1. MCM 2. Post-Construction Stormwater Control Measures

A. Areas of New Development and Significant Redevelopment

The City incorporates a wide variety of components into policy, planning, development, and implementation. The planning process and regulation of new development and redevelopment are outlined in the Fort Worth Comprehensive Plan, the Development Procedures Manual, as well as through the Subdivision Ordinance, Comprehensive Zoning Ordinance, Tree Ordinance, and Floodplain Ordinance. The City of Fort Worth recognizes the importance of integrating stormwater quality issues into its planning process.

1. New Development

Through the Subdivision Ordinance, the City of Fort Worth has adopted the Stormwater Management Design Manual consisting of the Local Criteria section and the 2006 edition of the NCTCOG iSWM Design Manual. This manual was established to guide the community in drainage policy and criteria so that new development does not increase flooding, erosion, and water pollution problems. The policies and standards contained within this manual apply to all development and redevelopment projects associated with platting activities and modifications to public infrastructure. The goals and objectives of the design manual are to:

- Establish and implement drainage policy and criteria so that new development does not increase flooding problems, cause erosion or pollute downstream water bodies.
- Facilitate the development of comprehensive watershed planning that promotes orderly growth and results in an integrated system of public and private stormwater infrastructure.
- Minimize flood risks to citizens and properties, and stabilize or decrease stream bank and channel erosion on creeks, channels, and streams.
- Improve stormwater quality in creeks, rivers, and other water bodies, remove pollutants, enhance the environment and mimic the natural drainage system, to the extent practicable, in conformance with the Texas Pollutant Discharge Elimination System (TPDES) permit requirements.
- Support multi-use functions of stormwater facilities for trails, green space, parks, greenways or corridors, stormwater quality treatment, and other recreational and natural features, provided they are compatible with the primary functions of the stormwater facility.
- Encourage a more standardized, integrated land development process.

Included in this design manual are a number of policy statements that govern development and redevelopment projects, of all sizes, in the City of Fort Worth. The following Policy statements are included in the manual:

- All development within the City of Fort Worth City Limits or Extra-territorial Jurisdiction (ETJ) shall include planning, design, and construction of storm drainage systems in accordance with this Stormwater Management Design Manual, Plan Commission Rules and Regulations, and Policy for the Installation of Community Facilities.
- All drainage related plans and studies shall be prepared and sealed by a Licensed Professional Engineer with a valid license from the State of Texas. The Engineer shall attest that the design was conducted in accordance with this Stormwater Management Design Manual.

- For currently developed areas within the City of Fort Worth with planned re-development, stormwater discharges and velocities from the project should not exceed discharges and velocities from current (existing) developed conditions, unless the downstream storm drainage system is designed (or adequate) to convey the future (increased) discharges and velocities.
- All drainage studies and design plans shall be formulated and based upon ultimate, fully developed watershed or drainage area runoff conditions. In certain circumstances where regional detention is in place or a master plan has been adopted, a development may plan to receive less than ultimate developed flow from upstream with the approval of D-TPW. The rainfall frequency criteria for stormwater facilities, as enumerated within this Stormwater Management Design Manual, shall be utilized for all drainage studies and design plans.
- Stormwater must be carried to an "adequate or acceptable outfall". An adequate outfall is one that does not create or increase flooding or erosion conditions downstream and is in all cases subject to the approval of the D-TPW.
- Proposed stormwater discharge rates and velocities from a development shall not exceed the runoff from existing, pre-development conditions, unless a detailed study is prepared that demonstrates that no unacceptable adverse impacts will be created. Adverse impacts include: new or increased flooding of existing insurable (FEMA) structures, significant increases in flood elevations over existing roadways, unacceptable rises in FEMA base flood elevations, and new or increased stream bank erosion.
- If a proposed development drains into an improved channel or stormwater drainage system designed under a previous CFW drainage policy, then the hydraulic capacities of downstream facilities must be checked to verify that increased flows, caused by the new development, will not exceed the capacity of the existing system or cause increased downstream structure flooding. If there is not sufficient capacity to prevent increased downstream flooding, then detention or other acceptable measures must be adopted to accommodate the increase in runoff due to the proposed development.
- Stormwater runoff may be stored in detention and retention basins to mitigate potential downstream problems caused by a proposed development. Proposed detention or retention basins shall be analyzed both individually and as a part of the watershed system, to assure compatibility with one another and with the City’s overall Stormwater Management Master Plan for that watershed (if available). Storage of stormwater runoff, near to the points of rainfall occurrence, such as the use of parking lots, ball fields, property line swales, parks, road embankments, borrow pits and on-site ponds is desirable and encouraged.
- When detention is used to attenuate peak discharge from a proposed development, runoff must be controlled for the applicable storms so that detained post-development peak discharges do not adversely impact downstream flooding and stream bank conditions, as described in Paragraphs 6 and 7.
- Alternatives to detention or retention, for mitigation of potential downstream problems caused by proposed development, include: acquisition of expanded drainage easements, ROW, or property owner agreements; downstream channel and/or roadway bridge/culvert improvements or stream bank erosion protection; and financial contributions to the CFW Stormwater Program for future improvements. These alternatives will be considered, as presented by the developer, by the Director of the Transportation and Public Works Department, on a case-by-case basis.

