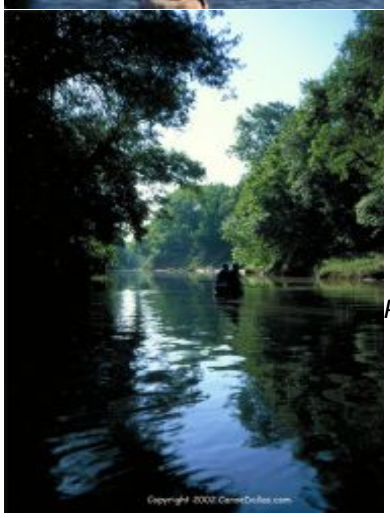

INTERIM

BACTERIA REDUCTION

PLAN

(*Appendix B of the Stormwater Management Plan*)

City of Dallas
TPDES Permit No. WQ0004396000

SEPTEMBER 30, 2012

THE TRINITY
DALLAS

Prepared by:

City of Dallas
Trinity Watershed Department
320 East Jefferson Boulevard, Room 108
Dallas, Texas75203

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INTERIM

BACTERIA REDUCTION PLAN

TPDES Permit No. WQ0004396000

September 30, 2012

Prepared by:

City of Dallas

Trinity Watershed Department

320 East Jefferson Boulevard, Room 108

Dallas, Texas75203

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Interim Bacteria Reduction Plan

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List of Abbreviations and Acronyms

AD	Administrative Directive
ALU	Aquatic Life Use
ATU	Aerobic Treatment Unit (small onsite treatment plant)
BMPs	Best Management Practices
BOD5	Biochemical Oxygen Demand, measured over a 5 day period
BST	Bacterial Source Tracking
CAFOs	Confined Animal Feeding Operations
cbd	Central Business District (downtown Dallas)
CCTV	Closed Circuit Television
CFR	Code of Federal Regulations
CFU	Colony Forming Units (Unit measurement for bacteria)
CGP	Construction General Permit (Discharge Permit for Construction Activities)
CRMS	Customer Response Management System
CRP	Clean River Program
CSN	Construction Site Notice
CWA	Clean Water Act
CY	Cubic Yards
DCAD	Dallas County Appraisal District
D/S	Downstream
DSHS	Texas Department of State Human Services
E. coli	*Escherichia coli*; (indicator bacteria)
EDMS	Environmental Data Management System
EMS	Environmental Management System
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FOG	Fats, Oils and Grease
GIS	Geographic Information System
GPS	Global Positioning System
HHW	Household Hazardous Waste
HUC	Hydrologic Unit Codes
IBRP	Interim Bacteria Reduction Plan
ISO	International Standards Organization
i-PLAN	Implementation Plan
iSWM	Integrated Stormwater Management Program
LEED™	Leadership in Energy and Environmental Design
LID	Low Impact Development
MCM	Minimum Control Measure (also referred to as a Permit Element)
MEP	Maximum Extent Practicable
MS4	Municipal Separate Storm Sewer System
MSGP	Multi-Sector General Permit (Discharge Permit for Industrial Facilities)
MPN	Most Probable Number (Measure for bacteria)
NC	Non-compliance
NCTCOG	North Central Texas Council of Governments
NEC	No Exposure Certification

List of Acronyms and Abbreviations (Continued)

NELAC	National Environmental Laboratory Accreditation Conference
NELAP	National Environmental Laboratory Accreditation Program
NOC	Notice of Change
NOI	Notice of Intent
NOT	Notice of Termination
NOV	Notice of Violation
NPDES	National Pollutant Discharge Elimination System
OSSFs	On-site Sanitary Sewer Facilities (Usually septic tank and drainfield)
PY#	Permit Year Number
QAPP	Quality Assurance Project Plan
RBP	Rapid Bioassessment Protocols
RWWCP	Regional Wet Weather Characterization Program
SARA	Superfund Amendment and Reauthorization Act
SCM	Stormwater Control Measure
SCN	Small Site Construction Notification
SOG	Standard Operating Guidance
SOP	Standard Operating Procedure
SSO	Sanitary Sewer Overflow
SWIMs	Stormwater Information Management System
SWM	Stormwater Management Program
SWMP	Stormwater Management Plan
SWPPP	Stormwater Pollution Prevention Plan
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TCRP	Texas Clean Rivers Program
TDS	Total Dissolved Solids
TMDLs	Total Maximum Daily Load
TNRCC	Texas Natural Resources Conservation Commission (now TCEQ)
TPDES	Texas Pollutant Discharge Elimination System
TPWD	TexasParks and Wildlife Department
TRA	Trinity River Authority
TSS	Total Suspended Solids
TWM	Trinity Watershed Management Department
U/S	Upstream
WWTF	Wastewater Treatment Facility

1.0 INTRODUCTION

Like many streams and rivers across Texas, sometimes the Trinity River and key tributaries may carry bacteria in excess of current water quality standards. In 2011, the Texas Commission on Environmental Quality (TCEQ) established a Total Maximum Daily Load (TMDL) to address bacteria in the two segments of the Upper Trinity River (Main Stem) that traverse through the heart of the Dallas. A TMDL is simply a targeted allowable pollutant level that will allow people to safely swim and boat in this part of the river. Additional TMDLs are proposed for other key tributaries, such as the Lower West Fork Trinity River that have comparable bacterial loads. In 2012, the North Central Texas Council of Governments (NCTCOG) facilitated stakeholder development of a draft regional implementation plan (iPlan) to address the multiple sources of bacteria across the Dallas-Fort Worth metroplex, and thus improve local water qualityacross the region(TCEQ, 2012).

The City of Dallas (City) has the responsibility and authority for Clean Water Act compliance for the City's storm drainage system including the lakes, streams and the portion of theTrinity River that passes through the City. The City operates a Municipal Separate Storm Sewer System (MS4) under Texas Pollutant Discharge Elimination System (TPDES) Permit Number WQ0004396000 (permit) (TCEQ, 2011). Under this permit, the City is required to implement a comprehensive Stormwater Management Plan (SWMP) to "*includepollution prevention measures, treatment, or pollutant removal techniques, stormwater monitoring, use of legal authority, and other appropriate means to control stormwater discharges from the MS4 into Waters of the United States*." As a part of the SWMP, this Interim Bacteria Reduction Plan (iBRP) is developed to be compliant with requirements of Part III.B. 3 of the City's permit:

> *"3. Discharges to Water Quality Impaired Receiving Waters.*
>
> *For discharges from the MS4 that will reach one or more surface water bodies that are identified on the latest approved Clean Water Act §303(d) List as not meeting applicable state water quality standards due to bacteria, the permittee shall develop an interim bacteria reduction plan (IBRP). The IBRP must be included in the SWMP and must discuss the management practice and control measures that the permittee will implement to reduce, with the goal of eliminating, the discharge of bacteria that contribute to the impairment of the water body. The IBRP must specifically identify control measures and practices, including monitoring and screening activities that are used to address the discharge of bacteria*."

The iBRP is consistent with the regional iPlan, and forms Appendix B to the City's SWMP. Each set of control measures and practices in the iBRPhas been outlined to address the eight (8)minimum control measures of the SWMP, and include measureable goals to reduce the discharge of bacteria from the MS4 to Trinity River to the maximum extent practicable. Most of the management practices and control measures are also correlated with the comparable best management practices (BMPs) outlined in the draft regional iPlan.

