

Program	BMP	Activity	Date Due
4. Construction Site Storm Water Controls	Evaluate and Update Regulatory Authority and Procedures	Evaluate existing legal authority and procedures.	Year 1
		Develop an ordinance and other regulatory mechanisms and procedures and adopt them.	Year 2
		Implementation Complete.	Year 2

4.2.1.3 Responsible persons

The Director of Public Works and the City Attorney are responsible for the implementation of this BMP to meet Measurable Goal 4.2.1.1.

4.2.4 BMP4 Public Meetings

The City of Denison will hold public meetings to discuss construction controls/options and ordinance requirements.

4.2.4.1 Measurable Goals

The measurable goal for implementation of this BMP is to hold two public meetings, to discuss construction controls and options in permit year 1. In permit year 2, two public meetings will be held to discuss construction ordinances and requirements.

4.2.4.2 Schedule

Program	BMP	Activity	Date Due
4. Construction Site Storm Water Controls	Public Meetings	Hold 2 public meetings to discuss controls and options.	Year 1
		Hold 2 public meetings to discuss ordinances and requirements.	Year 2
		Implementation Complete.	Year 2

4.2.4.3 Responsible Persons

The Director of Public Works is responsible for the implementation of this BMP to meet Measurable Goal 4.2.4.1.

STORM WATER MANAGEMENT IN NORTH CENTRAL TEXAS

www.dfwstormwater.com

Phase II Management Plan - Final Touches Forum

Tuesday, March 25, 2003

Additional Resources and Forum Materials

Storm Water BMPs: A Menu of Management Plan Options for Small MS4s in North Central Texas

An on-line guidance document created by NCTCOG to help operators of small MS4s develop a storm water management plan (SWMP) to meet the EPA's six minimum control measures. It has been developed from a number of sources, including suggestions by participants at storm water workshops held throughout North Central Texas during 2001 and 2002, local ordinances, EPA documents, and others materials.

Additional resource links for each minimum measure:

Public Education and Outreach

Public Participation/Involvement

Illicit Discharge, Detection & Elimination

Construction Site Runoff Control

Post-Construction Runoff Control

Pollution Prevention/Good Housekeeping

Model Storm Water Management Plans (SWMPs)

National Menu of Best Management Practices for Storm Water Phase II

EPA's Storm Water *Phase II Compliance Assistance Guide*

Adopted Feb 6 '03

STORM WATER MANAGEMENT PLAN
CITY OF BENBROOK

Draft
January 30, 2003

David Gattis
3-25-03

I. Introduction

The City of Benbrook's Storm Water Management Plan has been prepared to comply with the Phase 2 Storm Water Permitting Program of the U.S. Environmental Protection Agency (EPA) and Texas Commission on Environmental Quality (TCEQ). The Plan includes provisions of how the City will comply with the six minimum measures required under the General Permit, plus the optional seventh measure offered by the TCEQ. While the Plan is designed to be a stand-alone document for permitting purposes, it is also expected that it will be incorporated into the City's Comprehensive Plan.

A. Definitions and Acronyms

BMP – Best Management Practice – A design or mitigation method that has been regionally-accepted as providing significant flood management or nonpoint source pollution mitigation.

EPA – U.S. Environmental Protection Agency.

Floatables – Floating litter and debris that is carried into the storm drain system.

ISWM – Integrated Storm Water Management – A new design manual being developed by the North Central Texas Council of Governemnts that will include design criteria for both water quality and quality protection.

SWMP – Storm Water Management Plan – The City's overall plan for storm water quality.

SWPPP – Storm Water Pollution Prevention Plan – A plan prepared for an individual project that outlines the pollution abatement provisions to be used to prevent nonpoint source pollution.

TCEQ – Texas Commission on Environmental Quality

Xeriscaping – landscaping with native plants that require little or no irrigation water to survive.

B. Regulatory Requirements

In 1972, the U.S. Congress adopted the Federal Water Pollution Control Act Amendments (Public Law 92-500) which substantially strengthened the federal

and state role in water pollution control. Among the goals of the 1972 Amendements were that the Nation's rivers and lakes were to be fishable and swimmable by 1985. The 1972 Act recognized the importance of nonpoint sources (i.e. those sources of pollution which were diffuse in nature) but most of the regulatory activity was directed toward point sources (i.e. those that discharged from a pipe outfall.) Under the 1972 Act, urban runoff was considered a nonpoint source.

In 1987, Congress passed the Clean Water Act that further amended the 1972 Act. Among its provisions were that the U.S. Environmental Protection Agency develop a program to regulate the quality of runoff from nonpoint sources, including certain industries, construction activities that exceed five acres, and cities with populations greater than 100,000. These "Phase I" regulations have been in place since 1990 and the activities covered must obtain a discharge permit from EPA. For example, the City of Fort Worth was required to submit its permit application by August 1993.

The 1987 Clean Water Act also proposed a lesser program for Phase 2 cities, those with less than 100,000 population and for small construction projects (i.e. those from one to five acres in size. The final rules for the Phase 2 program were published by the U.S. Environmental Protection Agency on December 8, 1999 in the Federal Register (64 FR 68722). Benbrook was specifically identified under the proposed rules because it is located within the "urbanized area". Under the 1999 Rules Benbrook has until March 10, 2003 to seek and individual permit, seek a joint permit with another regulated entity (such as Fort Worth), or file a Notice of Intent to comply with the General Permit. The General Permit requires the development of a Storm Water Management Plan that addresses control measures in six areas:

Public Education and Outreach
Public Involvement and Participation
Illicit Discharge Detection and Elimination
Construction Site Storm Water Runoff Control
Post-Construction Storm Water Management in New Development and Redevelopment
Pollution Prevention/Good Housekeeping for Municipal Operations.

In 1998, the Texas Commission on Environmental Quality (TCEQ, formerly known as the Texas Natural Resources Conservation Commission) received authority to administer discharge permits within the State of Texas. The TCEQ proposed a draft general permit on September 13, 2002 that generally follows the requirements of the 1999 EPA Rules. The draft TCEQ permit requires that municipality prepare a Storm Water Management Plan that addresses the six minimum measure included in the 1999 EPA Rules. It also establishes an optional seventh minimum measure that includes discharges from construction activities where the municipality is the operator. This simplifies the process for municipal projects that disturb over an acre of land in that notice of intent to comply with the general construction permit is not required.

This Storm Water Management Plan is intended to satisfy the requirements of the TCEQ General Permit for Storm Water Discharges from Small MS4s.

C. Regulatory Authority

The EPA regulations require that a City have adopted an ordinance that provides sufficient enforcement authority to implement the Storm Water Management Plan. Benbrook adopted its Storm Water Quality Ordinance (Ordinance 1124, codified as Chapter 15.42 of the Benbrook Municipal Code) on July 9, 2002. The Ordinance establishes the City's authority, provides definitions, prohibits illegal discharges into the storm water system, establishes requirements for construction site runoff controls, requires industries to notify City of Phase 1 permits and any spills, requires developers to consider post-development runoff quality, require runoff controls be adequately maintained, and establishes enforcement and variance procedures.

Other ordinances also have an affect on storm water quality. The City's Flood Hazard Protection Ordinance (Chapter 15.40 of the Benbrook Municipal Code) has provisions for erosion control at construction sites (Section 15.40.320.F) and a prohibition of dumping in a stream or channel (Section 15.40.265). The City's Subdivision Ordinance was recently amended to prohibit new development within the 100-year floodplain and to require onsite detention of runoff to the predevelopment condition for any new developments outside of the 100-year floodplain. Detention ponds are required to accommodate water quality protection where feasible.

Benbrook has the authority to enforce its ordinances anywhere within its city limits. Benbrook is entirely surrounded by the City of Fort Worth, who regulates storm water quality within its own jurisdiction.

D. Existing Citywide Drainage Plan

Benbrook's existing drainage plan is included as part of its Comprehensive Plan, a portion of which is summarized here. It is primarily aimed at protecting citizens from the effects of flooding during the 100-year storm, but also addresses the need to protect runoff water quality. The Plan was originally written eight years ago and is undergoing a substantial revision during the next few years. The revised Plan will incorporate runoff water quality protection and non-structural approaches where practical.

One of the consequences of land use is the alteration of surface water runoff and drainage. Runoff from rainstorms is a natural hydrologic process. Urban development both affects and is affected by this process. Some land areas, such as floodplains along streams, are more prone to flooding than are others. Urban development in these areas should be avoided or be designed so that the risk of damage by flooding, including loss of life, is limited. Conversely, urban development increases runoff by increasing the amount of impervious surface

within a drainage basin. This increased impervious area results in higher rates of runoff, and thus larger flood flows downstream.

As in most developed areas, flooding has been a problem in Benbrook. Large floods occurred on Mary's Creek in April 1922 and May 1949. The creek reportedly is named after Mary Criswell, who lost her life in a flash flood. Flooding along Timber Creek was common until the City constructed a new concrete channel in 1982. Plantation East Creek flooded in August 1974, July 1975, May 1989, March 1990, and May 1990, but large storms subsequently have been contained by a new channel and culvert.

The Drainage element of the Comprehensive Plan seeks to minimize damage caused by flooding by identifying areas of higher flooding risk, establishing standards for protecting new development from causing or suffering from flooding, and to identify drainage improvement projects to better protect existing residents from flood events.

Rainfall

Benbrook's climate is classified as temperate. Average annual rainfall is approximately 34.76 inches (1970-2000). The wettest year on record was 1991, when 53.54 inches of rain was recorded. The driest year was 1921 when only 17.91 inches fell. There is a recording rain gage at Benbrook Dam, but most records are for Fort Worth's Meacham Field or Dallas-Fort Worth International Airport. Recent monthly rainfall data for Dallas-Fort Worth International Airport are presented in Table 9.1. Unofficial records from south Benbrook are presented in Table 9.2.

Most rainfall occurs during frontal-type storms or thunderstorms. Most of these storms occur during the Spring and Summer, but thunderstorms can occur at any time of the year. The maximum rainfall in a 24-hour period was 9.57 inches in September 1932. An average thunderstorm event lasts 7.5 hours and drops 0.60 inches of rain.

Because most rain falls within a relatively short period of time, annual or monthly precipitation is not indicative of the type or magnitude of flooding that may occur. Therefore, individual storms are classified by the intensity, duration, and probability of occurrence. The probability of occurrence is often presented as a recurrence interval of a given number of years. For example, a storm with a 20 percent probability of occurring in a given year is called a 5-year storm, while a storm with only a one percent probability of occurring in a given year is called a 100-year storm. It is a common misunderstanding, however, that only one 100-year storm may be expected in a 100-year period. In fact, there is a 37 percent chance that there will not be a 100-year storm in any given 100-year period, a 37 percent chance that there will be only one, and a 26 percent chance that there will be more than one 100-year storm in any given 100 year period.

The total rainfall expected for various storm events is presented in Table 9.3. Most of these rainfall figures are based on records from Fort Worth and Dallas rain

Table 9.1
Official Monthly Rainfall Records
Dallas-Fort Worth International Airport
(in inches)

Month	Normal	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Jan	1.90	3.25	1.74	1.43	2.11	0.97	0.33	5.07	1.44	1.59	2.44	4.90
Feb	2.37	2.40	5.78	2.01	0.44	0.35	7.40	3.22	0.48	3.30	6.17	0.94
Mar	3.06	3.24	3.03	1.69	6.69	2.36	2.21	4.45	2.84	2.92	5.27	7.39
Apr	3.20	2.46	3.49	3.62	6.83	2.14	6.73	1.25	2.74	4.28	0.89	5.68
May	5.15	6.93	1.75	5.80	7.50	1.03	3.93	2.38	6.91	3.17	5.58	5.40
Jun	3.23	5.23	3.75	2.05	2.51	3.42	4.00	1.75	0.99	5.93	1.28	3.10
Jul	2.12	2.48	0.00	4.58	3.45	3.85	1.68	0.11	0.77	Trace	3.85	3.07
Aug	2.03	2.08	0.75	4.89	0.86	5.02	3.13	0.35	Trace	0.00	2.72	1.47
Sep	2.42	3.25	3.28	1.39	1.54	1.51	2.01	0.68	2.30	0.17	3.72	1.38
Oct	4.11	3.05	5.10	8.19	0.75	6.56	5.66	5.64	2.26	4.38	1.87	6.44
Nov	2.57	3.56	1.62	6.03	0.74	5.54	1.01	4.91	0.31	6.95	1.11	0.52
Dec	2.57	4.26	2.54	2.42	2.07	0.47	6.93	4.43	2.55	3.57	3.24	-
Total	34.76	42.19	32.83	44.10	35.39	33.22	45.02	34.24	23.59	36.26	38.14	40.29

Source: National Weather Service, as published in Fort Worth Star-Telegram

Table 9.2
Unofficial Rainfall Records
Benbrook, Texas
(in inches)