- Stream bank stabilization and protection features to reduce or prevent erosion and sedimentation for creeks, streams, and channels shall be required, as specified in this Manual.
- Specified Requirements for Easements.
- All proposed developments within the City of Fort Worth City Limits or Extra-territorial Jurisdiction (ETJ) shall comply with all local, county, state and federal regulations and all required permits or approvals shall be obtained by the developer.
- The policy of the City of Fort Worth is to avoid substantial or significant transfer of stormwater drainage runoff from one basin to another and to maintain historical drainage paths whenever possible. However, the transfer of stormwater drainage from basin to basin may be necessary in certain instances and will be reviewed and a variance can be made by the D-TPW, in accordance with established variance procedures.

Credit Policy Manual:
The City of Fort Worth adopted a stormwater utility in July 2006 to provide stable and equitable funding for its stormwater management program. Developed properties are charged monthly fees based primarily on the amount of impervious area on a parcel of property. The ordinance establishing the utility also gives the Transportation and Public Works Director the authority to grant credits to rate payers who voluntarily use stormwater management techniques or BMPs to offset the impacts of their property on stormwater runoff. Individual properties can be eligible for multiple credits up to a maximum total credit of 40%. Credits are granted for a number of practices including but not limited to water quality treatment, inlet trash collection, active education programs, and channel protection detention.

Regional Perspectives on New Development:
Since the City of Fort Worth is part of a larger urban area sharing major watersheds, the City is actively involved in regional discussions of water quality issues related to new development through the NCTCOG.

In the Dallas-Fort Worth metropolitan area, municipalities share a common urban area and many of these cities are currently under the TPDES stormwater regulations. No municipality in the area wishes to ignore its responsibility towards water quality. At the same time, a municipality does not want to be seen as substantially more restrictive of development on the whole because of environmental concerns. Therefore, the City of Fort Worth worked at the regional level through North Central Texas Council of Governments (NCTCOG) in developing a template for designing water quality management programs for new development and significant redevelopment within the region. The template was drafted with participation from the other six (6) Phase I cities, builders and developers. The City of Fort Worth program, designed using this template, was submitted to the EPA and was accepted as satisfying the City's Implementation and Compliance Schedule for "Developing planning procedures to address water quality concerns to incorporate into existing comprehensive plan" due on or before February 1, 2000. In 2006, the City of Fort Worth adopted the regional stormwater quality manual (iSWM) which emphasized stronger development review and stormwater quality standards. The City is in the process of adopting the 2010 update of iSWM along with improved control of non-plat development through a Fill and Grading Permit.

2. Redevelopment – Reducing erosion and the discharge of pollutants in stormwater

The documents, policies, rules and ordinances discussed above guide development as well as any redevelopment project in the City of Fort Worth.