The iBRP is comprised of the following sections:

- **Section 1.0 - Introduction:** provides the purpose and general format of the iBRP;
- **Section 2.0 - Watershed Description** : provides a description of the geographic boundary of the MS4, the listed and classified waters, and watersheds comprised within the corporate boundaries of the City;
- **Section 3**.0 - **Water Quality – Sources and Trends**: provides a summary of potential sources of bacteria, current monitoring and screening programs, and water quality trends across the City with respect to bacteria;
- **Section4.0 - Regulatory Background:** provides a detailed description of theStormwater Management Plan, the designated bacteriaTotal Maximum Daily Loads and the draft Implementation Plan to address these TMDLs;
- **Section 5.0 - Bacteria Reduction BMPs:** provides a summary of the bacteria management practices and control measures, related iPlan and SWMP activities, measurable goals, and implementation schedule;
- **Section 6.0 - Implementation Schedule:** provides a comprehensive summary table of the various BMPs outlined in Section 5 with a schedule for implementation**;**
- **Section 7.0 - Anticipated Load Reduction:** provides a general discussion of anticipated load reductions over time given full implementation of the measures outlined herein**;**
- **Section 8.0 - References**

2.0 WATERSHED DESCRIPTION

Dallas is wholly contained within the Trinity River watershed, a 17,696 square mile watershed that extends from Archer County near the north Texas-Oklahoma border, through Dallas to an ultimate discharge through Galveston Bay into the Gulf of Mexico. Theportion of the watershed within the Dallas MS4 includes the incorporated areas of the City of Dallas, including lands within Dallas, Collin, Denton, Rockwall and Kaufman Counties.

The City MS4 permit area represents approximately 246,208-acres or 384.7-square miles. There are 32 12-digit Hydrologic Unit Code (HUC) defined watersheds that are located wholly or partially within the City limits. The primary tributaries that form the Trinity River system through Dallas include the Lower West ForkTrinity River, and Elm Fork Trinity River that drain into the Upper Trinity River (Main Stem), northwest of the central business district (cbd). The Main Stemthen flows within the leveed Dallas Floodway through the downtown area. The White Rock Creek system drains most of north-central and east areas of Dallas, discharging into the Main Stem just south of the cbd. Primary southern tributaries include Elam Creek, Five Mile Creek, Ten Mile Creek, Prairie Creek, and Parson's Slough. The East Fork Trinity River drains the Lake Ray Hubbard system, Spring Creek, Duck Creek, and South Mesquite Creek into the East Fork Trinity River, that drains far east Dallas, and joins the Upper Trinity River well south of the corporate boundaries. Figure 2-1 (at the end of this report) illustrates the representative watersheds included in the City's permit area.

Table 2-1 provides a summary of the watersheds and subwatersheds with respective areas that are included in the City's MS4. The sub-watershed names generally correspond with the watershed names used in the SWMP, to allow water quality trend analyses over time.The permit area is comprised of a predominantly developed urban area within the Blackland prairie eco-region. Figure 2-2 shows relative land uses within this area (also at the end of the report).

Table 2-1
WATERSHEDS & SUBWATERSHEDS IN DALLAS

12-Digit HUC	*Watershed Name*	*Area (Square Miles)*	*Sub-watershed Name*	*Drainage Area (Acres)*
Lower West Fork Trinity River System (Texas Stream Segment 0841)				
120301020603	Low Branch - Mountain Creek	48	JoePoolLakeDam	32,044
120301020606	Fish Creek - MountainCreekLake	43	MountainCreekLakeDam	26,036
120301020607	Cottonwood Creek - MountainCreekLake	29	MountainCreekLakeDam	19,172
120301020706	Delaware Creek - West Fork Trinity River	34	Delaware Creek	9,658
			Lower Mountain Creek	12,032

Table 2-1 (Continued) WATERSHEDS & SUBWATERSHEDS IN DALLAS				
12-Digit HUC	***Watershed Name***	***Area (Square Miles)***	***Sub-watershed Name***	***Drainage Area (Acres)***
Elm Fork Trinity River (Texas Stream Segment 0822)				
120301031006	Cottonwood Branch - Hackberry Creek	21	Elm Fork Trinity River	13,325
120301031003	Indian Creek – Elm Fork Trinity River	33	Elm Fork Above Denton Creek	21,196
120301031004	Grapevine Creek - Elm Fork Trinity River	30	Hutton Branch	9,237
			Grapevine Creek	10,205
120301031005	Farmers Branch – Elm Fork Trinity River	25	Farmer's Branch	8,354
			Elm Fork Above Cottonwood Branch	7,466
120301031007	Bachman Branch - Elm Fork Trinity River	42	Northwest Dallas	6,314
			Joe's Creek	4,588
			Lower Bachman Creek	2,282
			Upper Bachman Creek	6,147
			Elm Fork Trinity River	7,684
Main Stem Trinity River (Texas Stream Segment 0805)				
120301050101	Headwaters Turtle Creek	34	Dallas East Bank	15,285
			DallasWarren	6,603
120301050102	Turtle Creek –Trinity River	35	Dallas West Bank	11,076
			West Dallas	1,929
			Cedar Creek	6,380
			Coombs Creek	2,969
White Rock Creek System (Texas Stream Segment 0827)				
120301050103	Headwaters White Rock Creek	31	Upper White Rock Creek	19,972
120301050104	Floyd Branch – White Rock Creek	33	Upper/Middle White Rock Creek	21,109
120301050105	White Rock Creek - WhiteRockLake	35	White Rock Dam	22,713
120301050106	City of Dallas– White Rock Creek	35	Lower White Rock Creek	22,317
Five Mile Creek System (Unclassified Water Body)				
120301050108	Five Mile Creek - Trinity River	47	South Dallas	3,462
			Southeast Dallas	4,420
			Elam Creek	2,897
			Lower Five Mile Creek	8,103
			Trinity River above Ten	4,028
			Newton Creek	7,213
120301050107	Headwaters Five Mile Creek	38	Upper Five Mile Creek	24,117

Table 2.1 (Continued) WATERSHEDS & SUBWATERSHEDS IN DALLAS				
12-Digit HUC	***Watershed Name***	***Area (Square Miles)***	***Sub-watershed Name***	***Drainage Area (Acres)***
Other Unclassified Segments in South Dallas				
120301050204	Hickory Creek - Parsons Slough	30	Parson's Slough	18,992
120301050203	Prairie Creek - Trinity River	58	Main Stem above Trinity River	24,885
			Prairie Creek	12,202
120301050202	Deep Branch - Ten Mile Creek	32	Lower Ten Mile Creek	20,439
120301050201	Headwaters Ten Mile Creek	45	Ten Mile Creek	29,017
Lake Ray Hubbard (Texas Segment No 0820)				
120301060501	Duck Creek	42	Upper Duck Creek	27,180
120301060408	Rowlett Creek – Lake Ray Hubbard	27	Rowlett Creek	17,257
120301060403	Muddy Creek - LakeRay Hubbard	48	Muddy Creek	30,723
120301060401	Camp Creek - LakeRay Hubbard	40	Camp Creek	25,619
120301060402	Cottonwood Creek - East Fork Trinity River	43	Cottonwood Creek	27,265
120301060409	Rowlett Creek - East Fork Trinity River	24	Rowlett Creek	15,494
East Fork Trinity River (Texas Stream Segment 0819)				
120301060503	North Mesquite Creek - East Fork Trinity River	37	North Mesquite Creek	23,929
120301060504	South Mesquite Creek	28	Upper South Mesquite Creek	17,840
120301060505	Mustang Creek - East Fork Trinity River	38	East Fork Trinity River	24,611
TOTAL WATERSHED AREA:		**719**		**695,786**

The designated uses for a water body determine the types of water quality criteria that are used to assess water quality compliance. Table 2-2 includes the classified water bodies within the permit area and their designated use(s).