Month	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Jan	3.38	2.29	1.16	1.53	1.20	0.59	3.77	1.73	2.13	3.20	3.52
Feb	3.45	4.86	2.46	0.44	0.39	8.38	3.18	0.04	1.88	5.85	1.28
Mar	2.20	3.55	1.73	4.41	1.47	2.60	5.70	3.07	3.18	6.81	7.06
Apr	3.37	3.24	3.61	3.85	3.01	5.89	1.00	2.36	1.49	0.68	6.19
May	4.83	1.85	6.14	6.38	1.12	5.47	2.18	9.46	2.64	4.10	6.62
Jun	4.65	1.85	1.03	3.51	2.31	4.19	0.99	2.22	10.60	2.92	2.95
Jul	2.62	0.00	2.67	3.49	3.58	2.50	0.16	1.26	0.09	2.03	1.21
Aug	1.98	0.85	3.71	3.22	2.76	2.73	0.94	0.00	0.00	4.68	2.43
Sep	3.80	4.07	1.80	5.01	1.62	0.31	1.91	3.32	0.23	2.55	1.63
Oct	1.49	9.92	7.05	0.79	3.93	5.69	5.33	2.59	5.06	1.87	6.61
Nov	3.19	1.51	5.12	0.69	6.57	1.75	5.51	0.52	6.68	2.17	0.73
Dec	4.56	2.13	2.71	1.61	0.70	6.31	4.01	2.21	2.95	2.94	5.02
Total	39.52	36.12	39.19	34.93	28.66	46.41	34.68	28.78	36.93	39.80	45.26

Source: Frank Kleinwechter, KXAS Weather Watcher, South Benbrook

Table 9.3
MAGNITUDE OF STORM EVENTS
Benbrook, Texas
(in inches)

Storm Duration	Return Frequency (years)					
	2	5	10	25	50	100
0.5 hours	1.45	1.88	2.25	2.65	3.0	3.3
1 hour	1.85	2.4	2.9	3.4	3.8	4.2
2 hours	2.2	2.9	3.5	4.2	4.7	5.2
6 hours	2.88	3.84	4.56	5.4	6.0	6.9
12 hours	3.3	4.44	5.28	6.24	6.96	7.9
24 hours	3.96	5.28	6.24	7.44	8.4	9.36

gages from the 1890s to 1960. Since then, the Dallas-Fort Worth International Airport rain gage is most commonly used for statistical purposes. These stations are many miles away from Benbrook and may not represent actual precipitation in Benbrook during thunderstorms. The National Weather Service monitors a recording rain gage at Benbrook Dam operated by the U.S. Army Corps of Engineers. This station should provide better data regarding rainfall in south Benbrook and the City should establish a mechanism for obtaining this data on a regular basis.

Runoff

Once rainfall reaches the ground, a portion infiltrates into the soil and vegetation while the remainder runs off into natural and man-made drainage-ways. The amount of water that runs off is a function of the duration and intensity of rainfall, the size of the contributing drainage area, the amount and type of pervious and impervious surface, and the length of time since the last rainfall.

Runoff and stream flow is generally measured in cubic feet per second. A cubic foot is equivalent to 7.48 gallons and a cubic foot per second is equivalent to 450 gallons per minute.

For small watersheds (ie. less than 500 acres), the most common method of determining runoff is the Rational Method, expressed by the equation:

$$Q = CIA$$

where Q = storm flow in cubic feet per second (cfs)
C =runoff coefficient (ratio of runoff to rainfall)
I = rainfall intensity in inches per hour
A = drainage area in acres.

The runoff coefficient ranges from 0.3 in flat grassy areas to 0.90 in commercial areas with large areas of pavement. Table 9.4 presents the adopted runoff coefficient values for land uses typically found in Benbrook.

Table 9.4
RUNOFF COEFFICIENTS "C"

Land Use	Coefficient
Open Space	0.30
Single Family Residential	0.50
Apartments	0.75
Industrial	0.70
Commercial	0.80-0.90

For drainage areas larger than 500 acres, the rational method is less useful. For these larger areas, runoff is calculated using various Soil Conservation Service or Corps of Engineers methods.

Drainage Areas

Benbrook has rolling topography with elevations ranging from a low of 580 feet above mean sea level to a high of 865 feet msl. To assist in analysis, the City has been divided into seven major watersheds as shown in Figure 1. The watersheds are drained by the following streams:

Watershed A	Mary's Creek
Watershed B	Walnut Creek
Watershed C	Clear Fork Trinity River
Watershed D	Dutch Branch
Watershed E	Benbrook Lake
Watershed F	Benbrook Lake
Watershed G	Benbrook Lake

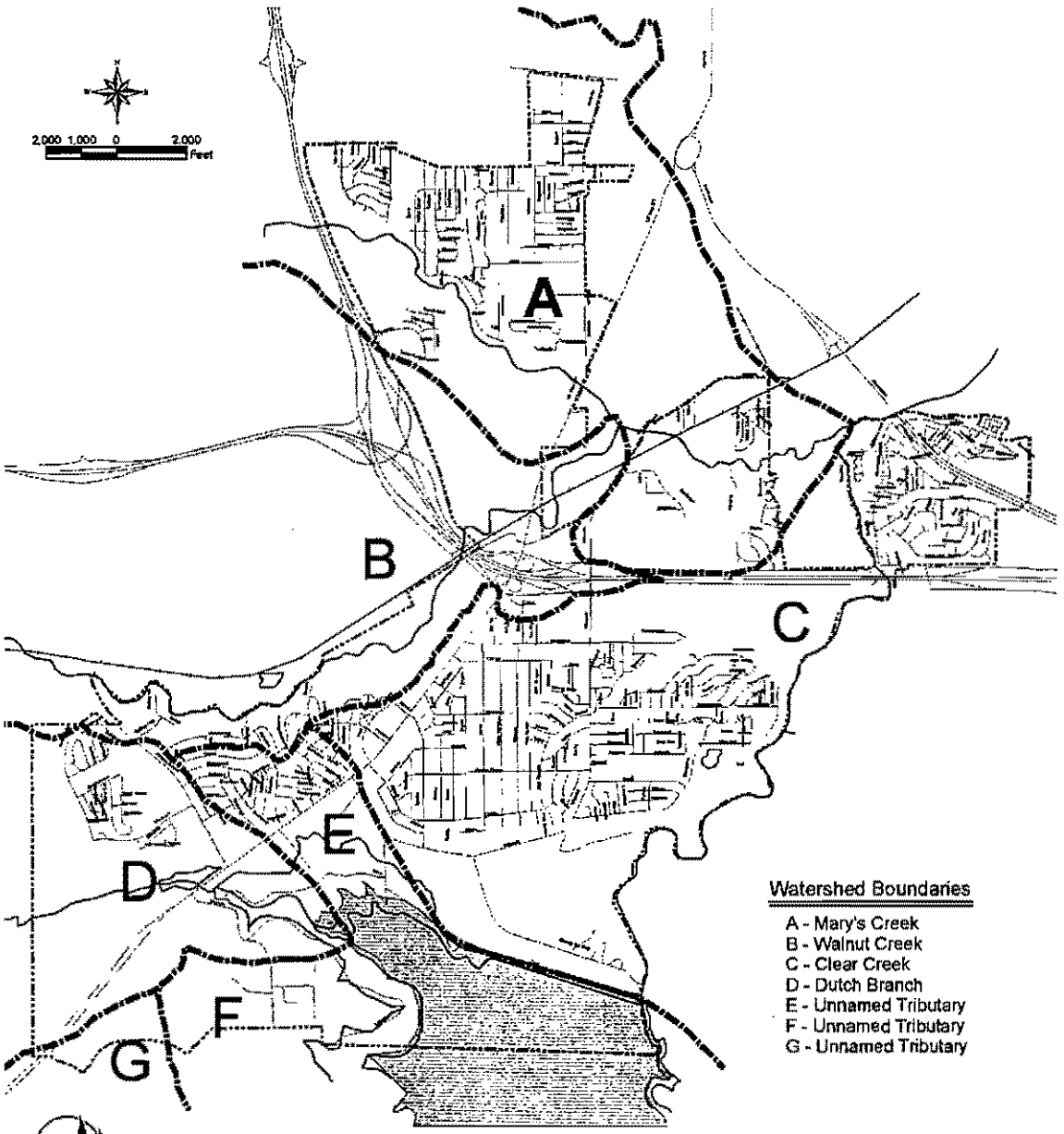
Each of these watersheds is further divided into drainage areas and subdrainage areas.

Specific drainage plans are being prepared for each watershed and are included in Section 9.4 of the Drainage element of the Comprehensive Plan. As new development is constructed, that development must accommodate the designated drainage plan, or devise an alternate plan with similar performance. Drainage requirements in previously developed areas have been included in the Capital Improvements Program for future funding and construction by the City.

Floodplains

Floodplains in Benbrook have been identified by the Federal Emergency Management Agency (FEMA) since May 1974 and the City entered the national flood insurance program in July 1979. FEMA delineates the 100-year floodplain

Watershed Boundaries



Benbrook

City of Benbrook, Texas

March 2003 | Figure 1

for flood insurance purposes, but also provides information on the 10-year, 50-year and 500-year floods as well. The 100-year floodplains in Benbrook are presented in Figure 2.

Natural floodplains have developed over many centuries as a result of the types and frequencies of floods that have occurred. Streams typically will scour a channel to a capacity of a 2-year storm, with an adjacent larger floodplain that will carry a 10-year to 100-year flood on a more infrequent basis. Problems occur when urban development is allowed to encroach into the floodplain. Most people have short concepts of time, and are often surprised at the magnitude of flooding which may occur in an area on a relatively infrequent basis. The second problem occurs when urban development in a watershed increases runoff, by increasing the amount of impervious area (rooftops, streets, etc.) This increases the quantity of water in a flood and the speed it travels.

There are approximately 1,564 acres of 100-year floodplain in Benbrook, including 513 homes. Based on average household size, it is estimated that approximately 1,195 residents of Benbrook are at risk of flooding by the 100-year flood.

Since 1979, the City has adopted increasingly stringent regulations over new development within floodplains. Currently, no new residences or buildings are permitted within the floodplain. Unfortunately, almost all of the 532 homes and buildings at risk were constructed prior to these newer regulations. The City is attempting to correct flooding in these areas through implementation of capital projects included in the Drainage element of the Comprehensive Plan.

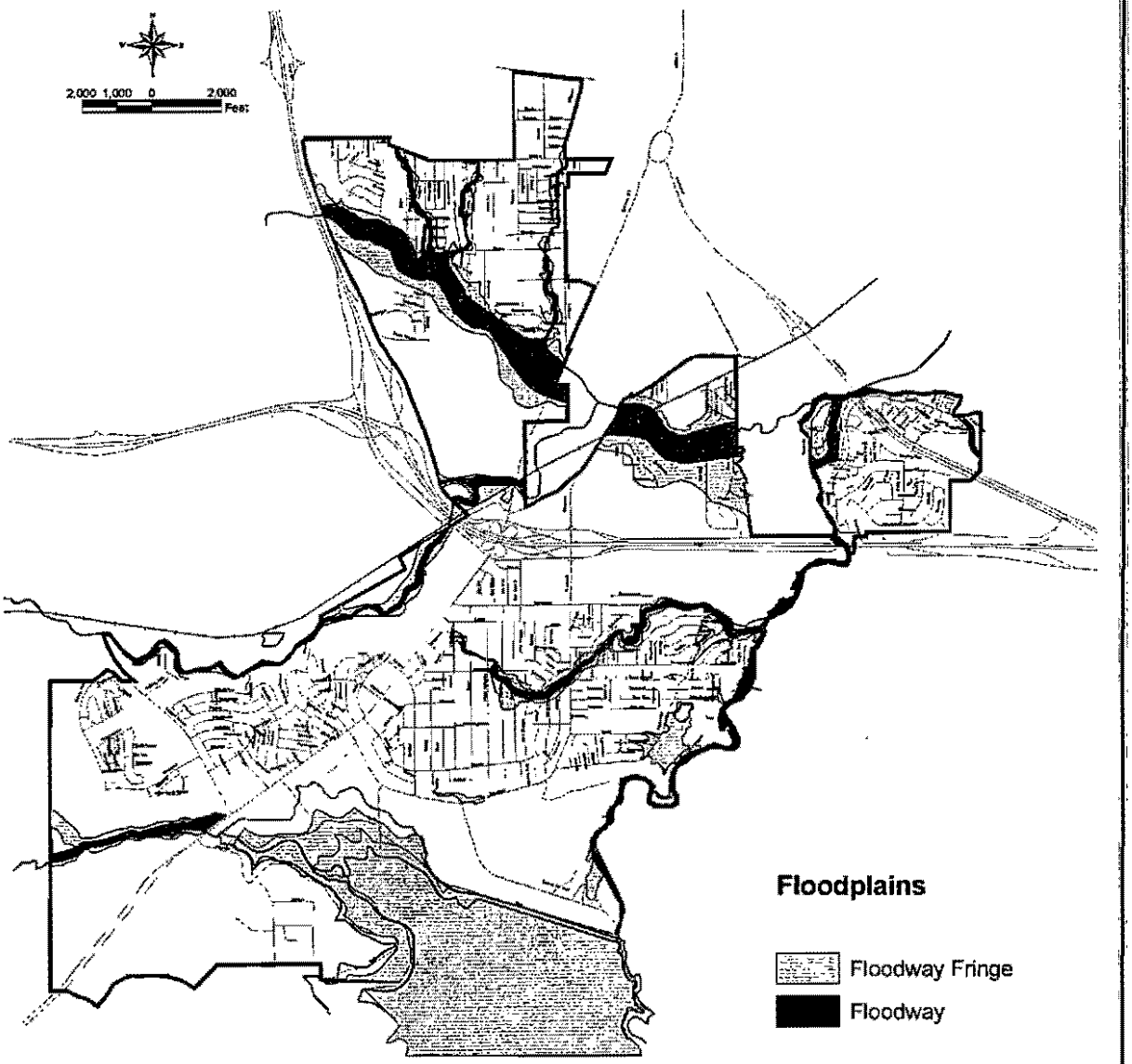
Runoff Water Quality

Recently, the issue of water quality in storm water has become more important. When storm water flows across the ground, it picks up and transports a number of pollutants, including sediment, oil and grease from roadways, fertilizers and pesticides from lawns, and other contaminants from various sources. For the past several decades, water pollution control has focused on 'point sources', such as sewage treatment plants and industrial waste treatment plants. In recent years, it has become evident that 'nonpoint source pollution' from runoff is now much more of a problem to water quality than point sources. As a result, the U.S. Environmental Protection Agency is implementing regulations designed to improve the quality of storm water.