3. Development and Redevelopment Application and Regulatory Mechanism

Currently, all development and redevelopment projects in the City of Fort Worth are required to adhere to the established documents, manuals, policies, rules and ordinances apply to all development and redevelopment projects associated with platting activities and modifications to public infrastructure. The primary mechanism regulating post-construction stormwater controls in the City of Fort Worth is the Stormwater Management Design Manual. This manual has been adopted via ordinance to implement structural and nonstructural controls for our community.

To further address the post-construction control requirements addressed in this section of the permit, the City of Fort Worth is currently in the process of developing and adopting a Grading Ordinance which will control grading activities for all projects which disturb 0.5 acres or more of land. This ordinance will also include the adoption of the 2010 revision of the NCTCOG iSWM manual and updated local criteria manual to increase the level of protection of the City of Fort Worth's stormwater infrastructure. The new manual adopts the explicit standards for construction runoff control and requires an integrated process for construction and post-construction controls.

The City of Fort Worth is evaluating current and upcoming changes in local ordinance, policies and procedures to ensure that the requirements of this permit are adequately addressed. The City of Fort Worth fully intends to comply with the requirements established to ensure all required development activities are properly addressed.

Additionally this manual addresses the need to establish policies and procedures to provide for long-term operation and maintenance of BMPs within the City of Fort Worth. Developers implementing structural BMPs are required to enter into an agreement with the city for perpetual maintenance. Policy statements in the manual addressing long term operation and maintenance are:

- City Maintenance - The CFW will provide for perpetual maintenance, in accordance with adopted city maintenance standards, of all public drainage facilities located within dedicated easements and constructed to the CFW standards. Access shall be provided and dedicated by the developer to all public stormwater facilities in developments for maintenance and inspection by the CFW.

- Private Maintenance:
  - Private drainage facilities include those drainage improvements which are located on private property and which handle only private water.
  - Private drainage facilities may also include detention or retention ponds, dams, and other stormwater controls which collect public water, as well as drainage ways not constructed to City standards but which convey public water. Such facilities must be designed in accordance with sound engineering practices and reviewed and inspected by the City.
  - An agreement for perpetual maintenance of private drainage facilities serving public water shall be executed with the City prior to acceptance of the final plat. This agreement

shall run with the land and can be tied to commercial property or to an owner's association, but not to individual residential lots.

- Access shall be provided by the developer/owner to all private drainage facilities where there may be a public safety concern for inspection by the CFW.

B. Flood Control Projects

In order to assure that proposed flood control projects assess the impacts on the water quality of receiving water bodies, the City performs a project design review of all future, major flood control projects. The project design review utilizes criteria contained in the City of Fort Worth Storm Water Management Design Manual, 2006 (Design Manual).

By definition, the purpose of a flood control project is to reduce flood damage. Flood control and water quality management strategies differ greatly. Flood control projects are designed to manage stormwater runoff resulting from large, infrequent storm events. Normally, these projects are designed to quickly convey runoff resulting from up to a 100-year storm event. On the other hand, water quality management facilities are designed to handle runoff from much smaller, more frequent storm events (1-2 year storm event). In a given year, 70-90% of all runoff (and generally the associated pollutants) typically result from storm events producing less than 2″ of rainfall. Water quality management facilities attempt to slow stormwater runoff, maximizing hydraulic detention periods to facilitate sedimentation and biological uptake. While this program element is not focused on providing comprehensive water quality management, water quality considerations are included in the design process. Discharge rates for the 2 year and 10 year event are analyzed in accordance with the Design Manual for both flood control projects as well as new development. The goal is to assure that project impacts to receiving water quality are assessed and minimized through the use of sound engineering design principles. Where possible, water quality treatment principles are incorporated into the design of flood control projects.

Existing Flood Control Structure Evaluation

During the first permit term two separate studies by the City of Fort Worth and the Tarrant Regional Water District (TRWD), formerly known as the Tarrant County Water Control and Improvement District No. 1 were performed to address the feasibility of converting existing flood control sump areas into detention/retention ponds for pollutant removal.