Table 2-2 CLASSIFIED WATER BODIES AND DESIGNATED USES		
Water Body	***Texas Stream Segment***	***Classified Water Use(s)***
East Fork Trinity River	0819	Primary contact recreation and High aquatic life use
LakeRay Hubbard	0820	Primary contact recreation, public water supply*, and high aquatic life use
Elm Fork Trinity River below LewisvilleLake	0822	Primary contact recreation, public water supply, and high aquatic life use
WhiteRockLake	0827	Primary contact recreation and high aquatic life use
JoePoolLake	0838	Primary contact recreation, public water supply, and high aquatic life use
MountainCreekLake	0841A	Primary contact recreation and intermediate aquatic life use
Lower West Fork Trinity River	0841	Primary contact recreation and intermediate aquatic life use
Upper Trinity River	0805	Primary contact recreation and high aquatic life use
* Segment 0820 (Lake Ray Hubbard) is owned and managed by the City of Dallas for water supply purposes; however, the City's MS4 system currently does not discharge into this water body.		

The other streams and creeks, as "unclassified receiving waters", have a presumed designated use as high "aquatic life use"for perennial streams, "limited aquatic life use" for intermittent streams with perennial pools, and "no significant life" for intermittent streams. The presumed recreational use for all water bodies within the City of Dallas is for primary contact recreation; that is, to allow wading, boating and swimming. The general and numerical criteria which form the stream water quality standards are provided in 30 TAC §§ 307.1 - 307.10 (TAC, 2010). The water quality criterion used to support recreational use is 126 most probable number (MPN) of *E. coli*bacteria colonies per 100 milliliters (mL) (about ½ cup) of water sampled.

Within the permit area, the City of Dallas actively manages a storm drainage system that drains 385 square miles within five counties. The MS4 infrastructure includes at least:

- 67,000 Inlets
- 1,800 miles Storm Sewers
- 8 Pressure Sewers
- 9 Street Pump Stations
- 33 miles Levees
- 11 Sump areas with 9 Pump Stations
- 100 Inline StormwaterInterceptors
- 200 Retention/Detention Ponds & Lakes
- 11,000 Drainage Outfalls
- 180 miles Creeks and Channels

3.0 WATER QUALITY – SOURCES AND TRENDS

The City employs an ongoing water quality monitoring and screening program to identify sources of water quality impairment, investigate water quality trends, and focus targeted implementation of outreach, education, and other management practices and controls.

3.1 Bacteria Sources

Millions of different bacteria populations are found all around us, and most strands are beneficial to life as we know it. Bacteria are common single-celled organisms that form a natural component of lakes, rivers, and streams. Bacteria are also found in soils, on plants, and in birds, animals and humans.

Bacterial pollution in surface water is typically measured by the concentration of *Escherichia coli* (*E. coli)* bacteria in the water because of the *initial* belief that *E. coli*are found only in the intestines and waste of humans and other warm-blooded animals. *E. coli* are generally harmless and are an important part of a healthy intestinal tract. However, these bacteria are used as an indicator species because they can often indicate higher numbers of harmful bacteria, as well as other disease-causing organisms such as viruses and protozoans. Some strains of *E. coli* are pathogenic, meaning they can cause illness, or diarrhea. The types of *E. coli* that can cause diarrhea can be transmitted through ingesting contaminated water or food, or through contact with animals or persons (CDC, 2012).

Once in the environment, bacteria thrive when provided an environment with optimaloxygen, sunlight, water, moderate temperatures, and higher levels of organic carbon, nutrients and fine particles present in the sediment (USDA, 2011). Because bacteria pose a biological, rather than chemical or physical pollutant source, they form a dynamic pollutant load. That is, once in the environment, they can asexually reproduce toexponentially increase their population, rather than behaving as a traditional fixed quantity of a pollutant. So, if the population is reduced to compliant levels, the few remaining individual colonies retain the ability to rebound back, as conditions allow.Bacteria can also affix themselves to sediment, plant material, rocks and other solid surfaces in a biofilm and remain in the system for years. A recent study by scientists at Georgia Tech University found nine (9) strains of *E. coli* that have adapted to living in the environment independent of warm-blooded hosts. These strains are indistinguishable from typical *E. coli* based on traditional laboratory tests and yield a positive fecal coliform result; however, researchersbelieve that these strains may not represent a true environmental hazard (Ga. Tech., 2011).

During the initial development of the TMDLs for the Upper Trinity River, the TCEQ commissioned a technical study to identify the potential sources of bacteria in this watershed. Scientists obtained water bacteria samples from the impaired segmentsof the Upper Trinity River. These samples were analyzed using bacterial source tracking (BST) techniques to identify the likely source(s) of the bacteria affecting the river. *E. coli* strains isolated from humans and other host animals such as cattle, chickens and pigs, will have different genetic features. Source tracking is a method of using these genetic features with other biochemical tests to identify the original animal or likely source type (TIAER, 2008).

The results of these analyses can be used to develop waste load allocations, and can help to focus the approach to developing a viable plan to effectively address the bacteria in the Upper Trinity River.

Figure 3-1 is excerpted from these analyses, and illustrates the combined relative source break down in the Trinity Riverin Texas Stream Segment 0805 through Dallas (TAIER, 2008).

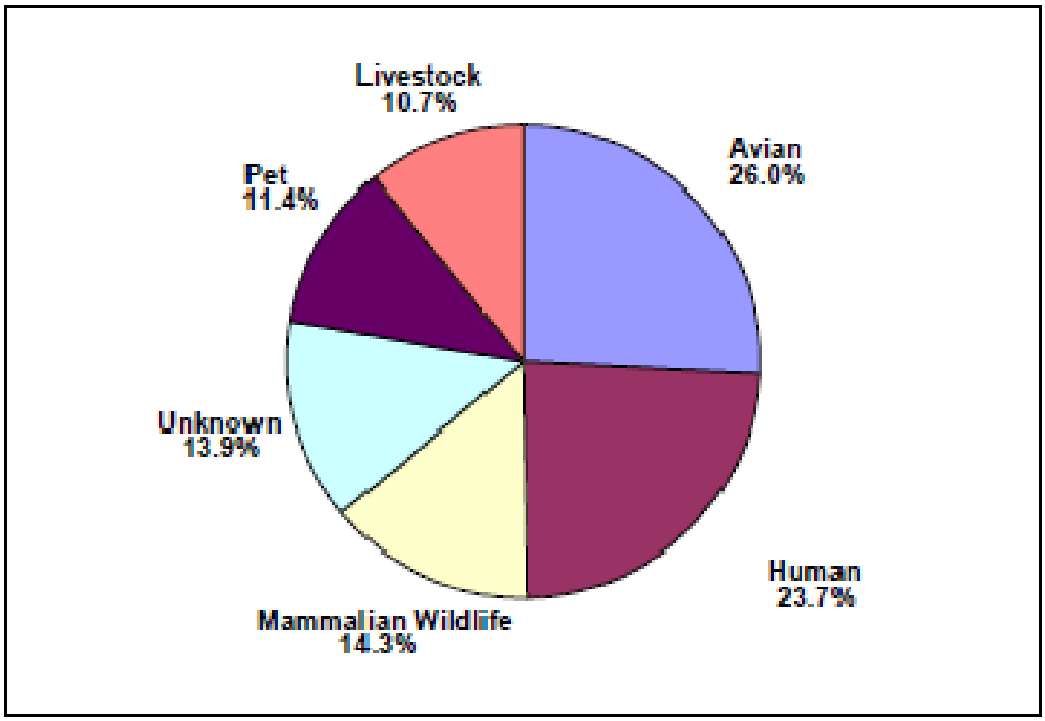

Figure 3-1 Bacteria Source Breakdown in the Upper Trinity River

As shown, these data from 2005 indicate the largest single source of bacteria is attributed to avian sources: birds. Humans contribute about 24 percent of the load, and domesticated animals (pets and livestock) form an additional 22 percent. Birds, wildlife and other unknown sources in the environment combine to form over half of the bacteria load. This means that a majority of the bacteria is coming from sources in ill-defined locations, forming a challenge for effective remediation. These study data also indicated very little seasonal variation, and very little difference in dry weather and wet weather loading (TIAER, 2008). Identified sources within the City of Dallas include, but are not limited to the following:

- Dallas Water Utilities (DWU) Central Wastewater Treatment facility: permitted 200million gallon per day (mgd) municipal wastewater treatment facility (wwtf) located off of Sargent Road, in Segment 0805-03; however, plant effluent monitoring data indicates verylittle to no bacteria discharges from this facility(DWU, 2012);
- Sanitary Sewer Overflows (SSOs): The City of Dallas participates in the SSO Initiative to address and eliminate inadvertent discharges from the sanitary sewer system to the storm sewer system(DWU, 2006);
- On-Site Sewage Facilities (OSSFs): Dallas has an estimated 8,600 OSSFs, particularly in developing rural areas of the City; however records for these facilities are very limited, and so the extent of the impacts from these OSSFs is not well understood (TAIER, 2008, TCEQ, 2012);
- Based on national pet ownership data, there are an estimated 1.2 million dogs, and 1.24 million cats in Dallas within the affected reaches of the Trinity River in Dallas(TCEQ, 2012);
- There are no permitted confined animal feeding operations (CAFOs) in Dallas; however there are an estimated 2,200 horses, 9,000 cattle, 1,100 goats and 720 domestic hogs/pigs (TIAER, 2008);

- There are approximately 2,500 “urban chickens”, ducks, geese and turkeys (TAIER, 2008);
- Feral hogs have been identified as a concern along the Dallas Floodway; Texas Parks and Wildlife data indicate over 1.5 million feral hogs across the state, and estimate at least 1,000 in Dallas(TAMU-AE,2011).

While wildlife, birds and other unknown sources form a majority of the identified bacteria types, location-specific population density data for these sources are unavailable. Because a majority of the identified sources are associated with diffuse ill-defined locations throughout the watershed, stormwater runoff becomes the default transport mechanism from these other sources. This loading is discharged through over 11,000 stormwater outfalls into 180 miles of channelacross the City.

Flow-duration curves indicate that during most low flow scenarios, the water meets water quality standards for bacteria. Most of the loading occurs during the moderate to high runoff events (TIAER, 2008). Figure 3-2 illustrates the load-duration curve from this segment of the river; cross-marks above the top pink line indicate a water quality issue.

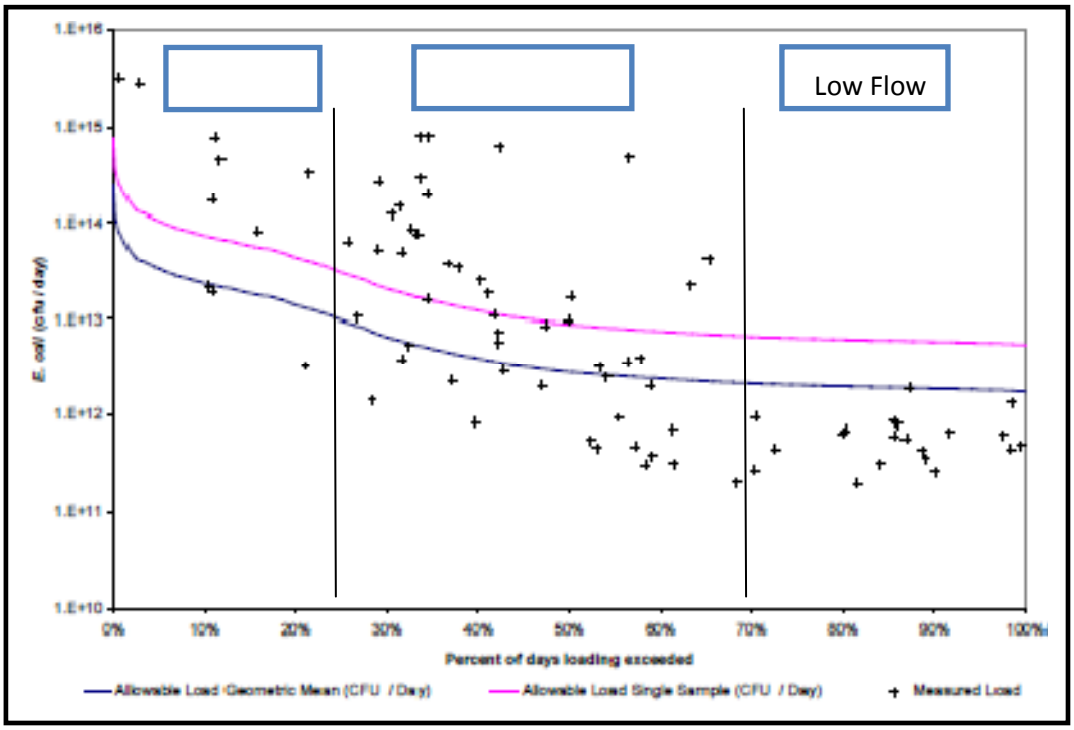

Figure 3-2 Load Duration Curve for Trinity River Segment 0805

3.2 Water Quality Monitoring and Screening Programs

Surface water quality is characterized through a comprehensive monitoring and screening program that includes dry weather screening, wet weather monitoring, and rapid bioassessment protocol monitoring within the 32 12-digit HUC-defined watersheds with lands that are wholly, or partially contained within the MS4. The City also participates in the Clean Rivers Program by monitoring the Trinity River through Dallas. All data used for regulatory purposes is obtained through NELAP-certified laboratory analyses, and under a quality assurance project plan (QAPP), or similar standard operating guidance (SOG) or

protocol. Figure 3-3, (at the end of the iBRP) provides a map showing the sample locations for these water quality monitoring and screening efforts. Monitoring and screening results are used to evaluate implemented BMPs and focus additional SWMP resources as necessary to improve water quality.

- **Dry Weather Screening:** The dry weather screening program focuses on identifying and eliminating illicit connections and improper discharges to the MS4 by inspecting all outfalls within the MS4 permit term during dry weather conditions, and investigating any observed discharges.
- **Wet Weather Monitoring:** Wet weather water quality data from each watershed that is located entirely within the City limits are collected at least once during the permit term in accordance with procedures set forth in the TCEQ "Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods (TCEQ, 2008, RG-415), and the NCTCOG Regional Wet Weather Characterization Program QAPP (NCTCOG, 2011). The City's wet weather monitoring efforts are coordinated with the NCTCOG Regional Wet Weather Characterization Program to identify regional water quality trends, as data availability permits. Because the pollutant load is typically higher during wet weather events, these data reflect a "worse-case scenario" with respect to pollutants conveyed into the Trinity River.
- **Rapid Bioassessment Protocol (RBP) Monitoring:** The City performs rapid bioassessment protocol (RBP) monitoring for all 32 HUC watersheds in accordance with the TCEQ "Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data" (TCEQ, 2007, RG-416). The RBP monitoring evaluates the chemical, physical, and biological in-stream features that promote a healthy and diverse habitat; as such, this method provides a good overall assessment of watershed conditions, and provides the best dataset to use in trend analyses. Two dry-weather sampling events are conducted each year for two to three locations within each watershed in accordance with the spring and summer index periods outlined in TCEQ guidance.
- **Clean Rivers Program:** The City also performs water quality monitoring at several places along the West Fork Trinity River, Elm Fork Trinity River, Upper Trinity River (Main Stem), Lake Ray Hubbard, and East Fork Trinity River as a participant in the Clean Rivers Program. The City collects quarterly data in accordance with the Quality Assurance Project Plan (QAPP), as managed by the Trinity River Authority (TRA) under contract with the TCEQ (TRA, 2012).