In October 1992, the EPA promulgated storm water permit requirements for certain industrial and construction activities to protect storm water quality. Cities with populations greater than 100,000 were required to implement certain storm water quality management programs. Benbrook has participated in a program through the North Central Texas Council of Governments to develop region wide storm water programs. The committee has developed guidance documents for construction activities, residential development and industrial activities. Any new construction covering more than five acres is required to obtain a storm water permit from the U.S. EPA.

There is little data on water quality in streams in Benbrook. The Tarrant Regional Water District maintains three monitoring stations in Benbrook Lake. All samples

Floodplains



City of Benbrook, Texas

March 2003 | Figure 2

collected have been within normal ranges. The nearest continuous automated river monitoring station is near downtown Fort Worth and is not representative of conditions in Benbrook. There are few known problems with water quality in streams and waterways in Benbrook.

The U.S. Environmental Protection Agency has identified pollutants of concern to include biochemical oxygen demand (BOD), sediment (or total suspended solids), pathogens, oil and grease and any pollutant that has been identified as causing impairment of the receiving water. Sampling data from the NCTCOG's storm water program for Phase 1 cities indicates the following parameters to be of concern for various land use types:

Land Use Type	Parameter
Residential	Arsenic
	Chlordane
	Diazinon
	Chemical oxygen demand (COD)
	Fecal coliforms
	Fecal streptococcus
	Total and dissolved phosphorus
	Total and Kjeldahl nitrogen
Commercial	Fecal coliform
	Fecal streptococci
	Lead
	Diazinon
	Oil and grease
	Arsenic
	Chromium
Industrial	Cadmium
	Chloride
	Chromium
	Copper
	Lead
	Mercury
	Nickel
	Zinc
	Oil and grease
	Phenols
	Sulfates
	Total suspended solids

The City is continuing to work with various agencies to identify existing water quality in Benbrook streams and threats to that quality. Among the agencies that will be contacted are the Benbrook Water & Sewer Authority, City of Fort Worth, Tarrant County Health Department, Tarrant Regional Water District, Texas Commission on Environmental Quality, U.S. Army Corps of Engineers and U.S. Environmental Protection Agency.

Public Outreach Regarding Flood Hazards

In addition to the direct drainage management activities, the City also performs a number of public information and outreach programs to inform the public of flood hazards. The Community Development Division routinely responds to 10 to 20 inquiries per month from residents regarding floodplain boundaries. The City and City Engineer also perform technical evaluations of specific flooding or erosion problems for residents.

The City has provided a number of reference books on floodplain management to the Benbrook Public Library for use by the general public. These references are also available at City Hall. The City staff issues press releases from time to time on various flood management topics to the local newspapers. The City has compiling a mailing list of residents and landowners located within the floodplain for use in direct mail campaigns.

Benbrook participates in the Community Rating System for floodplain management. A requirement of Benbrook's participation include at least one newsletter article annually to the entire community regarding floodplain management activities and one letter annually to everyone within the 100-year floodplain.

II. Storm Water Management Plan - Six Minimum Measures

The U.S. Environmental Protection Agency has established six minimum measures that are required for to comply with the General Permit for Phase 2 cities.

A. Public Education and Outreach

EPA requires that participating communities distribute educational materials and perform outreach activities to inform citizens about the need to protect runoff quality and the effects that pollution can have on water quality. TCEQ requires a public education program to distribute educational materials or equivalent outreach activities to inform residents, visitors, public employees, businesses, commercial and industrial facilities and construction site personnel. The outreach must inform the public about the impacts polluted storm water runoff can have on water quality, hazards associated with illegal discharges and improper disposal, and way they can minimize their impact on storm water quality.

1. What We Are Currently Doing:

The City of Benbrook has already been conducting public education and outreach projects that benefit storm water quality:

a. The City distributes Texas Smartscape CDs to new residents (based on the Chamber of Commerce's newcomer packets). The Smartscape CD was developed by the North Central Texas Council of Governments and promotes the use of native plants in landscaping to reduce water and fertilizer requirements.

b. The City has installed plastic storm drain markers on each of the City's curb inlets that caution residents not to dump waste into the inlets because they flow directly to a stream.

c. The City participates in the "Keep Texas Beautiful" program, which includes regular litter collection programs along major streets and annual participation in the Trinity Trash Bash that collects litters from streams and parks.

d. The City has an "Adopt-a-street" litter program that designates a local civic group to be responsible for litter collection along designated city streets.

e. The City distributes bookmarks that promote selected facts from the Smartscape CD. These are distributed to new residents in a letter written by the Mayor.

2. New Programs We Plan To Do In Next Five Years:

As part of our Storm Water Management Plan, the City of Benbrook commits to adding the following programs during the next five-year period:

a. The City will prepare periodic articles and information pieces for distribution through water bills, local newspapers, and the Benbrook Community Newsletter.
b. The City will develop brochure for distribution to new residents outlining the importance of water quality protection and the steps that each residents can take to protect water quality.
c. The City will develop a web page as part of the City's web site that will promote storm water protection. The site will have links to other related storm water web sites (North Central Texas Council of Governments, Texas Commission on Environmental Quality, U.S. Environmental Protection Agency)
d. The staff will develop and post "no dumping" signs and major stream/street crossings and at parks
e. The City will offer speakers to speak at civic groups
c. The staff will develop a program module for elementary school students, that may include coloring books, poster contest, and/or field activities to promote storm water quality protection.

3. Adopted Five-Year Plan for Public Education and Outreach

Target Date	Activity/Goal	Measurable Annual Goal
Year Zero (current activities)	a. Continue to install/replace storm drain markers on curb inlets	a. Install and/or replace storm drain markers so that 99 percent of curb inlets are marked at all times.
	b. Continue to distribute Smartscape CDs to newcomers	b. Distribute at least 500 Smartscape CDs via Chamber newcomer packet at service counters in City Hall, the Benbrook Water and Sewer Authority, and Benbrook Public Library
	c. Continue adopt-a-street litter program and Keep Texas Beautiful programs	c. Benbrook will continue as an active participant in the Keep Texas Beautiful Program and will maintain at four streets as part of the adopt-a-street program. Document and report volume of litter collected annually.
Year One (3/03-2/04)	a. Continue Year Zero activities b. Develop articles for distribution through water bills, local newspapers, and the Benbrook	a. See above. b. One article annually in water bill Two articles annually in

Target Date	Activity/Goal	Measurable Annual Goal
	Community Newsletter.	local newspapers One article annually in Benbrook Community Newsletter
	c. Develop brochure for distribution with Mayor's welcome letters, public buildings, and civic/community organizations	c. Develop brochure and distribute at least 100 copies during first year
	d. Develop web site	d. Web site will be operational by 10/03
Year Two (3/04-2/05)	a. Continue Year One activities b. Post no-dumping signs at major street/creek intersections and at parks c. Provide speakers for civic organizations	a. See above b. Signs will be installed at 90 percent of crossing by end of year c. Staff will contact all known civic groups offering speakers, Will report number of speeches given.
Year Three (3/05-2/06)	a. Continue Year Two activities b. Develop and implement program for use in elementary schools	a. See above b. Develop curriculum and materials by 7/05. Contact Benbrook Elementary and Westpark Elementary to discuss scheduling.
Year Four (3/06-2/07)	a. Continue Year Three activities	a. see above
Year Five (3/07-2/08)	a. Continue Year Four activities	a. see above

4. Additional Suggestions from Storm Water Advisory Committee

The Storm Water Advisory Committee also considered the following ideas, which are not included as part of the current five-year plan:

Distribute Storm Drain Marker as a Coaster
Place logo on t-shirts, pizza boxes
Have booth at Summerfest with demos of best practices
Create promotional products such as refrigerator magnets, etc
Work with science teachers, scouts
Place info on vehicle leaks at local automobile parts stores and service centers
Provide information on preventing and detecting vehicle leaks to local car maintenance shops, auto parts distributors, etc.
Stress quality-of-life, water is essential
Participate in regional TV/radio spots

Broadcast storm water programming on the government access channel
Provide educational resources at the public library and Benbrook Community Center/YMCA
Adopt a mascot
Work with local civic clubs, such as Lions Club, Churches, Neighborhood Associations, TMCA, American Legion, VFW, PTA, Senior Citizens
Target homebuilders
Adopt catchy jingle, slogan
Host fair or other special event
Put "storm water blotter" of violations in newspaper
Patrol dumpsters for illegal dumping or cleaning

These activities will be reevaluated for possible inclusion in the next five-year Plan.

B. Public Involvement and Participation

EPA requires that participating communities provide opportunities for citizens to participate in program development and implementation, including effectively publicizing public hearings and/or encouraging citizen representatives on a storm water management panel. TCEQ requires the community to identify and implement a public involvement and participation program that includes provisions to allow opportunities for all constituents within the City to participate in the storm water management program development and implementation.

1. What We Are Currently Doing:

The City of Benbrook has already been conducting public involvement and participation programs that benefit storm water quality:

a. In September 2002, the Benbrook City Council appointed a Storm Water Advisory Committee to assist in developing Storm Water Management Plan. The Committee consists of the seven existing members of the Benbrook Parks and Recreation Board, plus nine additional appointees who volunteered to serve. Applicants were requested through the local newspaper and the Benbrook Community Newsletter, and volunteers include a wide range of backgrounds. The Storm Water Advisory Committee assisted in the development of this Plan by suggesting activities and reviewing drafts of the Plan as it was developed.

b. The Storm Water Management Plan is expected to be adopted by the City Council in February. The City Council will hold public hearing on adoption of Plan, including publishing an announcement in the newspaper, placing notice on the City's cable TV channel, and notice on the City web page.

c. The City used local Boy Scouts to install drain markers on the City's curb inlets in 2001

d. The City has hosted Trinity Trash Bash for the past several years, which includes volunteers and volunteer groups removing litter for streams in City parks.

2. New Programs We Plan To Do In Next Five Years:

As part of our Storm Water Management Plan, the City of Benbrook commits to adding the following programs during the next five-year period:

a. The Storm Water Advisory Committee will continue to be used to review the status of Plan implementation on an annual basis. The Plan status will also be presented to City Council on an annual basis.

b. The City will train volunteers to assist in screening storm water outfalls to detect illicit discharges.

3. Adopted Five Year Plan for Public Involvement and Participation

Target Date	Activity/Goal	Measurable Goal
Year Zero (current activities)	a. Continue hosting annual Trinity Trash Bash	a. Host Trinity Trash Bash on an annual basis. Report number of volunteers and volume of trash collected.
Year One (3/03-2/04)	a. Continue Year Zero activities b. Review of plan status by citizens advisory committee	a. see above b. Annual review of plan status by Storm Water Advisory Committee
Year Two (3/04-2/05)	a. Continue Year One activities b. Brief City Council on Plan status	a. see above b. Annual presentation before City Council on status of Plan implementation
Year Three (3/05-2/06)	a. Continue Year Two activities b. Develop citizens monitoring groups utilizing volunteers from local civic/community organizations	a. see above b. Train at least four volunteers on conducting outfall screening.
Year Four (3/06-2/07)	a. Continue Year Three activities	a. see above
Year Five (3/07-2/08)	a. Continue Year Four activities	a. see above

4. Additional Suggestions From Storm Water Advisory Committee

As part of the Plan development, the Storm Water Advisory Committee suggested the following addition activities, which are not included in the current five year Plan:

Develop an elementary school project or contest, host a pizza party
Work with the Boy Scouts/Girl Scouts
Train the Citizens on Patrol to look for environmental violations
Participate in regional telephone hot line for violations
Use demonstrations of storm drain cleaning as school field trips
Recruit volunteers to monitor outfalls
Expand Adopt-a-Street program, implement Adopt-a-Stream program
Use Stream Team to evaluate local projects
Involve Benbrook Youth Baseball Softball Association (BYBSA), perhaps trade litter for lights
Involve other civic groups, such as Lion Club, veterans organizations, churches, neighborhood associations.

These activities may be included in future years if deemed practical.

C. Illicit Discharge Detection and Elimination

EPA requires that participating cities develop and implement a plan to detect and eliminate illicit discharges to the storm sewer system. This includes developing a storm sewer system map and informing the community about hazards associated with illegal discharges and improper disposal of waste. TCEQ requires the community to establish a program to detect and eliminate illicit discharges to the storm sewer system. The SWMP must list the techniques used for detecting illicit discharges and the appropriate enforcement procedures for removing the source of an illicit discharge. The SWMP must also include measures to prevent illegal dumping and other non-storm water discharges.