The City of Fort Worth contracted with Freese and Nichols, Inc. Consulting Engineers and EMCON Engineering and Environmental Services in studying 11 flood control structures (Table 1) for the possible retrofitting of BMPs. These were the only flood control structures that the City owned and/or operated at that time.

The evaluations reviewed the design of the existing structural control. The considerations below were addressed during each facility evaluation to determine if retrofitting for water quality enhancement was feasible and practical.

1. Can steep channel side slopes be regraded/stabilized to a minimum design steepness to reduce velocities/erosion (thus, reducing sedimentation downstream)?
2. Can ponds or channel segments be deepened or expanded to increase permanent pool or dynamic storage?

3. Can control structures on ponds be modified to increase small storm detention times, increase solids settling, and reduce short-circuiting (e.g., baffles, notches, control elevation adjustments, etc.)?
4. Can littoral zones be established?
5. Can stormwater be directed to offline areas for treatment and released back to conveyance after peak flood stages have passed?

The study indicated that none of the 11 structures were good candidates for retrofitting based on the criteria above.

The TRWD used two models, Watershed Management Model (WMM) and Soil and Water Assessment Tool (SWAT) to estimate pollutant loads and reductions that occur with the current BMPs in place to aid in their assessment of retrofit feasibility, primarily wet ponds, to improve pollutant removal in 29 flood control sump areas along both the Clear Fork and West Fork of the Trinity River. Conclusions of the study were that retrofits were not practical for any of the studied sump areas. Complete information on the modeling and analysis of the sumps is available in previous Annual Reports (1999-2004).

TRWD PROGRAM

The plans for all construction projects on any TRWD land owned or controlled by fee ownership or easement on the Fort Worth Floodway are reviewed by District staff for erosion control measures prior to permit issuance. TRWD has developed a pamphlet that details set of the criteria for construction that occurs within its jurisdictional area of the Fort Worth Floodway. These criteria are to be used as a supplement to the U.S. Army Corps of Engineers, Fort Worth District (CESWF) Pamphlet SWFP 1150-2-1. Part of the criteria considers Stormwater Collection Devices on all new, relocated or renovated storm drain systems. These devices should consider the capability of containing trash, sediment and oils in accordance with the guidelines set forth in the integrated Stormwater Management (iSWM) program developed by North Central Texas Council of Governments (NCTCOG) and available at: http://www.nctcog.org/envir/SEEDevEx/iswm/index.asp.

Currently, the District is in discussions with the City of Fort Worth to formalize an agreement whereby they would perform ongoing maintenance of the Stormwater Collection Devices installed under these criteria once the construction is complete. In addition to the stormwater collection devices installed for post-construction control measures, the pamphlet also details the criteria requiring post-construction grass establishment and erosion protection utilizing cabled articulating revetment systems. Long term post construction maintenance on these practices installed on the floodway will be done by TRWD.

TXDOT PROGRAM

1.0 Post-construction stormwater control measures

1.1 Areas of New Development and Significant Redevelopment

TxDOT has a well-defined and organized planning process in place for the development of transportation projects. As part of the transportation planning process, water quality and stormwater management are incorporated in the early decision-making on a project. Stormwater issues are one of the many issues taken into consideration during the identification of potential alternatives available to meet a project's needs. Later in the transportation planning process, TxDOT follows the environmental review process outlined by the National Environmental Policy Act of 1969 (NEPA) and Federal Highway Administration rules (23 CFR 771). If the project is not federally funded, TxDOT is required to follow its state equivalent to the federal process (43 TAC Chapter 51).

TxDOT's environmental review process follows strict requirements for public involvement, impact assessment, and agency coordination. Among the issues addressed during the environmental review process is water quality. Depending on the significance of the project and its potential impacts, existing water quality conditions are discussed and potential impacts are evaluated in the project's environmental assessment. If appropriate, water quality mitigation measures are also presented.

During project development, TxDOT is also required to coordinate with the Texas Commission on Environmental Quality (TCEQ). This coordination is conducted as outlined in a Memorandum of Understanding between the TCEQ and TxDOT and, among other things, allows for TCEQ to review and comment on TxDOT project environmental assessments.