3.3 Local Watershed Trends

Data collected from 2007 to 2012 through the wet weather program and the water sampling portion of the bio-monitoring program can be used to assess local watershed conditions, and progress towards meeting water quality criteria. Water quality assessment for bacteria is based on a geometric mean of sample data collected over time that is evaluated against a human-healthrisk-based criteria of 126 MPN/100 mL water. A geometric mean represents the centralized average value of the data, and is calculated as the nth root of all sample measurements multiplied together:

Geometric mean is calculated as:

$$WQ = (n \times n_1 \times n_2 \times n_3 x \ldots\ldots n_n)^{-n}$$

Trends in water quality are assessed by placing the data values in chronological order, and analyzing the change in the geomean from the initial data value to last value. Because the sampling conducted for the bioassessment monitoring is obtained after a minimum of 72 hours following the last precipitation event, these data generally represent a dry-weather condition. Table 3-1 provides the trend analyses for ambient (dry) weather conditions for each of the subwatersheds that are monitored in Dallas. The number of samples obtained, along with the range of values, the geomean, and ongoing trends are shown for each subwatershed. Water quality exceedences, and areas with water quality degradation are highlighted using bold font. With the exceptions of a handful of tributary streams, the water quality in a majority of the subwatersheds from Dallas that flow into the Trinity River are showing marked improvement over the last six (6) years. ***Seventy-four (74%) of the local subwatersheds are either presently compliant, or showing improvement for dry weather conditions.***

Table 3-1
LOCAL DRY WEATHER WATER QUALITY TRENDS

Water Body	*Period of Record*	*# of Samples*	*Maximum*	*Minimum*	*# of Exceedences**	*Geomean*	*Trend** % Change*
Elm Fork Trinity River (Texas Stream Segment 0822)							
Elm Fork Trinity River (u/s)	2009-2012	14	**15,531**	1	5	49	-75%
Furneaux Creek	2007-2012	20	**2,247**	20	6	105	4%
Hutton Branch	2007-2012	12	**816**	10	3	65	-48%
Farmer's Branch	2007-2012	12	**288**	0	2	36	-82%
Rawhide Creek	2007-2008	5	**2,600**	25	2	**180**	-21%
Joe's Creek	2007-2012	15	**32,550**	120	**11**	**903**	**71%**
West Joe's Creek	2007-2012	12	**43,520**	10	**6**	**246**	3%
Bachmann Creek	2007-2012	28	**563**	0	**11**	**124**	-50%
California Crossing	2007-2012	13	**300**	0	**3**	38	**80%**
Daniel's Creek	2007-2012	13	**650**	1	**2**	**49**	**53%**
Richard's Branch	2007-2012	12	**2,900**	**40**	**8**	**212**	**14%**
Elm Fork Trinity River (d/s)	2009-2012	16	**34,480**	10	**10**	**1,302**	-66%
Lower West Fork Trinity River (Texas Stream Segment 0841)							
Mountain Creek	2007-2012	33	**657**	**1**	4	17	**238%**
Artesian Creek	2007-2012	12	98	**0**	0	22	-67%
Delaware Creek	2009-2012	6	**932**	**1**	3	39	-82%
West Fork Trinity River	2009-2012	15	**1,664**	**0**	**7**	**141**	-74%

Data obtained from City of Dallas MS4 Annual Reports; Bold font notes criteria exceedence, or degrading trend; Shading denotes watershed with majority of samples exceeding water quality criteria, and decreasing water quality trend. (Negative numbers for trend indicate decreasing number of bacteria colonies, and thus, improved water quality).

Table 3-1 (Continued) LOCAL DRY WEATHER WATER QUALITY TRENDS							
Water Body	***Period of Record***	***# of Samples***	***Maximum***	***Minimum***	***# of Exceedences****	***Geomean***	***Trend** % Change***
Main Stem Trinity River (Texas Stream Segment 0805-04: West Fork/Elm Fork Confluence to Cedar Creek)							
Old Trinity River (Nobles Branch)	2009-2012	18	**1,467**	1	6	79	-15%
Knights Branch	2007-2012	14	**11,199**	0	**11**	**438**	**120%**
Dallas East Bank Sump System	2009-2012	16	**3,076**	1	**12**	**176**	-20%
Cedar Branch	2009-2012	12	**4,900**	107	**12**	**540**	**225%**
Turtle Creek	2007-2008	19	**1,515**	69	**17**	**294**	-18%
CBD	2009-2012	10	**24,196**	10	**9**	**593**	-33%
Coomb's Creek	2007-2012	12	**750**	10	**9**	**188**	-69%
Dallas West Bank Sump System	2009-2012	8	**4,611**	108	**7**	**773**	**41%**
Cedar Creek	2007-2012	22	**2,489**	63	**20**	**484**	-69%
White Rock Creek System (Texas Stream Segment 0827 – discharges into Trinity River Segment 0805-03)							
White Rock Creek Above Lake	2007-2012	22	**4,000**	1	7	78	-64%
McKamy Branch	2007-2012	16	**2,800**	**0**	**14**	**372**	-15%
Cottonwood Creek	2007-2012	16	**21,200**	**1**	**14**	**276**	-34%
Floyd Branch	2007-2012	14	**19,863**	**0**	**13**	602	**17%**
Jackson Branch	2007-2012	16	**1,730**	**146**	**16**	**432**	**49%**
Dixon Branch	2007-2012	20	**4,400**	**0**	**15**	**355**	**13%**
Williamson Branch	2007-2012	12	**2,863**	**0**	6	**160**	-65%
McCommas Creek	2007-2012	12	**410**	**1**	6	107	-49%
Ash Creek	2007-2012	12	**2,200**	**0**	6	**104**	-51%
White Rock Creek below Lake	2007-2012	18	**3,654**	**0**	**9**	**267**	**456%**
Data obtained from City of Dallas MS4 Annual Reports; Bold font notes criteria exceedence, or degrading trend; Shading denotes watershed with majority of samples exceeding water quality criteria, and decreasing water quality trend. (Negative numbers for trend indicate decreasing number of bacteria colonies, and thus, improved water quality).							

Table 3-1(Continued) LOCAL DRY WEATHER WATER QUALITY TRENDS							
Water Body	*Period of Record*	*# of Samples*	*Maximum*	*Minimum*	*# of Exceedences**	*Geomean*	*Trend** % Change*
Main Stem Trinity River (Texas Stream Segment 0805-03: Cedar Creek to Five Mile Creek)							
Honey Springs Branch	2009-2012	12	**575**	10	6	106	-82%
Elam Creek	2007-2012	20	**1,376**	0	**14**	**174**	-79%
West Sump System	2009-2012	8	**836**	98	**7**	**198**	**42%**
Five Mile Creek	2007-2012	69	**2,520**	0	27	124	-38%
Crow Creek	2007-2012	14	**1,789**	0	**9**	**273**	-50%
Woody Creek	2007-2012	13	**9,678**	64	**9**	**345**	80%
Rickett's Branch	2007-2012	14	**1,523**	1	**8**	**192**	**64%**
Newton Creek	2007-2012	13	**490**	1	**9**	**102**	-27%
White's Branch	2007-2008	4	**299**	10	**1**	**66**	-78%
Main Stem Trinity River (Texas Stream Segment 0805-02: Below Five Mile Creek)							
Main Stem above Ten Mile Creek	2007-2012	7	**30**	0	0	5	**448%**
Prairie Creek	2007-2012	16	**20,000**	0	0	**159**	-99%
Hickory Creek	2009-2012	8	**1,600**	0	5	418	-74%
Parson's Slough	2009-2012	16	**1,664**	0	5	**251**	-4%
Ten Mile Creek	2007-2012	39	**12,997**	0	12	48	-70%
East Fork Trinity River (Texas Stream Segment 0819)							
Spring Creek	2009-2012	8	**1,274**	0	**4**	**159**	-24%
Long Branch	2009-2012	8	**1,354**	0	**6**	**562**	-22%
South Mesquite Creek	2009-2012	46	**1,300**	0	17	83	-37%
East Fork Trinity	2007-2008	4	41	1	0	12	1113%
Data obtained from City of Dallas MS4 Annual Reports; Bold font notes criteria exceedence, or degrading trend; Shading denotes watershed with majority of samples exceeding water quality criteria, and decreasing water quality trend. (Negative numbers for trend indicate decreasing number of bacteria colonies, and thus, improved water quality).							