1. What We Are Currently Doing:

The City of Benbrook has already been conducting activities in the area of illicit discharge detection and elimination that benefit storm water quality:

a. The storm drain system has been mapped and placed in the City's Geographic Information System.
b. The City participates with the City of Fort Worth in their household hazardous waste collection program. The City annually budgets to allow citizens to dispose of household hazardous waste at Fort Worth collection sites, and annually hosts a collection day within Benbrook.
c. The City has adopted and enforces at least two ordinances prohibiting illegal discharges to the storm drain system.
d. The City has installed plastic storm drain markers on all curb inlets informing residents not to dump in the inlet.

2. New Programs We Plan To Do In Next Five Years:

As part of our Storm Water Management Plan, the City of Benbrook commits to adding the following programs during the next five-year period:

a. The City will field verify the location and condition of all storm drain outfalls included on the storm drain system map.
b. The City will perform simple dry weather testing of storm drain outfalls to identify potential indicators of cross-connections or other illicit discharges.
c. In subsequent years, outfalls will be randomly inspected and tested for indicators of illicit discharges.

3. Adopted Five Year Plan for Illicit Discharge Elimination

Target Date	Activity/Goal	Measurable Goal
Year Zero (current activities)	a. Completed mapping of storm drain outfalls	a. map completed
	b. Continue household hazardous waste collection program	b. Continue to participate in Fort Worth's household hazardous waste program.

Target Date	Activity/Goal	Measurable Goal
		Report number of participants
Year One (3/03-2/04)	a. Continue Year Zero activities b. Complete field verification of all outfalls c. Begin dry weather screening on outfalls	a. see above b. Locate and describe all outfalls on storm system map c. Complete dry weather screening on 50 % of outfalls
Year Two (3/04-2/05)	a. Continue Year One activities b. Complete dry weather screening on remaining 50% of outfalls	a. see above b. Complete dry weather screening on remaining 50 percent of outfalls
Year Three (3/05-2/06)	a. Continue Year Two activities b. Remove identified illicit discharges	a. see above b. Any identified cross-connections or illicit discharges will be removed.
Year Four (3/06-2/07)	a. Continue Year Three activities b. Randomly test outfalls for indicators of illicit discharges	a. see above b. The staff, in conjunction with volunteers, will randomly test 20% of outfalls for indicators of contamination
Year Five (3/07-2/08)	a. Continue Year Four activities	a. see above

4. Additional Programs Suggested By Storm Water Advisory Committee

The following ideas were suggested by the Storm Water Advisory Committee, but are not included in the current five-year Plan:

Continue to expand Household Hazardous Waste Program
More Aggressive enforcement against illegal dumping
Levy fines, make examples of violators
Place more trashcans at parks
Better litter control, more active around lake
Promote vehicle leak detection program

D. Construction Site Storm Water Runoff Control

EPA and TCEQ requires that participating communities develop, implement, and enforce an erosion and sediment control program for construction site activities that disturb one or more acres of land. The controls may include silt fences and temporary storm water detention ponds.

1. What We Are Currently Doing:

The City of Benbrook has already implemented a program to control construction site runoff quality, including the following:

a. The City has adopted an erosion control ordinance regulating construction site runoff from any construction site that exceeds 5,000 square feet in size. The Ordinance requires a storm water pollution prevention plan and/or an erosion and sediment control plan as part of the construction plans and prior to the issuance of a grading or building permit. The Ordinance requires the posting of an Erosion Control Deposit Account, as well as various enforcement actions.

b. The City's Inspection Department inspects all construction sites on regular basis to assure conformance with the erosion control requirements.

2. New Programs We Plan To Do In Next Five Years:

As part of our Storm Water Management Plan, the City of Benbrook commits to adding the following programs during the next five-year period:

a. The City will develop and distribute a brochure targeted toward builders and developers. The brochure will promote training opportunities through appropriate organizations.

b. The City will cross-train other City employees to monitor construction and identify violations.

c. The City will recognize builders and developers that demonstrate a high level of compliance.

3. Adopted Five Year Plan for Construction Site Runoff Control

Target Date	Activity/Goal	Measurable Goal
Year Zero (current activities)	a. Erosion control ordinance adopted b. Continue periodic training of construction inspectors c. Continue inspecting construction sites	a. Continue enforcement b. Provide training opportunities for building inspectors c. Inspect construction sites for erosion control on at least a weekly basis and after each ½" rain event
Year One (3/03-2/04)	a. Continue Year Zero activities b. Maintain 95% compliance on	a. see above b. Maintain compliance on

Target Date	Activity/Goal	Measurable Goal
	construction sites and pursue enforcement actions against violators	95% of all active construction sites at any time. Actively pursue correction of any violations.
	c. Develop brochure and publicize training opportunities to builders/developers	c. Develop or modify a brochure targeted to builders by 9/03. Provide copy to each development inquiry and/or permit applicant
	d. Cross-train other City employees to monitor construction	d. Cross train 50% of Street Dept. and Police Dept. to identify violations.
	e. Recognize builders/developers in compliance	e. Annually recognize builders and developers at City Council meeting
Year Two (3/04-2/05)	a. Continue Year One activities	a. see above
Year Three (3/05-2/06)	a. Continue Year Two activities	a. see above
Year Four (3/06-2/07)	a. Continue Year Three activities	a. see above
Year Five (3/07-2/08)	a. Continue Year Four activities	a. see above

4. Additional Programs Suggested by Storm Water Advisory Committee

The following ideas were considered by the Storm Water Advisory Committee, but are not included within the current five-year Plan:

Participate in citizen's hot line
Clarify ordinance to eliminate loopholes
Utilize students as interns (earn credit hours at Junior College), part-time inspectors
Provide training for builders
Participate in Clean Construction Campaign

E. Post-Construction Storm Water Management in Areas of New Development and Redevelopment

EPA and TCEQ require that participating communities develop, implement, and enforce a program to address discharges of post-development storm water runoff from new development and redevelopment areas. Applicable controls could include preventative actions such as protecting sensitive areas, such as wetlands, or the use of structural best management practices such as grassed swales or porous pavement.

1. What We Are Currently Doing:

The City of Benbrook already has adopted programs for development and redevelopment that benefit post-development storm water runoff quality, including:

a. The City amended its subdivision ordinance in June 2002 to prohibit new development within the 100-year floodplain (which automatically creates a natural buffer), and requires onsite detention for new development outside of the 100-year floodplain so that post-development peak runoff is not increased over natural conditions. The Ordinance also requires that detention ponds be designed to capture sediment and floatables from the 25-year storm event.

b. The City also adopted adopted its Storm Water Quality ordinance in July 2002 that requires new development to consider post-development runoff quality as part of the subdivision design. The Ordinance has a goal of 80% removal of total suspended solids from standard conditions. It encourages both structural and non-structural approaches to reduce runoff pollutants.

c. The City of Benbrook is participating in the regional effort by the North Central Texas Council of Governments to prepare a new Integrated Storm Water Management (iSWM) Design Manual for the North Central Texas region. The new manual will replace the existing drainage criteria manual used by Benbrook that primarily treats drainage as a flood control problem. The new manual will include storm water quality criteria as part of the drainage design, including best management practices and the use of non-structural alternatives.

   The City is participating in the program during the current year by providing funding to the regional effort and by having a staff member serve on the Regional Steering Committee. It is expected that the draft manual will be completed in Fall 2003 and that the City will adopt the Plan sometime in 2004.

d. The City has adopted a "parkland dedication policy" that requires the dedication of parks and open space as a condition of approval

for residential subdivisions. The preservation of open space serves to reduce post-development pollutants.

2. What We Plan To Do In Next Five Years:

As part of our Storm Water Management Plan, the City of Benbrook commits to continuing to participate in the North Central Texas Council of Government's Integrated Storm Water Management Design Manual process and to amend other ordinances to conform if warranted.

3. Adopted Five Year Plan for Post Construction Runoff Control

Target Date	Activity/Goal	Measurable Goals
Year Zero (current activities)	a. Continue participation in NCTCOG's preparation of Integrated Storm Water Management Design manual	a. Payment of funding share.
Year One (3/03-2/04)	a. Continue Year Zero activities	a. see above
Year Two (3/04-2/05)	a. Continue Year One activities b. Approve standards and criteria proposed by NCTCOG's iSWM Design manual c. Revise ordinances as necessary	a. see above b. Adopt iSWM Design Manual c. Revised Erosion Control Ordinance and Subdivision Ordinance as necessary
Year Three (3/05-2/06)	a. Continue Year Two activities	a. see above
Year Four (3/06-2/07)	a. Continue Year Three activities	a. see above
Year Five (3/07-2/08)	a. Continue Year Four activities	a. see above

4. Additional Suggestions by Storm Water Advisory Committee

The following suggestions were discussed by the Storm Drain Advisory Committee, but are not included in the current five-year Plan:

Utilize grass-lined swales and other landscaping for storm water quality purposes

Promote alternate street pavement and design to reduce runoff, such as porous pavements or other alternate pavements, narrower widths, etc.

These will be revaluated for future consideration during the next five-year plan.

F. Pollution Prevention/Good Housekeeping Measures for Municipal Operations.

EPA requires that participating communities develop and implement a program with the goal of preventing or reducing pollutant runoff from municipal operations. The program must include municipal staff training on pollution prevention measures and techniques (e.g. regular street sweeping, reduction in the use of pesticides or street salt, or frequent catch basin cleaning.

TCEQ requires good housekeeping practices as part of park and open space maintenance; street, road, or highway maintenance; fleet and building maintenance; storm water system maintenance; new construction and land disturbance; municipal parking lots; vehicle and equipment maintenance and storage yards; waste transfer stations; and salt/sand storage locations. TCEQ requires a training program for all employees responsible for municipal operations subject to the good housekeeping program. The training program must include training materials directed at preventing or reducing storm water pollution from municipal operations and examples or descriptions of the training materials must be included in the SWMP. TCEQ requires that if structural controls are required, then maintenance be performed to maintain effectiveness and that the SWMP list all maintenance activities, maintenance schedules and long-term inspection procedures for controls used to reduce floatables and other pollutants. TCEQ requires that the SWMP address the proper disposal of dredge spoil, accumulated sediments, and floatables. The TCEQ requires that the SWMP include a list of all municipal activities that are subject to the good housekeeping program and any municipal operations that are covered under other industrial storm water regulations.

1. What We Are Currently Doing:

The City of Benbrook has already implemented some activities in its own operation that benefit storm water runoff quality:

a. The City sweeps its 104 miles of streets on a regular basis. The current goal is to sweep every street once every 60 days.
b. The City recently conducted a mini-environmental audit of the City's maintenance facility. The audit identified several activities that could be implemented to reduce potential pollution.

2. New Programs We Plan To Do In Next Five Years:

As part of our Storm Water Management Plan, the City of Benbrook commits to adding the following programs during the next five-year period:

a. The staff will develop a training program for all streets and parks employees on pollution prevention practices.
b. The staff will develop and implement a leak detection program for all City vehicles
c. The City's Parks Department will reduce use of fertilizer, pesticides and herbicides in parks and other City yards

d. The City will cover and contain runoff from vehicle cleaning areas at the City Maintenance facility
e. The City will develop and implement a spill response plan
f. The City will cover the fueling and material storage areas at the City's Maintenance Facility
g. The City will implement a regular stream maintenance program to maintain flows, protect habitat, and reduce debris
h. The City will construct a containment and detention/treatment pond to contain runoff from the City's Maintenance facility.
i. The City will develop and implement a program to floatables and other litter entering streams within the Community.

3. Adopted Five Year Plan for Pollution Prevention

Target Date	Activity/Goal	Measurable Goal
Year Zero (current activities)	a. Periodic street sweeping b. Conduct mini-environmental audit of maintenance facility	a. Sweep every street every 60 days (i.e. sweep 624 miles annually) b. Completed
Year One (3/03-2/04)	a. Continue Year Zero activities b. Develop municipal employee training program on pollution prevention c. Fully implement City vehicle leak detection inspection program d. Reduce use of fertilizer, pesticides and herbicides in parks and other City yards e. Cover and contain vehicle cleaning areas	a. see above b. Train 100% of Street and Parks personnel annually c. Inspect 100% of City vehicles annually d. Reduce volume of fertilizer, pesticides, and herbicides by 5% e. Complete construction
Year Two (3/04-2/05)	a. Continue Year One activities b. Develop and implement spill response plan c. Cover fueling and material storage areas d. Regular stream maintenance program	a. see above b. complete plan c. complete construction d. Streams will be inspected monthly and debris and litter removed semiannually
Year Three (3/05-2/06)	a. Continue Year Two activities b. Develop containment and detention/treatment pond for maintenance facility runoff	a. see above b. Design and construction completed
Year Four (3/06-2/07)	a. Continue Year Three activities b. Implement program on floatables	a. see above b. Program developed and implemented
Year Five (3/07-2/08)	a. Continue Year Four activities	a. see above

4. Additional Suggestions by Storm Water Advisory Committee

The following suggestions were made by the Storm Water Advisory Committee, but were not included in the current five-year plan:

Utilize integrated pest management to reduce pesticides
Inform citizens of City activities
Develop demonstration garden with literature available, partner with Native Plant Society?
Continue xeriscaping City-maintained landscaped areas

These will be reevaluated at the end of the five-year planning period for possible inclusion in the following five-year program.