During the transportation planning process, the alternatives available to TxDOT to manage stormwater quality on a particular project take into consideration all of the conditions at the project site and are contingent upon what is practicable, while maintaining compliance with the NPDES goal of pollutant reduction to the maximum extent practicable. For these purposes, the definition of maximum extent practicable is taken from the Clean Water Act Section 402 and is interpreted as meaning available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

TxDOT develop and implement of permanent structural control and non-structural controls to reduce pollutants from roadway runoff into the planning process. In the past, TxDOT has used permanent stormwater control measures on an as needed or an as required basis. As a result of the NPDES requirements and other water quality concerns, TxDOT has developed this program to assist in addressing water quality issues in the early stages of project development and throughout the construction of the project. The program has been phased into the existing project development process and provides guidance on the appropriate levels of mitigation to minimize the impacts to water quality resulting from highway runoff.

In assessing the need to incorporate permanent water quality control measures into highway construction projects, the quality of receiving water will be factored against other variables. There are several variables that might affect the quality of runoff from a roadway including rainfall characteristics, traffic type, and surrounding land use, but traffic volume appears to be the best single determining factor. In addition, traffic volume data is easily obtainable.

Policy

It is the policy of TxDOT to preserve and where practicable enhance the environment. Environmental concerns are to be fully implemented into departmental policies, procedures, and decision-making practices by addressing environmental considerations in a systematic, appropriate interdisciplinary manner. This will include public involvement and interagency cooperation early in the transportation policy setting, planning and development stages. Particular emphasis will be placed on balancing social and environmental concerns consistent with economic growth and the minimization, and mitigation of environmental impacts. In implementing this policy TxDOT recognizes the need for effective communication and encourages working with others in a cooperative approach early in the policy, planning and developmental stages.

It should also be noted that the TxDOT Fort Worth District has a policy regarding stormwater quantity. If a project has the potential to produce adverse impacts during the 100-year flood event, then hydraulic studies are conducted to determine the impacts and appropriate mitigation. If necessary, detention is provided.

Development and Implementation of Permanent Controls

The Environmental Affairs Division of TxDOT has developed the Stormwater Planning and Design Guidelines for New Development and Significant Redevelopment for use by environmental, planning and design staff. This section includes a description of permanent structural and non-structural control measures to reduce pollutants from roadway runoff, and how the controls will be developed and incorporated into the planning process. In the past, TxDOT has used permanent stormwater control measures on an as needed or an as required basis. As a result of the NPDES requirements and other water quality concerns, TxDOT has developed this program to assist in addressing water quality issues in the early stages of project development and throughout the construction of the project. The program has been phased into the existing project development process and provides guidance on the appropriate levels of mitigation to minimize the impacts to water quality resulting from highway runoff.

During the project planning process, TxDOT staff will identify receiving waters and their potential to be adversely impacted by the proposed project. To provide guidance on the sensitivity of receiving waters, the TxDOT staff will utilize the TCEQ's stream segment classification system as referenced from the "State of Texas Water Quality Inventory" and 30 Texas Administrative Code Chapter 307 entitled "Texas Surface Water Quality Standards." Using the stream segment classification system, the TCEQ and the Texas Parks and Wildlife Department have published documents which list "Use" and "Quality" designations for each waterway segment. Using this available information, TxDOT can identify the existing quality of receiving waters at the site.

For the purposes of the Fort Worth District program covering the Phase I City and County MS4 areas, the quality of receiving waters will be classified into three categories: Exceptionally High, High, and Moderate. Also, any water-related conservation or restoration effort (i.e. Clean Lakes Program, local Watershed Ordinance, River Authority Program (SB 818), or Galveston Bay Plan) shall also be considered when evaluating the appropriate mitigation measure(s). The Galveston Bay Plan has incorporated actions of the NPDES municipal stormwater permit program into the Plan to provide consistency between the Plan and the co-permittees' stormwater management programs.