Representative wet weather sampling is conducted in each of the major subwatersheds that are wholly contained with the City of Dallas at least once during each permit term. Because these samples are obtained during a rain event with at least .1 inch of rainfall, these data represent a "worse-case" scenario with respect to pollutant loading. Table 3-2, on the following page provides the trend analyses for wet weather conditions for each of the subwatersheds that are monitored in Dallas. The number of samples obtained, along with the range of values , the geomean values, and ongoing trends are

shownfor each subwatershed. Water quality exceedences and areas with water quality degradation are highlighted using bold font.

Table 3-2 *LOCAL WET WEATHER WATER QUALITY TRENDS*							
Water Body	***Period of Record***	***# of Samples***	***Maximum***	***Minimum***	***# of Exceedences****	***Geomean***	***Trend** % Change***
Elm Fork Trinity River (Texas Stream Segment 0822)							
Hutton Branch	2010	2	**813**	**232**	2	479	-41%
Farmer's Branch	2008	2	**1,725**	158	2	**522**	**230%**
Joe's Creek	2009-2012	8	**141,000**	120	**7**	**4,985**	-96%
Bachmann Creek	2008-2011	7	**4,410**	13	**5**	**181**	-94%
California Crossing	2010-2011	4	**580**	10	**2**	**128**	**31%**
Daniel's Creek	2010-2011	4	**400**	10	**3**	106	-27%
Elm Fork Trinity River	2008	2	20	4	0	9	**124%**
Lower West Fork Trinity River (Texas Stream Segment 0841)							
Mountain Creek	2011	2	**1,400**	80	1	**335**	-76%
Main Stem Trinity River (Texas Stream Segment 0805-04: West Fork/Elm Fork Confluence to Cedar Creek)							
Old Trinity River (Nobles Branch)	2009-2012	3	**1,200**	**520**	**3**	**825**	**59%**
Dallas East Bank Sump System	2007-2012	3	**1,600**	**600**	**3**	**841**	**40%**
Turtle Creek	2007-2008	3	**3,200**	**750**	**3**	**1,687**	-16%
Coomb's Creek	2007-2012	2	**4,040**	**2,851**	**2**	**3,394**	-16%
Dallas West Bank Sump System	2008-2012	20	**64,880**	1	**16**	**485**	-26%
Cedar Creek	2008-2009	2	**1,090**	**820**	**2**	**945**	-13%
White Rock Creek System (Texas Stream Segment 0827 – discharges into Trinity River Segment 0805-03)							
White Rock Creek Above Lake	2010-2011	8	**12,000**	41	**4**	**66**	**159%**
McKamy Branch	2010	2	**185**	**63**	1	108	-42%
Dixon Branch	2010	2	**2,382**	**480**	**2**	**1,069**	-55%
Williamson Branch	2010	2	**86**	**1**	**0**	**9**	-89%
White Rock Creek below Lake	2009-2010	6	**24,200**	**20**	**5**	**577**	-83%

Table 3-2 (Continued) LOCAL WET WEATHER WATER QUALITY TRENDS							
Water Body	***Period of Record***	***# of Samples***	***Maximum***	***Minimum***	***# of Exceedences****	***Geomean***	***Trend** % Change***
Main Stem Trinity River (Texas Stream Segment 0805-03: Cedar Creek to Five Mile Creek)							
Elam Creek	2009	2	**341**	216	**2**	**271**	**26%**
Five Mile Creek	2009-2012	6	**4,611**	120	**5**	**813**	-77%
Newton Creek	2009	2	**171**	41	**1**	**84**	-51%
Main Stem Trinity River (Texas Stream Segment 0805-02: Below Five Mile Creek)							
Main Stem above Ten Mile Creek	2007	2	**23**	21	0	22	**4%**
Parson's Slough	2009	2	**1010**	657	2	**815**	-19%
Ten Mile Creek	2011	2	**305**	18	1	74	-76%
East Fork Trinity River (Texas Stream Segment 0819)							
Spring Creek	2007	2	75	73	0	74	-1%
Upper Duck Creek	2009	2	**3,654**	464	2	**1,302**	**181%**
South Mesquite Creek	2010	2	**173**	52	1	95	**82%**
Data obtained from City of Dallas Annual Reports; Bold font notes criteria exceedence, or degrading trend; Shading denotes watershed with majority of samples exceeding water quality criteria, and decreasing water quality trend. (Negative numbers for trend indicate decreasing number of bacteria colonies, and thus improved water quality).							

These data are consistent with the flow-duration data shown in Figure 3-1, with generally higher concentrations found during wet weather events. However, even ***during the wet weather scenario, seventy-two (72) percent of the subwatersheds are either compliant or improving;*** so while there is a way to go, the water quality in a majority of the Dallas subwatersheds that flow into the Trinity River are showing marked improvement over the last 6 years.

3.4 Trinity River Trends

The Trinity River Authority (TRA) monitors water quality in the classified river segments under contract with the TCEQ through the Clean Rivers Program (CRP). The TRA has been performing water quality monitoring at sites throughout the Trinity River basin since 2001, and all data is collected and analyzed in accordance with the CRP QAPP. These data were used to establish the TMDLs, and will be used to assess water quality improvement or degradation over time within these classified water bodies. The City of Dallas is a participating partner with the TRA in the CRP, and monitors 11 locations within the Upper Trinity River system. TRA CRP monitoring station locations are shown on Figure 3-3. Table 3-3 on the next page includes the period of record, number of samples obtained, range of values, geomean, and ongoing trends for the monitoring stations along the impaired reaches. Water quality exceedences are highlighted using bold font.

Table 3-3 TRINITY RIVER WATER QUALITY TRENDS							
Trinity River Location/Station	***Period of Record***	***# of Samples***	***Maximum***	***Minimum***	***# of Exceedences***	***Geomean***	***Trend** % Change***
Lower West Fork Trinity River (Texas Stream Segment 0841: Upstream of Trinity River Confluence)							
Lower West Fork Trinity River (0841) (U/S Confluence with Upper Trinity River)	2001-2012	255	**24,000**	2	111	**160**	**+70%**
Main Stem Trinity River (Texas Stream Segment 0805-04: West Fork/Elm Fork Confluence to Cedar Creek)							
Upper Trinity River (0805-04) @Mockingbird Lane (10937)	2001-2012	88	**24,200**	12	43	**219**	-1007%
Upper Trinity River (0805-04) @ Sylvan Boat Ramp (20933)	2011-2012	5	**866**	28	3	**174**	-80%
Upper Trinity River (0805-04) @ Santa Fe Ave/DART Rail (U/S Standing Wave) (20934)	2011-2012	5	**687**	45	3	**167**	-76%
Main Stem Trinity River (Texas Stream Segment 0805-03: Cedar Creek to Five Mile Creek Confluence)							
Upper Trinity River (0805-03) @ SH 310 Bridge (20444)	2011-2012	5	**1,300**	50	3	**224**	-83%
Upper Trinity River (0805-03) @ S. Loop 12)(10934)	2001-2012	89	**39,700**	17	56	**359**	-79%
**Data obtained from TRA CRP database; Bold font notes criteria exceedence, or degrading trend; Negative numbers for trend indicate decreasing number of bacteria colonies, and thus improved water quality.							