III. MUNICIPAL CONSTRUCTION ACTIVITIES

A. GENERAL APPLICABILITY

The City of Benbrook also plans to regulate municipal construction site activities under the optional minimum control measure No. 7 offered by the Texas Commission on Environmental Quality. This coverage includes construction exceeding one-acre in extent that is conducted directly by City personnel or by contractors working directly for the City on a capital improvement project. This activity does not include public improvement construction being performed by developers, such as subdivision construction. This activity will occur only within the city limits of the City of Benbrook.

B. PROJECTS BUILT BY CITY FORCES

Construction activities performed directly by City personnel are generally small and many will fall under the one-acre criteria. For those City constructed projects that do exceed one-acre in extent, the City will implement appropriate construction best management practices as identified in the "Storm Water Quality Best Management Practices for Construction Activities," latest edition, published by the North Central Texas Council of Governments. These BMPS will often include silt fences, inlet protection, stabilized construction entrances and sediment filter dikes. In some cases, sediment basins may be required. For complex projects, city staff will consult with the City Engineer for an appropriate Storm Water Pollution Prevention Plan design.

BMP installation will be inspected on a regular basis by the City's public improvements inspector, who also serves as the City's primary erosion control inspector. The City's inspector works in a different Department than the Street and Park crews and will report violations through the Director of Public Services and the Assistant City Manager.

Upon completion, projects will be stabilized with perennial vegetation or mulch. Erosion control features will remain in place until 70 percent coverage is obtained.

C. PROJECTS BUILT UNDER CONTRACT FOR CITY

The City also constructs streets, drainage projects, and public buildings as part of its capital improvement program. These projects are designed by the City Engineer. All plans for projects built under this General Permit will include a SWPPP as part of the plan documents. The General Conditions and Specifications in the Contract Documents will include a requirement by the contractor to conform to the erosion control provisions of the design, or as may be modified by the City in the field, as well as all applicable State and Federal regulations.

In addition to the Contractor's own inspections, the City's Public Improvements Inspector will inspect all capital improvement projects for conformance with the provisions of the SWPPP. The Contractor will be responsible for maintaining records of maintenance activities on the BMPs.

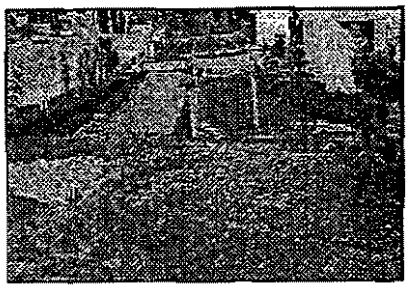
The City requires a two-year maintenance bond for all capital improvement projects and will use this to assure that final stabilization is achieved. BMPs will remain in place until 70 percent coverage is established.

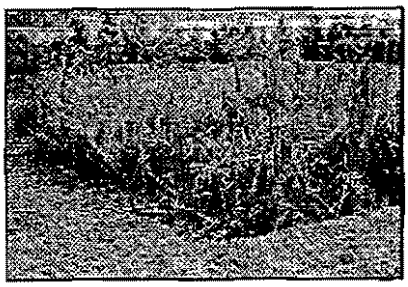
IV. REPORTING ACTIVITIES

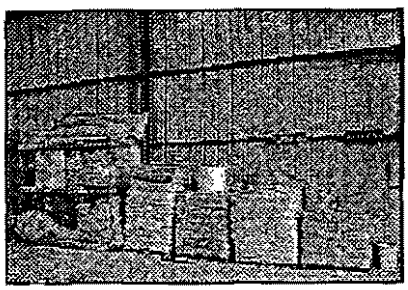
The City of Benbrook will make an annual report to the Texas Commission on Environmental Quality by the end of March of each Year. The report will include the activities of the City as compared to the measurable goals established and an evaluation of the effectiveness of each activity.

Designing and Implementing an Effective Storm Water Management Program

Storm Water NPDES Phase II Regulations

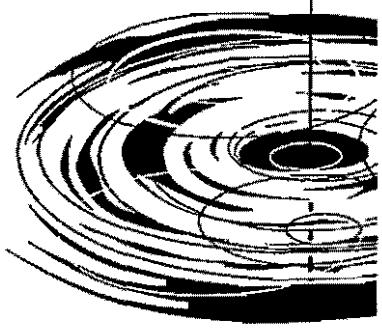






February 2000

American Public Works Association



Excerpt – Complete manual available from the American Public Works Association at www.apwa.net/

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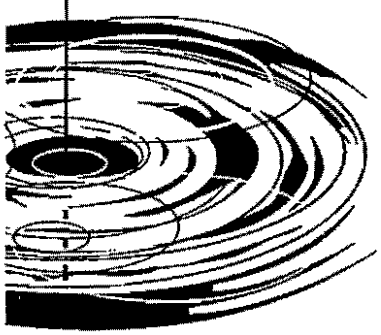
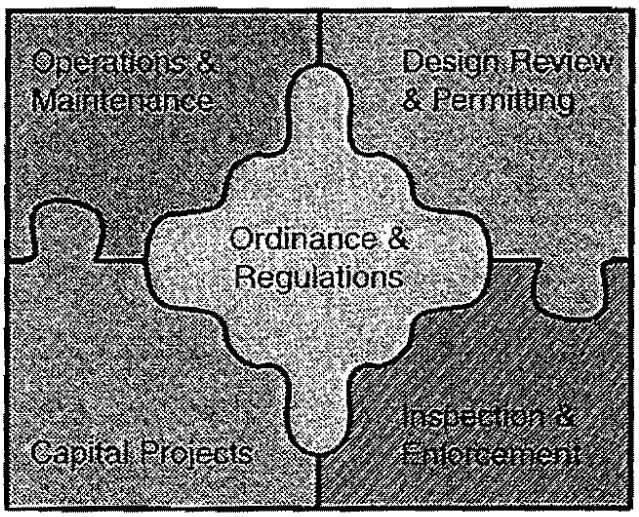


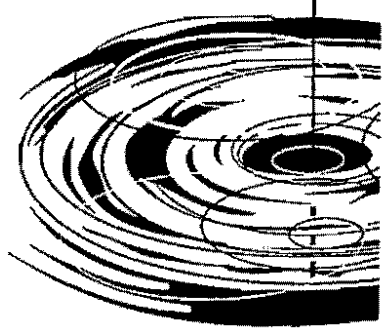
Chapter 3
What Does an Effective Storm Water Management Program Look Like?



Effective storm water program planning requires several key steps: (1) identifying your local needs and requirements for compliance with the Phase II rule; (2) assessing alternatives; and (3) developing a plan to implement the selected alternatives. Chapters 1 and 2 of this workbook addressed the need for storm water management programs for smaller communities, from both a practical and regulatory context.

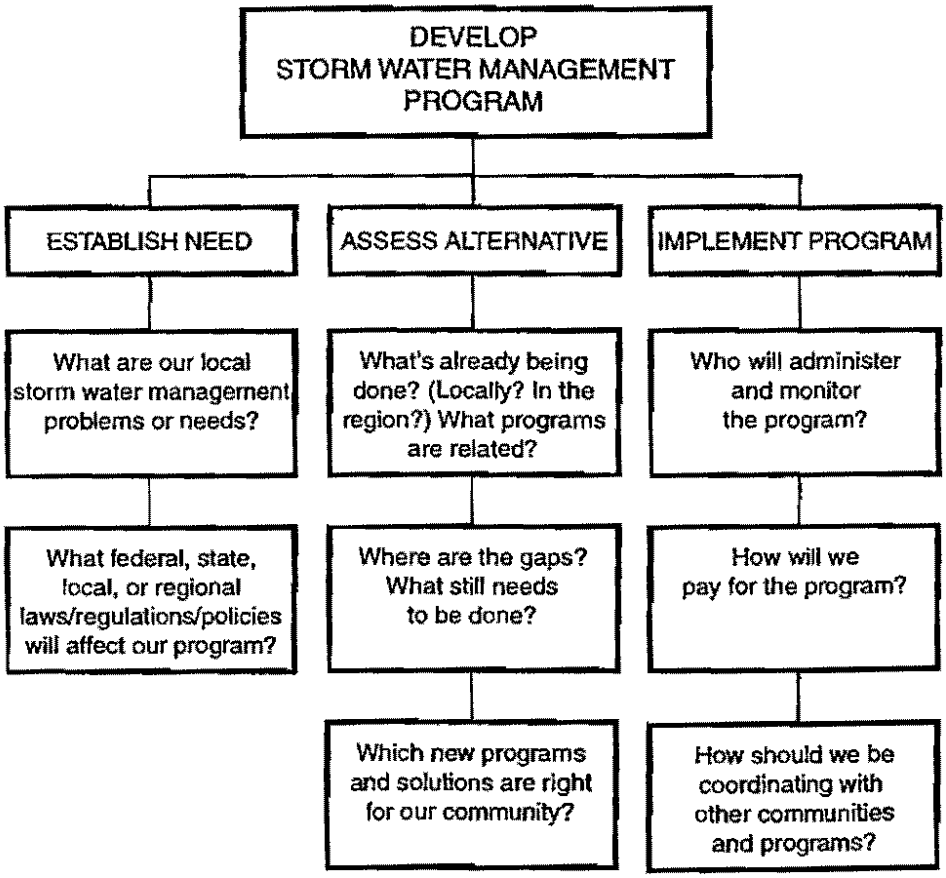
This chapter describes the alternative approaches to storm water management required by the Phase II rule and the process of evaluating the best solutions for your community. The chapter addresses typical components of a storm water management program, including:

- New or revised regulations/ordinances;
- Design review and permitting;
- Inspection and enforcement activities;
- System inventory/mapping;
- Operations and maintenance;



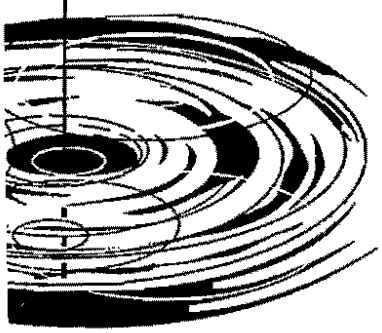
- Capital projects;
- Program planning;
- Public education;
- Project administration; and
- Linkages with other environmental programs.

First Things First



Before you begin planning a Phase II-compliant storm water management program, you should examine what's already being done in your community. At a minimum, ask yourself the following questions:

- What is the nature and status of your storm water system, including its capacity, how it operates, where the components of the system are located, what the maintenance routine is, and where the storm water discharges?



- What existing ordinances or regulations currently address storm water management directly or indirectly? Even if you do not have a storm water management ordinance, you may have other ordinances or regulations with features that affect storm water management, such as: land use and development, zoning, landscaping, wellhead protection, open space and conservation, economic development, growth management, etc.

- What related environmental programs may affect storm water management in the region?

- What storm water management programs are currently in place? How many of the six minimum control measures specified in the Phase II rule or identified by your local NPDES permitting authority are in place?

- Where are the gaps between current programs and policies and those that will be needed to effectively manage storm water and fulfill regulatory and permitting requirements?

Once you have answered these questions, you are ready to begin evaluating alternatives to fill those gaps. Each BMP should be evaluated using locally appropriate criteria, including:

- How much will it cost? Who will bear those costs? How acceptable are costs likely to be to affected stakeholders?

- What minimum control measures will this program element address?

- What is the likelihood of success (both technically and socio-politically) given local conditions?

- How easy or difficult will implementation be?

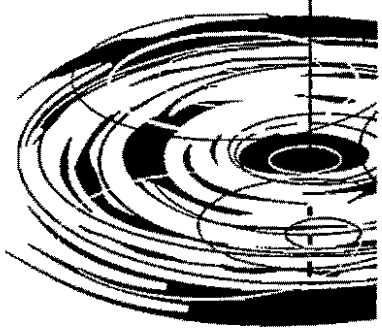
- Do we have the needed expertise, authority, and control?

- Is this alternative compatible with community values?

- Is there potential for cooperation with other agencies?

- What are the potential "unintended consequences" (environmental and otherwise)?

By answering these questions, you can better design a program that meets federal standards as well as the needs of your community. The sections that follow address additional questions that will help you understand the requirements of a Phase II storm water management program.



Will We Need New Ordinances or Regulations?

You will need to ensure that you have regulations or ordinances in place that satisfy the Phase II minimum control measures for:

- Construction site storm water runoff control;
- Post-construction storm water management in new development and redevelopment;
- Illicit discharge detection and elimination; and
- Illegal dumping
- Pollution prevention/ good housekeeping for municipal operations.

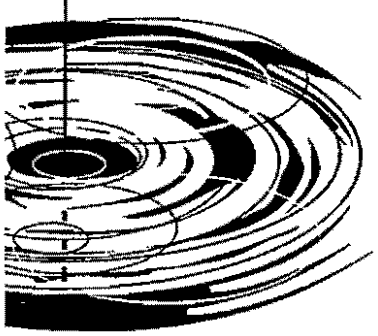
In addition to meeting new federal requirements for storm water management, developing and enforcing appropriate regulations can minimize your future cost of implementing and maintaining storm water facilities from newly developed areas.