Exceptionally High: These are waters that have been designated "Exceptional Quality Aquatic Habitat" by the TCEQ, listed as a "high" priority impaired water by the TCEQ, or have been identified as providing Endangered/Protected Species Habitat by the Texas Parks and Wildlife Department.

High: Three or more designated uses as taken from the Texas Surface Water Quality Standards, or any perennial stream not having a segment designation.

Moderate: Two designated uses.

In assessing the need to incorporate permanent water quality control measures into highway construction projects, the quality of receiving water will be factored against other variables. There are several variables that might affect the quality of runoff from a roadway including rainfall characteristics, traffic type, and surrounding land use, but traffic volume appears to be the best single determining factor. In addition, traffic volume data is easily obtainable.

The use of 30,000 vehicles per day (or Average Daily Traffic - ADT) as a dividing point, is based on two Federal Highway Administration (FHWA) publications. In Effects of Highway on Receiving Waters: Procedural Guidelines for Environmental Assessments, (Pub. No. FHWA/RD-84-065, July 1985) the authors concede that anticipated impacts to water quality are highly subjective, but they go on to state that greater impacts might be anticipated where volume traffic exceeds 30,000 ADT and drainage is by curb and gutter. Also, in Pollutant Loadings and Impacts From Highway Storm Water Runoff (Pub. No. FHWA/RD-88-006, 007, 008, and 009. April 1990), the findings indicate that pollutants in runoff from urban highways, which usually had greater than 30,000 ADT (compared to the rural highways in the study that had less than 30,000 ADT), were found to be higher in concentration by a factor of three. For all intents and purposes runoff from extremely low volume roadways (<1500 ADT) will have no impact on receiving waters, therefore permanent controls will generally not be required on such roadways. If the cost of the permanent runoff control measures for any project is substantial relative to the overall project costs, then the measures will be subject to review. A level of permanent stormwater management measures applicable to TxDOT highway projects should be considered as guidance to be used during project planning and design for construction of new location roadways and major reconstruction projects. The ADT will be based on a 20-year design projection.

Level I: This designation pertains to projects that have the highest potential to affect water quality and require the highest degree of mitigation consideration. Preventive measures appropriate for consideration at this level include:

- Controls of higher water quality potential
- Water Quality Wet Pond/ Constructed Wetland
- Extended Dry Detention Basin
- Controls of lower water quality potential (consider multiple controls of this type)
- Vegetative Controls (Grassed Waterways/ Existing Vegetation/ Seeding/ Sodding)
- Outlet Protection/ Riprap

- Curb Elimination/ Discontinuous Curbs with Flow to Vegetative Controls/ Detention Basin/ or Wet Pond
- Slope Drains/ Back of Slope Control
- Long-term Maintenance Controls

Level II: This designation pertains to projects that have a moderate potential to affect ambient water quality depending on project specific conditions. Preventive measures appropriate for consideration at this level include:

- Extended Dry Detention Basin
- Vegetative Controls (Grassed Waterways/ Existing Vegetation/ Seeding/ Sodding)
- Outlet Protection/ Riprap
- Curb Elimination/ Discontinuous Curbs with Flow to Vegetative Controls/ or Detention Basin
- Slope Drains/ Back of Slope Control
- Long-term Maintenance Controls

Level III: This designation pertains to projects which have a minimal potential to impact water quality depending on project specific conditions and only if drainage is by curb and gutter. Drainage through a grass-lined channel will typically attenuate any contaminants in runoff from this level of project.

- Vegetative controls (Grassed Waterways/ Existing Vegetation/ Seeding/ Sodding)
- Outlet Protection/ Riprap
- Curb Elimination/ Discontinuous Curbs with Flow to Vegetative Controls
- Slope Drains/ Back of Slope Control
- Long-term Maintenance Controls

TxDOT implements a planning process to develop, implement, and enforce controls to minimize the discharge of pollutants from areas of new development and significant redevelopment after construction is completed. The goals of such controls must include:

- New development - limiting increases in the discharge of pollutants in stormwater as a result of development; and
- Redevelopment - reducing the discharge of pollutants in stormwater.