These data are generally consistent with the CRP data from 2001 to 2008 that were used to identify water quality impairments for these two segments of the Upper Trinity River in Dallas(TCEQ, 2011a).With the exception of the West Fork Trinity River that enters into the upstream portion of the Dallas reach of the Main Stem Trinity River, ***the trend analyses on these data indicate a 76 to 1007 percent reduction in bacteria counts forming a significant water quality improvement over the last decade***. The additional data collected within these reaches in the last year, also shows sustained and consistent water quality improvement over the last year.

4.0 REGULATORY BACKGROUND

The federal Clean Water Act (CWA) and Texas Water Code provide the regulatory requirements including defined responsibilities and authorityfor stewardship of the Waters of theUnited States and Waters of the State, respectively. The process for formally assessing surface water quality in a stream is set forth in Section 303(d) of the CWA. TheEnvironmental Protection Agency (EPA) delegated responsibility for CWA compliance to the Texas Natural Resources Conservation Commission (TNRCC), in 1998; the name for the TNRCC evolved to the TCEQ in 2002 (TCEQ, 2012a).

4.1 TPDES Municipal Separate Storm Sewer System Permit

In 2006, the TCEQ delegated the authority and responsibility to enforce the provisions of the CWA, and the Texas Water Code to the City of Dallas through TPDESPermit Number WQ0004396000 (permit). The City has a population of 2.4 million residents(U.S. Census Bureau, 2011), and thus is permitted as a Phase I (large city) MS4 operator, which includes additional permit responsibilities.This permit, as renewed in 2011, requires the City to control the quality of stormwater discharged from the drainage system (TCEQ, 2011).

4.2 Stormwater Management Plan

As the operator of a Phase I MS4, the City is required under TPDES Permit Number WQ0004396000 to develop and implement a comprehensive Stormwater Management Program (SWM). This permit requires the City to "*develop, implement, and revise, as necessary, a comprehensive Stormwater Management Plan(SWMP) which includes pollution prevention measures, treatment or pollutant removal techniques, stormwater monitoring, use of legal authority, and other appropriate means to control the quality of stormwater discharged from the MS4 to Waters of the United States (U.S.).*" In addition, "*each element of the plan must be developed to include measureable goals, when feasible.*"

The SWMP includes an overview of the ordinances and other regulatory mechanisms that provide the legal authority to implement and enforce the requirements of the permit, and outlines the eight (8) Stormwater Control Measures (SCMs) or Minimum Control Measures (MCMs) that are used to meet the Permit requirements:

1) MS4 Maintenance Activities
2) Post-Construction Controls
3) Illicit Discharge Detection and Elimination
4) Pollution Prevention and Good Housekeeping for Municipal Operations
5) Industrial and High Risk Stormwater Runoff
6) Construction Site Runoff
7) Public Education, Outreach, Involvement and Participation
8) Monitoring, Evaluation and Reporting

These SCMs are developed to protect water quality, and satisfy requirements of the TPDES permit as issued by the TCEQ. Each SCM as outlined in the SWMP includes measures with measurable goals to target bacteria within the Dallas watersheds.

4.3 TMDLs and Required Load Reduction

The process for formally assessing surface water quality in a stream is set forth in Section 303(d) of the CWA. Every two years, the states are required to develop a list of water bodies that are not attaining the water quality required to sustain the desired (and designated) use(s) for that water body. This is called the 303(d) List of Impaired Waters; it is submitted to EPA for their concurrence and approval.Once a waterbody is included on the 303(d) list, then additional monitoring is performed to assess whether Total Maximum Daily Loads (pollutant load allocations, or limits) are required to improve water quality.

TMDLs are based upon a seven-year data set that incorporates an assessment of the geometric mean for water quality over that time. The pollutant load reductions that are required to meet the surface water quality standards are developed from these data based upon primary contact recreational uses: wading, swimming and boating.Once the TMDL load reductions are developed and public input is received, the TCEQ provides the EPA with these documents for review and approval.

The EPA has approved the 2010 303(d) List for Texas; this list includes most of the Trinity River through the DFW metroplex, including portions of the East Fork, West Fork and Clear Fork Trinity Rivers, and several tributary streams (TCEQ, 2011b). Figure 4-1 illustrates the locations of water bodies in the DFW area that are currently listed as being impaired due to bacteria (shown with purple ink).

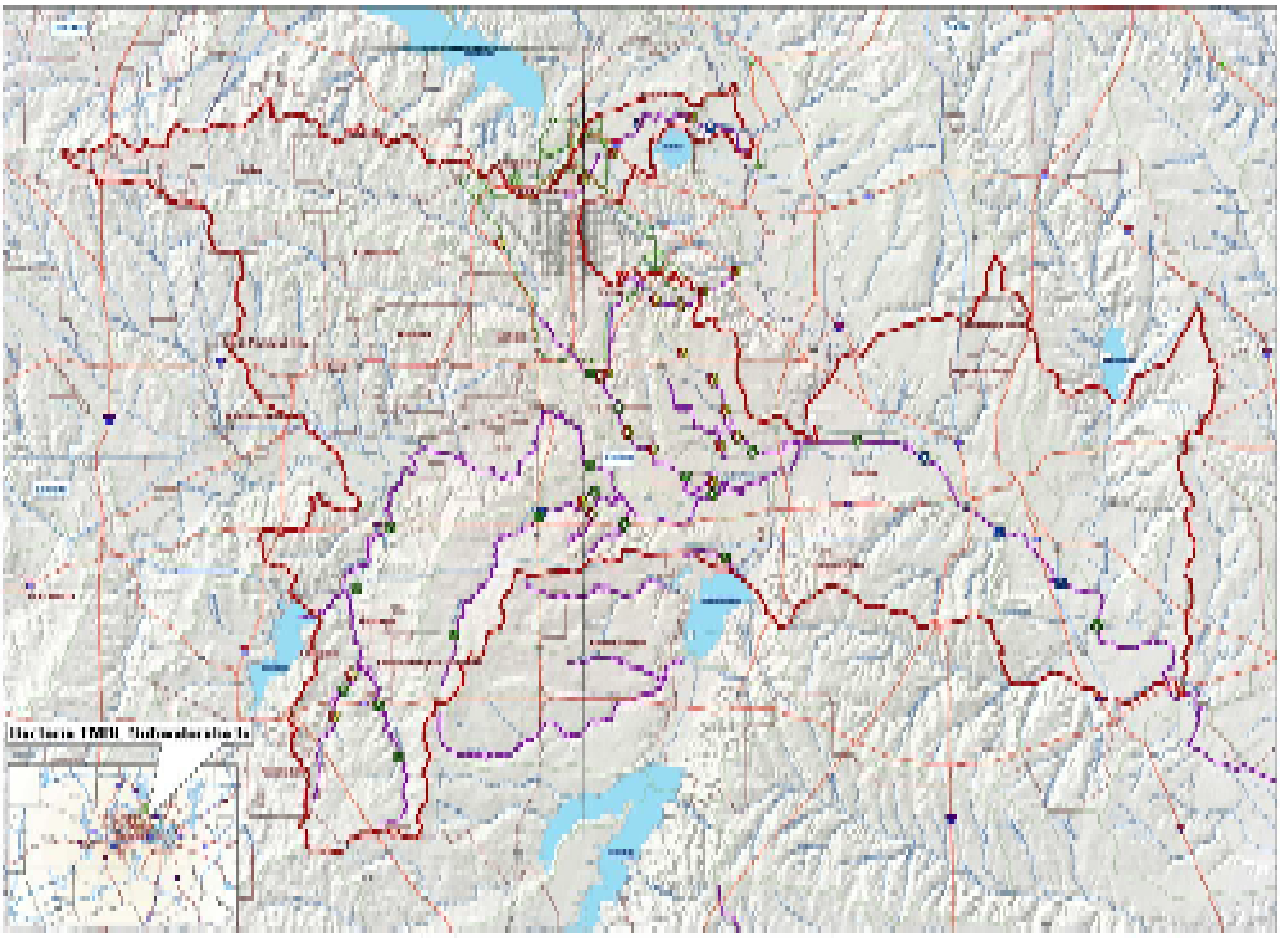

Figure 4-1 Bacteria-Impaired Water Bodies in the DFW Metroplex

Table 4-1 includes the classified water bodies in Dallas that are currently listed as having impaired water quality, with the required load reductions that are necessary to allow safe recreation.