Regulations to satisfy minimum control measures usually consist of design standards for new development and redevelopment; operations and maintenance requirements for private facilities; and ordinances/regulations prohibiting illicit discharges.

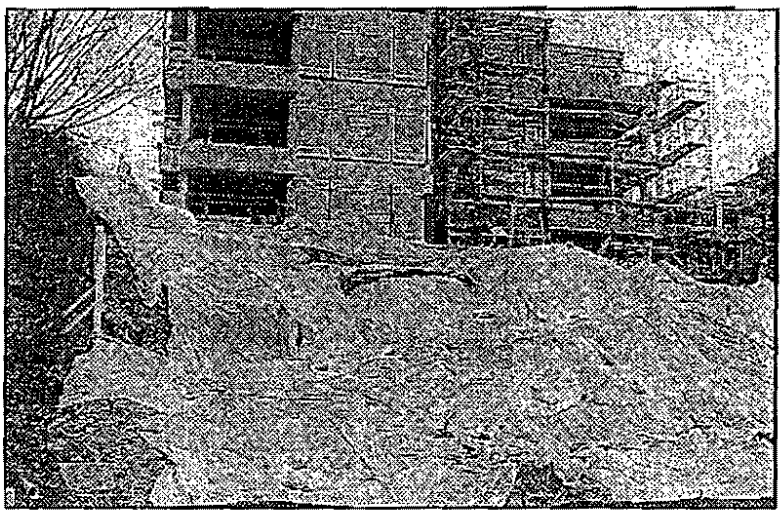
Design Standard Regulations for New Development and Redevelopment

Design standards to control storm water runoff should:

- Define what types of construction activities must comply with the standards;
- Define thresholds and standards for different types of construction activities, such as:
  - Small sites for single family residential construction,
  - Larger residential, commercial, or industrial sites,
  - Very large or unique residential, commercial, or industrial sites,
  - Sites in close proximity to environmentally sensitive areas, and
  - Redevelopment projects;
- Mitigate for downstream impacts;
- Define exemptions; and
- Take into consideration the resources available for design review, inspection and enforcement.



If you don't already have them in place, you will need design standards for storm water runoff pollution controls to satisfy Phase II minimum control measures for pre- and post-construction. While treatment control BMPs may be applicable, most agencies with successful storm water management programs emphasize source controls. There is increasing recognition that treating storm water runoff with today's BMPs may be only partially effective.

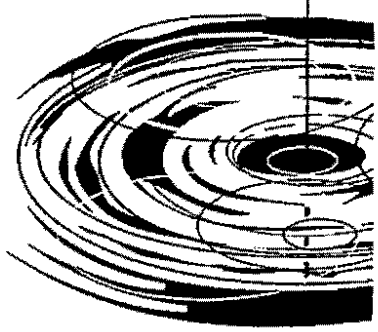


During construction, regulations will be needed for temporary BMPs to control erosion and sedimentation and reduce pollutants in runoff from sites with one or more acres of land disturbance. State, regional, or local requirements may set more stringent thresholds for temporary erosion and sediment controls. Regulations for temporary BMPs must also control other waste on the construction site that can adversely affect water quality.

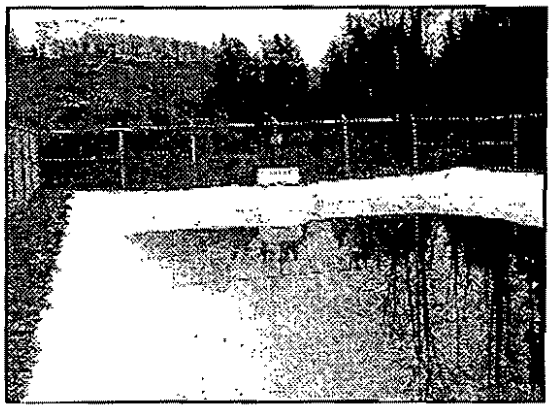
From sites with one or more acres of land disturbance, regulations will also be needed to ensure that BMPs are used to control the quantity and quality of storm water runoff after construction. State, regional, or local requirements may set more stringent thresholds for these permanent BMPs.

Sample Temporary Erosion and Sediment Control BMPs

Source Controls	Treatment Controls
• Construction sequencing	• Stabilized construction entrances
• Limiting the amount of area disturbed at one time	• Silt fences and hay bales
• Time limits on activities during both wet and dry weather	• Diversions
• Timely stabilization of denuded areas	• Sediment traps and basins
• Proper storage of construction materials	• Temporary vegetation/mulching
• Proper disposal of construction waste	



Vegetated Water



Oil/Water Separator

Operation and Maintenance Regulations for Private Facilities Connected to Regulated MS4s.

To satisfy the Phase II minimum control measure for storm water management for new development and redevelopment, an operations and maintenance program is required for all storm water facilities discharging to a regulated MS4. To prevent and reduce pollutant runoff from your municipal system, operations and maintenance will be required for your publicly owned system, as well as any privately owned storm water facilities connected to the public system.

Typically local governments maintain the public system, but you must make a policy decision about who is responsible for maintaining the privately owned facilities connected to the public system. The issue of who maintains privately owned storm water facilities is further complicated where storm water from the publicly owned system enters a private system on private property. Some common policy options for maintaining private facilities are listed below.

- **Option 1** - The municipality is responsible only for maintaining the public system where it owns or has maintenance easements to the facilities. Private property owners are responsible for maintaining all private systems on private property.

- **Option 2** - The municipality is responsible for maintaining both the public system (where it owns or has maintenance easements to the facilities) and the private facilities where storm water from the public system enters a private system on private property. Private property owners are responsible for maintaining those private systems that do not accept water from public systems.

- **Option 3** - The municipality is responsible for maintaining both the public and private systems. This arrangement can be implemented with formal or informal agreements with property owners for right-of-entry.

Whose Water Is It, Anyway?

With regard to storm water system maintenance, the overriding philosophy in King County, Washington is simple — storm water facilities located on private property that do not impact public conveyances or stem from public conveyances are the responsibility of the property owner.

In 1992, however, King County was asked to address some of these issues as a provision of a rate increase. Thus the Neighborhood Drainage Program was established. This program dedicates approximately $650,000 each year to repair storm drain problems on private property.

Projects are NOT considered for the Neighborhood Drainage Program if:

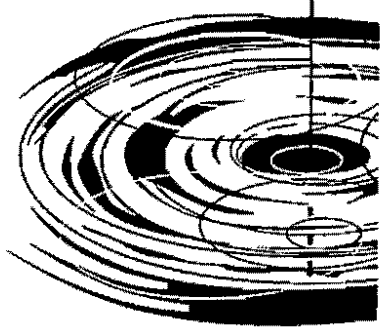
- The property is in an incorporated municipality;
- The project could fall under the responsibility of another program;
- The problem is simply a neighbor versus neighbor dispute; or
- The problem is due to violation of an enforceable code.

Potential projects are ranked by a point system. Consistent problems, and those that impact living quarters, receive higher points. The projected cost of fixing the problem is also considered, with the lowest cost projects typically receiving a higher priority.

On average, the County undertakes 6 to 8 capital improvement projects, 12 to 15 somewhat complex maintenance projects, and 30 more simple "quick fix" projects per year. One third to one half of the projects that are not accepted in the program receive some other sort of technical assistance.

The program is very popular among property owners, as well as elected officials, because it is highly visible and has resulted in the repair of many nuisances in the County.

More information on King County's storm water management program can be found on the World Wide Web at http://splash.metroke.gov/wlr.



You will need regulations to support any policy decision made to require private property owners to maintain all or a portion of their systems for pollution prevention. These regulations usually include:

- A definition of what the private property owner is required to maintain;
- A requirement that prevents the obstruction or disposal of debris in the storm water system on private property;
- Requirements for proper disposal of waste from maintenance activities; and
- Inspection and enforcement provisions.

Regulations to Prevent Illicit Connections

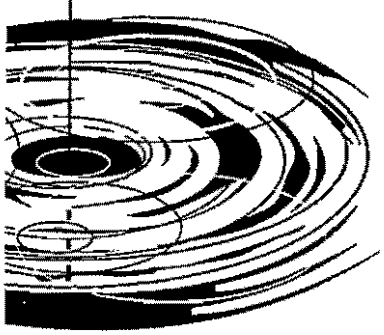
The Phase II regulations require minimum control measures to prevent illicit discharges of non-storm water into your municipal storm sewer system (MS4). If you have not already done so, you will need to establish the authority to prevent illicit connections by implementing regulations that address:

- Definition of discharges prohibited to the MS4;
- Definition of discharges permissible to the MS4;
- Exemptions; and
- Authority to enforce.

What Type of Design Review and Permitting Requirements are Appropriate for Our Community?

Effective enforcement of minimum control measures number 4 (construction site storm water runoff control) and 5 (post-construction storm water management in new development and redevelopment) will require you to implement new or revise current design standards and a permitting process. You will need to review project design plans and calculations to verify that both pre-construction and post-construction storm water BMPs meet your requirements. Permits can then be either granted or denied depending upon whether all the community standards for the project were met.

One important tenet of successful storm water management programs is linkage to other land development programs at the local level. For example, approximately 88 percent of the urban communities surveyed by the Watershed Management Institute in 1997 require storm water management and erosion and sediment control plans to be approved before building permits can be issued.



In fact, Winter Park, Florida (a Phase II community located near the City of Orlando) coordinates zoning approval with the approval of runoff control plans.

Educating the development community as to what your standards are will also be a crucial element in the process.

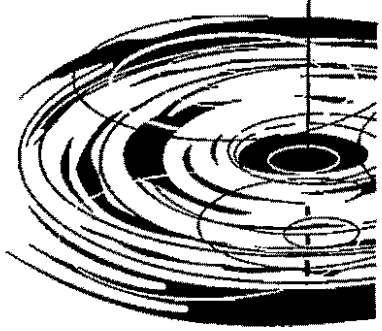
The process that you use to perform reviews and issue permits for construction will depend on the following factors:

- The size of your community;
- Your institutional framework;
- Your staffing level; and
- The level of storm water runoff controls required.

In some communities it may be appropriate to perform design reviews and issue permits for all projects using the same procedure. In other communities, the review process may be different depending upon the size or type of project and the potential for adverse impacts.

Rules of Thumb for Establishing Design Review Procedures

- Meet with project engineer and/or architect early in the process
- Provide plan review checklists or other tools to ensure that the requirements are clear
- Make sure there are clear linkages with other approvals
- Allow for a pre-construction conferencing phase to help prevent problems from occurring later in the design review and permitting process.
- Create a relationship between the complexity of the permitting process and the potential for adverse impacts.
- Clearly convey design requirements to the development community.



Saving Time and Money through Pre-Application Meetings

When Stafford Township, New Jersey passed their aggressive storm water management ordinance in 1987 — which requires developers to give preference to underground infiltration systems to control storm water runoff — the Township had no experience in actually constructing or maintaining the underground infiltration type system. It was a learning experience for the Township's Engineer, the Environmental Commission, and the development community.

The Township has been willing to listen to developers and make adjustments to the original requirements where it is reasonable and practical to do so. "This does not mean," emphasizes the Township's Mayor, Carl Block, "that we just roll over when we get opposition from a developer. We are very clear. You either meet our standards, or you build elsewhere. But we are willing to make sensible compromises as long as our overall standards aren't affected."

According to Martha Kremer, the Director of Community Development and the Township's Zoning Officer, some of the biggest challenges that staff faced in trying to implement the storm water management ordinance were:

- Lack of understanding about the technology;
- Difficulties in communicating the plan's goals and requirements to small residential builders; and
- Working through objections from larger retailers who have wanted to move into the Township.

"Most of the time, once we sat down with the engineer or project developer and explained what we wanted them to do, it was no problem," noted Kremer.

To ensure that such discussions took place early in the site development process, the Township implemented requirements for pre-application meetings in 1988. These meetings are intended to expedite the application process, reduce development costs, suggest and recommend appropriate and ordinance-compliant site design, and provide applicants with direction toward the other agency approvals that may have jurisdiction over their site.

The pre-application meetings require flexibility on the part of the Township's professional staff, as well as the applicant. The advantages include providing input from several local sources early in the design process, saving applicants the costs involved with repetitive engineered revisions, and allowing the Township to be well-informed as it considers the development application. In addition, Kremer notes that projects where pre-application meetings have been conducted experienced a shorter review process and a less costly project. "We spend more time in up-front planning, but we spend less time trying to fix the problems and monitoring bad situations."

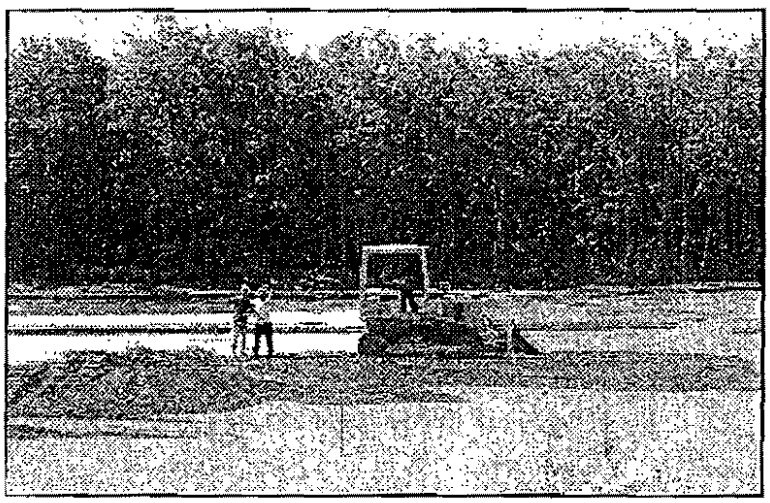
What Types of Inspection and Enforcement Tasks Are Required?