The District lacks authority to prohibit or to control post-construction discharges of stormwater from areas of new development and redevelopment located outside of the right-of-way (ROW). Discharges to the MS4 from adjacent areas of new development and redevelopment that cause erosion or similar water quality issues with the District's MS4 will be identified in conjunction with the illicit discharge detection survey activities. The District may approach the discharger to resolve the water quality/quantity/discharge rate concerns or may install controls in the District's MS4, according to TxDOT policy and guidance and as is necessary.

New development and redevelopment projects within the ROW are under District control. District policy requires all new development and re-development projects, including highway

construction subject to the TCEQ Storm Water Construction General Permit, to include permanent controls appropriate for the project and for local water bodies. Permanent controls may be structural or non-structural in nature. Because highway projects are linear in nature and ROW can be limited, non-structural controls are frequently necessary and may be preferred when adequate.

TxDOT's post-construction plan design efforts primarily address velocity dissipation, pollutant reduction, and erosion control practices. Specifically, the use of vegetative filter strips enables infiltration and evapotranspiration of stormwater runoff from the TxDOT highways based on moderate retention and velocity dissipation. The velocity of stormwater discharges is reduced, thus limiting erosion and stream channel degradation and pollutant discharge. All TxDOT ROW and new ROW with earthen surfaces are vegetated or re-vegetated according to the specifications included in the *Roadside Vegetation Management Manual*.

As described in the Section 2.0 Structural Control section of the SWMP, TxDOT uses a number of other post-construction control measures in addition to vegetative filter strips. The structural controls are selected and designed based on TxDOT's manual *Storm Water Management Guidelines for Construction Activities* dated July 2003. Structural controls may include the following:

- Retention / irrigation ponds
- Extended detention (wet/dry basins)
- Vegetative filter strips
- Vegetated swales
- Constructed wetlands
- Sedimentation ponds/traps
- Infiltration ponds
- Catch basins
- Grated inlets
- Outfall velocity dissipation controls

Hazardous material traps Non-Structural controls may include the following:

- Street sweeping
- Litter collection
- "No Mow" areas
- Inlet stenciling

In addition to the *Storm Water Management Guidelines for Construction Activities*, TxDOT's Bridge Division's Hydraulic Manual establishes general procedures for development of highway drainage facilities. It includes a survey of existing characteristics, estimates of future

characteristics, engineering design criteria, discharge estimates, structure requirements, and constraints for the hydraulic design or analysis of highway drainage and receiving facilities. The manual also discusses in some detail stormwater management, erosion control, pollution prevention plans, and issues related to managing quantity and quality of runoff.

The designer/planner also considers the existing quality of receiving water at the site to determine potential of a project to impact water quality for both new development and redevelopment. For the purposes of this management plan, the source for this determination will be based on the Texas Integrated Report for Clean Water Act Sections 305(b) and 303(d) and 30 Texas Administrative Code Chapter 307 entitled *Texas Surface Water Quality Standards*.

If warranted, additional District-specific controls will be developed and implemented in accordance with TPDES Permit Part III.B requirements as stated above, and are included ***Appendix A of the Attached TxDOT SWMP.***

1.2 Flood Control Projects

Per permit requirements, impacts on receiving water quality must be assessed for all flood control projects. Where feasible, new flood control structures must be designed and constructed to provide pollutant removal from stormwater. If applicable, the retrofitting of existing structural flood control devices to provide additional pollutant removal from stormwater must be implemented, to the MEP.

The District does not construct flood management projects. Flood control devices are not considered as a management measure and are omitted from this SWMP. However, the District does have structural and non-structural controls to provide pollutant removal from stormwater and this information is discussed in the respective sections in this SWMP. If the District does propose to construct a flood control project within an area, the SWMP will be updated with applicable control measures for Flood Control Projects and TCEQ will be notified of the change.

If warranted, additional District-specific controls will be developed and implemented in accordance with TPDES Permit Citation Part III.B requirements as stated above, and are included in Appendix A.