Phase II NPDES regulations will require you to enforce the requirements of minimum control measure number 3 (illicit discharge detection and elimination), number 4 (construction site storm water runoff control), and number 5 (post-construction storm water management in new development and redevelopment). To comply with these requirements, you will need adequate inspection and enforcement activities.

Inspections

Inspections are required to ensure that storm water BMPs are constructed and maintained in accordance with approved designs. Inspections are also required to detect and address illicit discharges to the system. At a minimum, you must conduct:

- Inspections during construction for erosion and sediment control;
- Inspections during and immediately after construction for proper installation of permanent storm water control BMPs;
- Ongoing maintenance inspections of completed storm water BMPs to ensure continued water quality protection; and
- A plan to detect and address illicit discharges (including illegal dumping) to the system.



Inspections of temporary erosion and sediment controls used during construction should be performed at regular frequencies and after significant storm events.

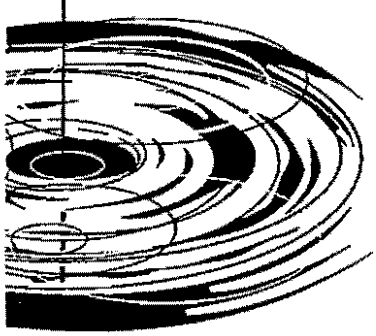
When inspection staff resources are insufficient to visit all construction sites on a regular basis, priorities should be established based on potential impacts to water quality at the site. Cooperative partnerships between you and the development community can increase the effectiveness of limited staff resources for inspection.

Keys to Building a Cooperative Inspection Policy

- Perform high profile inspections and provide reports that emphasize the importance of proper erosion and sediment controls to key project stakeholders.
- Provide training to "certify" private inspectors. Require contractors or private facility owners to hire "certified" inspectors to inspect on a regular frequency, and to supply your agency with inspection reports.
- Provide training and education to the development community on how to install erosion and sediment control BMPs.
- Provide training to private facility owners about proper facility maintenance.
- Implement inspection procedures that outline what the inspector should do and what should be done if requirements are not met.

Inspections for proper installation of permanent storm water control BMPs must be performed at critical stages during construction. These inspections should occur prior to when structures are buried, when details can be observed and necessary corrections can be made. Implementing requirements for the developer to produce "as-constructed" record drawings will also encourage construction that conforms to approved plans.

Where maintenance is required by private property owners, ongoing maintenance inspections of completed storm water BMPs is a key, but often under funded element in many storm water management programs. Proper maintenance is necessary to ensure continued water quality protection and to extend the effective life of permanent storm water BMPs. Again, cooperative partnerships between you and private facility owners can increase the effectiveness of limited staff resources for these inspections.



Going for the Green

Maryland Department of the Environment's Nonpoint Source Program conducts a "Responsible Person Training and Certification Program" for Erosion and Sediment Control. This program, which was implemented in 1980, teaches best management practices associated with erosion and sediment control. Since its inception, approximately 15,000 people have taken the training course. Training is typically provided during the winter months when construction and earth-moving workload is light. Once a person completes the one-day seminar and passes an exam, he or she is certified and receives a "Green Card." Certification is valid for three years and is automatically renewed unless the Department of the Environment notifies the certification holder that additional training is required. A Green Card holder must be on a construction site at all times.

The program helps to ensure that construction activities within the State meet minimum sediment and erosion control standards without overburdening developers or inspection staff within the regulating agency.

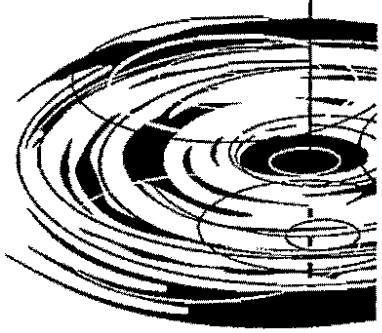
Enforcement

Formal inspection procedures are performed to identify violations of regulations. In these instances enforcement mechanisms should be in place that give you:

- The legal authority to act;
- The procedures to follow; and
- The flexibility to use enforcement methods appropriate for the situation.

The vast majority of municipalities surveyed as part of this project use civil rather than criminal penalties as an enforcement tool. Even with civil penalties available, most communities note challenges with implementing the enforcement mechanisms. Unless the local government has established an "Environmental Court" (dedicated to enforcement of a wide range of environmental code violations), enforcing environmental laws is likely to be a low priority in the local justice system.

Data from a 1997 research effort conducted by the Watershed Management Institute suggests that over half of the municipalities with legal authority to enforce storm water management facility maintenance requirements have failed to take legal steps to facilitate the needed maintenance. In fact, the State of Florida estimates that over 70 percent of storm water management systems constructed since 1982 are not being maintained and operated properly.

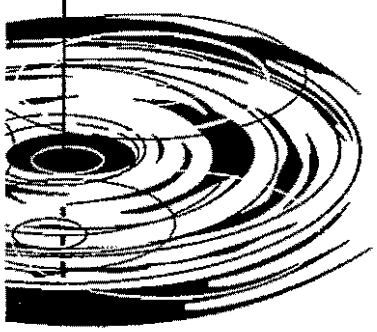


Common Enforcement Tools

- Positive recognition of those complying with regulations
- Written notification to project manager
- Stop work orders
- Withholding permits
- Performance bonding
- Action by the locality upon failure of the developer to act, with costs levied against the developer
- Civil penalties
- Criminal penalties

Do We Need an Inventory of our Municipal Storm Sewer System?

The phase II regulations require minimum control measures to detect and address illicit discharges of non-storm water into your MS4. To accomplish this task, the regulations require that you have a storm sewer map showing the location of outfalls, and the name and location of the waters of the US that receive discharges from these outfalls. Inspection, enforcement, and spill response programs also need system maps in order to detect illicit discharges. These system inventory maps are also necessary to operate and maintain the system in accordance with the minimum control measures for pollution prevention and good housekeeping.



Getting the Most out of GIS

A Geographic Information System (GIS) was once considered a high-tech tool used essentially for planning and mapping. Now GIS is becoming a handy instrument for nearly every aspect of local government service. Communities use GIS for:

- Code enforcement
- Emergency response and management
- Recreation and parks management
- Roads and streets management
- Utilities management
- Infrastructure and facility management
- Police protection
- Land use management
- Ecosystem study and management
- Pollutant effect tracking

Using GIS allows municipal departments to more easily share data. Resulting policy decisions can be made, and projects that require inter-departmental coordination can run more efficiently. An added bonus is that a GIS allows officials to show citizens planned or completed improvements to the community.

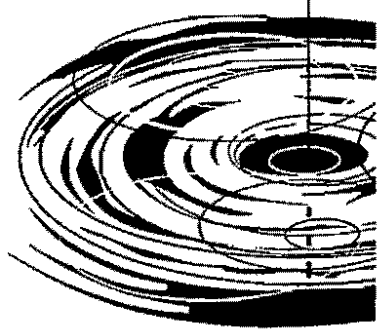
The applications of GIS programs for water quality management are exciting. The Commonwealth of Massachusetts, for example, is using a GIS to monitor the water quality of the entire Merrimack River basin. The location of each sampling station, landfill, incinerator, pond, and tributary is stored in the GIS database. The GIS can plot the relationships between test sampling station water quality and potential sources of pollutants.

Although GIS systems are more affordable than they once were, the costs of developing and maintaining a sophisticated GIS may be unwarranted for smaller communities. As a result, many communities are developing GIS systems jointly, thus sharing in costs and responsibilities. Cities and towns often find counties, regional planning districts, or councils of governments to be good teaming partners for GIS projects.

If you are considering jointly developing a GIS program, you should resolve issues such as:

- How the cost of developing and maintaining the system will be shared;
- Who will have access to the system;
- What types of data will be included in the system;
- How priorities will be established for collecting and entering data and using the system;
- How users will pay for access to the system; and
- Whether data will be sold to outside entities.

Communities that share in developing a GIS system not only create a valuable policy tool that they might not otherwise be able to afford, but they also help each other through the kinks of developing the system and open opportunities for other cooperative efforts.



What Types of Operations and Maintenance Are Required?

The Phase II minimum control measure for pollution prevention/good housekeeping for municipal operations requires an operations and maintenance program for your MS4. You must develop this operations and maintenance program with the goal of preventing and reducing pollutants in storm water runoff from municipal operations.

At a minimum your maintenance program must include:

- Training local government employees to prevent or reduce pollutants in storm water from municipal operations; and
- Implementing regulations requiring private property owners to maintain their systems if a policy decision is made to require that.

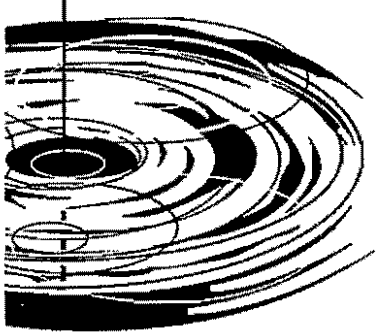
EPA also encourages communities to:

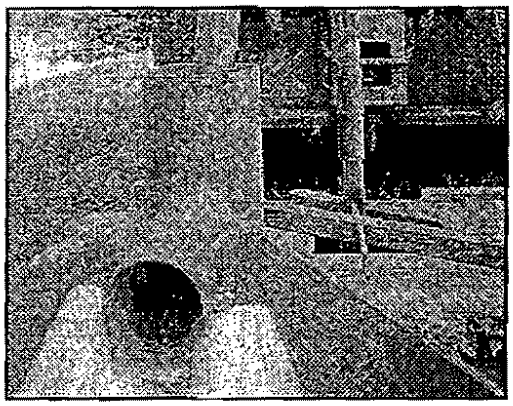
- Schedule maintenance activities and inspection procedures; and
- Dispose of wastes from maintenance activities in a proper manner.

Maintenance activities performed by a typical storm water management program include:

- Cleaning catch basins, manholes and outfalls;
- Cleaning pipes and culverts;
- Removing sediment from roadside ditches (only as necessary — avoid disturbing vegetated ditches that help remove pollutants in storm water);
- Controlling vegetation in roadside ditches;
- Sweeping streets;
- Cleaning detention structures;
- Controlling vegetation in above ground detention ponds;
- Repairing and replacing infrastructure;
- Performing inspections; and
- Properly disposing of waste from maintenance activities, such as catch basin cleaning.

In addition to its use to help locate illicit discharges, a map of the MS4 is necessary to carry out an effective maintenance program. From this map an inventory of system components can be created and used to schedule maintenance.





Cable toll rig used to clean storm drains

Catch basin cleaning

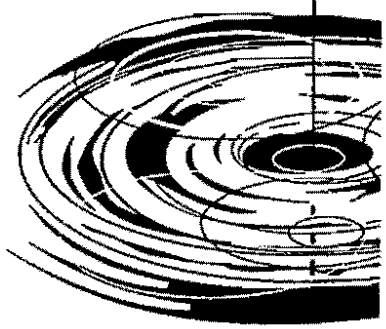
Elements of a Maintenance Program

- The number or length of each system component that needs maintenance
- The frequency with which each maintenance activity needs to be completed
- The crew sizes and equipment needed to perform each maintenance activity
- The production rate for each maintenance activity

What Types of Capital Projects Will Be Required?

The Phase II minimum control measure for pollution prevention/good housekeeping for municipal operations encourages communities to consider storm water controls from public facilities. This minimum measure also encourages communities to consider water quality BMPs in flood management projects.

Compliance with these requirements may require capital facilities construction. It is important to remember that, in addition to the NPDES program, there are other regulatory requirements and citizen concerns that establish the need for your capital improvements program.



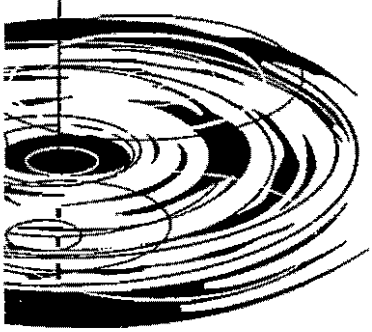
Capital improvement programs are not specifically required by the NPDES Phase II regulations, however most storm water management capital improvement programs are driven by local interest in solving flooding, water quality, and sensitive aquatic resource problems. Community interest in solving these problems may be the source for much of the support for your program. Many of these problems you already know about because of citizen feedback. You may also be confronted with agency concerns and possible enforcement actions when there is a problem that impacts water quality.

Capital projects may include:

- Detention facilities;
- Water quality treatment facilities;
- Conveyance systems;
- Pumping stations;
- Dikes or berms;
- Culverts;
- Fish passage struetures;
- Stream channel habitat restoration projects;
- Neighborhood drainage projects; and
- Retrofits of existing facilities.

The mandate from the public and elected officials for both new and existing storm water management programs may be to assume responsibility for both typical drainage problems, as well as water quality problems, associated with storm water runoff. Managing the drainage, or water quantity, part of your storm water program can require significant investment in capital projects that must be balanced with other program needs.

Capital projects can be a highly visible and popular part of your program, but you need to manage the public's expectations that there are quick fixes to longstanding problems. Oftentimes these expectations are inconsistent with the rate at which funding is available to implement new capital projects. You can educate your community on how quickly you can afford to resolve the problem, explaining that speeding up the process will require additional financial resources. In planning your capital program, it will also be important to show the community that everyone benefits by distributing projects in neighborhoods throughout your service area.



What Should We Do About Planning?

Although it is not specifically required as part of the Phase II regulations, you may want to plan your surface water program to make it more effective. This planning activity could consist of a comprehensive planning process that includes all the storm water policy, programmatic, funding, and technical issues. You may also decide that you want to perform the technical analysis for each of your watersheds or sub-basins separately and have the comprehensive plan include the results of those efforts.

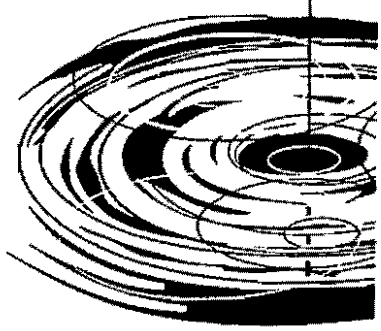
What is Included in a Comprehensive Plan?

Storm water program comprehensive planning is a process of developing a unified vision for your community that, at a minimum, identifies and addresses:

- Goals;
- Policies for managing your storm water;
- Programs needed to accomplish your goals;
- Program costs; and an
- Implementation strategy.

Your goals will most likely include complying with regulations and meeting other local needs such, as flood protection. Policies will be needed, such as determining who is responsible for maintaining private storm water facilities. You will need to establish the specific duties associated with most of the program elements presented in this chapter. In order to develop an implementation strategy you will need to determine what it will cost to put these programs in place. Your implementation strategy will need to consider a number of possible funding mechanisms and how to obtain the necessary support from your community.

Your storm water management program will affect and be affected by other plans and policies in your community and region. The comprehensive planning process can help to ensure that your storm water management program interacts appropriately with other local and regional philosophies and programs. In addition, if the storm water management program can be demonstrated to mesh appropriately with existing comprehensive plans, both public and political support is more likely.



What is Included in a Watershed or Drainage Basin Plan?

Drainage basin or watershed planning is a process that uses data gathering and technical analysis methods to:

- Characterize the environmental, hydrologic, and hydraulic features of a surface water drainage area and its water bodies;
- Define problems with those features;
- Analyze solutions to those problems;
- Recommend a preferred set of solutions; and
- Determine the costs to implement the recommended solutions.

Drainage basin or watershed planning should determine needed capital projects, special regulations, maintenance, monitoring, and costs.

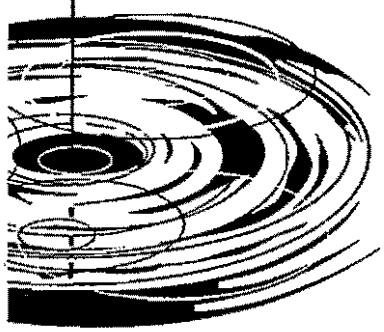
It is preferable to have the drainage basin or watershed technical analysis completed prior to finalizing your comprehensive plan. In this manner, your comprehensive plan contains a more accurate projection of your program costs. But oftentimes it is necessary to prepare a comprehensive plan prior to completing the drainage basin planning because the comprehensive plan is needed as a basis to obtain funding for the overall program (which includes the drainage basin planning).

Comprehensive plans can be used as a powerful tool to obtain community support for your program, especially if your planning effort shows a strong link between the goals established by the community at the outset and the various program elements. Your comprehensive plan can then include a level of service analysis that defines costs associated with each program element. In this manner the community can clearly see what can and cannot be provided with the resources available to implement the plan.

Why Is Public Education and Involvement Important?

An effective public education and involvement program will enable you to meet the following objectives:

- Satisfy the Phase II minimum requirements for public education and involvement;
- Improve water quality by modifying community awareness and behavior; and



- Obtain the necessary community support to fund your program.

Because public education and involvement is so crucial to the success of your program, Chapter 4 is devoted to this topic. Chapter 4 describes specific techniques that can he used to involve the community in your storm water program and educate them about the importance of adequate storm water management.

What are the Administrative Requirements of a Storm Water Management Program?

The Phase II regulations specify requirements for:

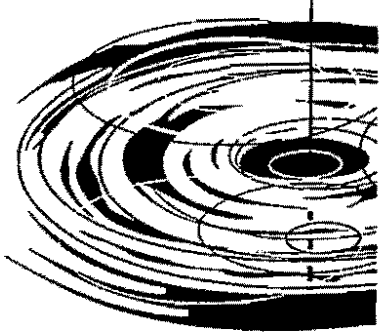
- Designating an entity responsible for implementation;
- Seeking public input into the storm water management planning process and communicating with the public about storm water management issues;
- Defining measurable goals for each of the six required minimum control measures;
- Establishing an implementation schedule that includes frequency of actions; and
- Establishing appropriate evaluation, record keeping, and reporting procedures.

In addition, you will need funding for your storm water management program. And all of these steps need to be evaluated within the framework of planning processes and programs that may already be underway in your community.

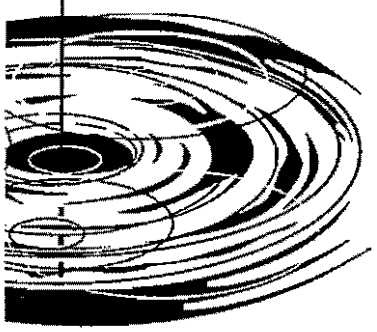
Chapter 5 of this workbook addresses selecting the implementation entity that makes sense in your community. Chapter 6 describes some common approaches to funding and financing storm water management programs. The sections that follow discuss the other key elements of storm water management program administration.

Establishing Measurable Goals

As part of your Phase II permit, you will identify and implement specific BMPs to meet the six minimum control measures. The effectiveness of each BMP must be assessed using measurable goals. Examples of measurable goals for the six minimum control measures are listed below:



Minimum Control Measure	*Sample Measurable Goals*
Public Education and Outreach	• Distributing a specified number of brochures or utility bill inserts addressing storm water management • Participating in a specified number of community meetings • Issuing a specified number of press releases on storm water management topics • Providing contractors with technical assistance
Public Involvement/ Participation	• Conducting a specified number of meetings with a citizen advisory committee • Soliciting a specified number of volunteers to participate in storm water management related activities • Stenciling a specified number of storm drains • Receiving a certain number of calls to an illicit discharge hotline
Illicit Discharge Detection and Elimination	• Surveying municipal rights of way a specified number of times over a specified time period • Inspecting or repairing a specified number of drain inlets per year • Performing dry weather testing a specified number of times
Construction Site Runoff Control	• Conducting a specified number of training programs for non-governmental inspectors • Conducting a specified number of inspections per year (% of construction permits)
Post-Construction Storm Water Management Control	• Conducting a specified number of inspections per year (% of occupancy permits)
Pollution Prevention/Good Housekeeping for Municipal Operations	• Conduct a specified number of training programs for municipal operations staff per year • Sweep a specified number of miles of road per year • Vacuum each storm drain outlet a specified number of times per year • Inspect and clean a specified number of gulches, regional ponds, and municipal facilities



Developing an Implementation Schedule

Your implementation schedule will be closely linked to your measurable goals for each minimum control measure. Availability of staff and other resources should be carefully weighed as you set frequencies for key activities and determine your overall timeline.

Evaluating Your Program

You are required to evaluate the effectiveness of your BMPs and achievement of measurable goals. Your storm water program should be monitored to determine the effectiveness of program elements and to provide a feedback loop to guide program changes. Monitoring must evaluate your program delivery systems, as well as their effectiveness.

Monitoring your program delivery systems can involve:

- Strategic planning;
- Comprehensive planning;
- Tracking the number of capital projects implemented;
- Determining actual maintenance frequencies and production rates;
- Linking goals to outcomes in program evaluation methods;
- Measuring regulatory compliance; and
- Achieving public participation goals.

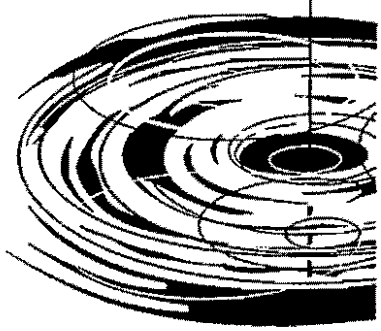
Monitoring your program effectiveness includes physical measurements that determine how well your program is meeting its goals. Common steps involve:

- Stream gauging;
- Water quality sampling and testing;
- Channel bank erosion monitoring;
- Fish habitat/population monitoring; and
- Sediment deposition monitoring.

Keeping Up with Record Keeping

Your NPDES permit will require you to keep records for at least three years. These records should include information on what your storm water management program has accomplished, such as:

- Monitoring information;
- Inspection and enforcement records;
- Your public involvement program;



- Operations and maintenance records;
- Records of capital expenditures for storm water quality control facilities; and
- Monitoring data.

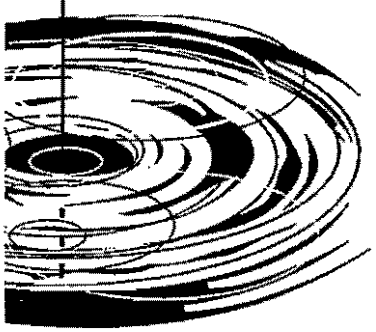
Reporting to Appropriate Agencies

You will be required under Phase II to submit annual reports to your NPDES permitting authority in the first permit term. The rules provide for more limited reporting in subsequent permit periods. This reporting must contain information on:

- Status of compliance with your permit;
- Monitoring data; and
- Summary of activities to be accomplished the next year.

Are There Other Programs Linked to Your Storm Water Management Program?

Although it is not included in the Phase II requirements, many jurisdictions manage storm water related environmental programs as a part of their overall surface water management program. Many of these programs involve fish, wildlife, and wetlands preservation. In some instances these programs are prompted by endangered species listings. In other instances, these programs are prompted by public input where preservation of environmental resources is an important quality of life issue for the community. It is important to take advantage of the public support that can be achieved for the program by implementing these types of environmental programs.

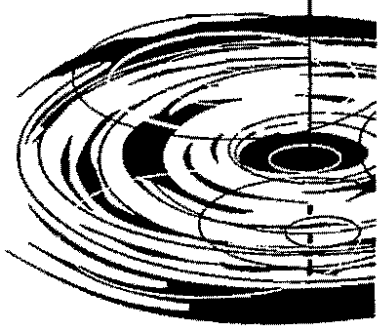


Local Land Use Policy Links with Watershed Protection

Mount Joy Borough, Pennsylvania, is a small municipality in the Chesapeake Bay watershed. In 1989, the Borough amended its zoning ordinance to provide for and encourage cluster development. Provisions in the ordinance permit cluster development (for residential use only) as follows:

- The cluster development may occur as a unified development of a lot that is 15 acres or more;
- The development must be served by public water and sewer;
- The overall density of the cluster development cannot exceed six units per acre;
- Special consideration will be given to the use of slant curbing to facilitate storm water management controls;
- At least 30 percent of the parcel to be developed must be preserved as common open space, wherever possible making open space interconnected with open space on adjacent parcels;
- The common open space must be improved for active residential use, unless the areas contains natural features, such as wetlands or wildlife habitat;
- The common space must be owned and maintained to ensure its preservation; and
- Depending on the maintenance method, the Borough may request that owners bordering the open space be assessed to provide reserve funds for maintenance or capital improvements of the open space.

This approach helps to ensure that land use in the Borough is compatible with environmental and quality of life priorities of the community and the watershed.



There may also be other mandatory water quality management programs that your community may be required to implement, such as a TMDL (total maximum daily load) on an impaired body of water. The requirements of the TMDL program may be in excess of what you are required to do under your Phase II NPDES permit.

Acquiring Land to Protect Water

As one example of how storm water management programs can link to other conservation and preservation activities, consider the Southwest Florida Water Management District's land acquisition program. In order to enhance water management, improve or protect water supply, or protect water resources, Florida's Water Management Districts are given the statutory authority to acquire land under two programs:

- "Save Our Rivers" Program, and
- "Preservation 2000" Program.

Anyone can nominate land for acquisition, and a site identification model is used to determine which properties would yield the best environmental impact. To date, the Southwest Florida Water Management District has acquired over 268,000 acres of land. A small portion of this acreage - approximately 13 percent - is acquired through conservation easements. Under this approach, owners agree to leave the designated land undeveloped or to develop only minimally on the selected property. The remainder of the acquired land is purchased outright by the District.

Of the land that has been acquired by the District to date, over 95 percent is open for public use. Thus, the acquired land provides recreational opportunities, such as hiking, camping, equestrian paths, biking, boating, and picnics. The District is also using some of the acquired land for cattle, hay management, and timber production.

Is There a Need for Interlocal Cooperation?

Storm water runoff does not start and stop at jurisdictional boundaries. Developing regional solutions for elements of your storm water program will be critical for success. Regional cooperation is discussed in more detail in Chapter 7.