Table 4-1 IMPAIRED WATER BODIES IN DALLAS & REQUIRED LOAD REDUCTIONS							
Water Body/ Segment #	***Reach Description***	***Year Listed***	***# of Samples***	***Range***	***GeoMean***	***TMDL?***	***Required % Reduction***
Upper Trinity River/ 0805-04	Confluence of Elm Fork Trinity River to Confluence of Cedar Creek	1996	75	12- 24,200	224	2011a	-44%
Upper Trinity River/ 0805-03	Confluence of Cedar Creek to confluence of Five Mile Creek	1996	75	17-39,700	384	2011a	-67%
Cottonwood Branch*/ 0822A-02	3.5 mile segment from Valley View Drive to 0.5 mi south of Story Road*	2006	62	19-4,840	786	2011b	-84%
Grapevine Creek*/ 0822B-01	From confluence with Elm Fork Trinity River U/S to DFW Airport*	2006	34	21-4,838	411	2011b	-69%
Lower West Fork Trinity River * /(0841-01)	Confluence of Elm Fork to Dallas County Line*	1996	115	N/A	177	In Process	-29%
Data Source: Draft Implementation Plan for Seventeen TMDLs for Bacteria, (NCTCOG, 2012); data range reflects period from 2001-2008 * Only a very small portion of the downstream portion of this watershed is included within the Dallas City limits							

The following TMDLs have been developed to address these water quality issues:

- Two TMDLs for Indicator Bacteria in the Upper Trinity River, Dallas, Texas, (TCEQ, 2011a)
- Two TMDLs for Indicator Bacteria in Cottonwood Branch and Grapevine Creek, Texas, (TCEQ, 2011c)

Development of the 13 TMDLs for indicator bacteria in the Lower West Fork Trinity River and tributaries is in process and is anticipated to be complete mid-year in 2013 (TIAER, 2012a).

4.4 Regional Implementation Plan (i-Plan)

Once the TMDL load allocations are approved, then the stakeholders in the affected watershed(s) are asked to develop an implementation plan (i-Plan) to address the necessary water quality improvements. Depending on the number of stakeholders and the level of competing interests, this can often take 2 to 5 years. Because there are several water bodies across the DFW metroplex with identified bacteria water quality issues and pending TMDLS, the TCEQ contracted with the NCTCOG to facilitate development of a regional i-Plan to outline the measures to be implemented to improve water quality.

City of Dallas staff from stakeholder departments participated in the regional i-Plan development process, along with counterparts from other local cities, transportation agencies, the respective

Chambers of Commerce, and other stakeholders such as the Sierra Club, and Dallas Downstream Paddlers. This entailed identifying and prioritizing best management practices that could be implemented at a regional basis, as well as providing interim plan reviews, comments and suggestions.

The i-Plan has been developed to address the TMDLs established for the Upper Trinity River, Cottonwood Branch and Grapevine Creek, and the 13 TMDLs anticipated for the Lower West Fork Trinity River system. Thei-Plan summarizes the TMDLs for the area, affected landuse, identifies potential sources, and outlines Best Management Practices (BMPs) within the followingcategories of strategies:

1) Wastewater
2) Stormwater
3) Planning and Development
4) Pets, Livestock and Wildlife
5) Onsite Sewage Facilities and Aerobic Treatment Units
6) Monitoring Coordination
7) Education and Outreach
8) BMP Libraries

The draft "*Implementation Plan for Seventeen TMDLs for Bacteria in the Greater Trinity River and Tributaries*" was submitted to the EPA for review and comment in August, 2012, (TCEQ, 2012). The public comment period for this document will occur in Fall, 2012. The measures within this IBRP have been developed to be generally consistent with the draft iPlan, and the City's SWMP.

5.0 BACTERIA REDUCTION ELEMENTS

The best management practices (BMPs) that the City of Dallas is using to reduce bacteria loading to the Upper Trinity River and tributaries are described in this section. To help integrate the iBRPinto the City's Stormwater Management Plan, these BMPs are organized into sections following the eight elements or minimum control elements outlined in the City's MS4 Permit.

Each section includes a brief explanation of what is included and how each practice is anticipated to help reduce bacterial loading. A summary table follows each description to outline the BMP, measures for tracking performance, and an implementation schedule. To assist with correlation between the SWMP, and the draft I-Plan, columns that reference the applicable section in each document are also provided in this table.

5.1 Element 1 - MS4 Maintenance Activities

The MS4 maintenance program for structural controls includes a regular program of inspections, repair and maintenance activities for the City's roads and drainage infrastructure. The storm drainage system requires regular maintenance to make sure that the control structures that are installed to prevent pollution are functioning as intended to effectively mitigate/reduce negative impacts to water quality. The City uses a tiered maintenance approach to prioritize cleaning and repair activities and opportunities to incorporate water quality improvement measures. Implementing a comprehensive maintenance program to address structural controls, and roadways improves the integrity of the storm sewer system and decreases the potential for the discharge of pollutants to the MS4, including bacteria and the nutrients necessary to support it.

At present, the City maintains over 100 in-line stormwater interceptors at various City facilities. The City has found that stormwater interceptors are very effective in removing floatables and litter from the MS4. However, because a small amount of water is always retained in the bottom of these structures between rain events, thiscan often result in the development of a mini-breeding system for bacteria, particularly during the warm summer months. Any bacteria remaining in the sump water can multiply between storms, resulting in a fairly large flush of bacteria at the beginning of the next storm. Regularly inspecting, maintaining and cleaning the in-line stormwater interceptors helps to prevent system failure, backup, vectors, overflow, odors and these other biochemical reactions from occurring.

Several recent studies including a USGS study of street sweeping in the Charles River watershed in Boston, the Chesapeake Bay area, and Newport Beach, indicate that street sweeping may be effective in reducing bacterial loading, and may contribute to decreased bacteria regrowth from biofilm within city gutters, thus providing benefits towards basin-wide reductions in bacteria (Zariello, et al, 2003, CWP, 2008, Skinner, et al, 2010).

The City also responds to citizen service requests concerning water quality related to the creeks, ponds and channels within the MS4. While all water-quality requests are investigated immediately upon notification, of particular concern are the fish kills that can occur with abrupt changes in temperature, long hot, dry periods, and other causes. Fish kills can be an indicator of other disturbances in the

watershed, both man-made and natural. By investigating these events thoroughly, it is sometimes possible to identify previously undetected illicit discharges that can be contributing bacteria or other pollutants to the MS4.

The fish-kill investigation includes water quality sampling, fish retrieval and monitoring over a period of several days. The fish are retrieved and assessed for potential cause of mortality. Water quality is sampled at the site where the dead fish are observed, and at key locations above and below that location. The surrounding area is investigated for possible causes for the fish-kill, based on the results of the water quality sampling. The area is then monitored daily until water quality resumes ambient conditions. The TCEQ and Texas Park and Wildlife Department (TPWD) are notified of fish kill events that cause more than 50 mortalities, and a formal report is provided following the investigation(Stratus Consulting, 2008).

Lastly, implementing appropriate best management practices to minimize the impacts of day-to-day maintenance activities can help reduce the amount of sediment and other pollutants that are discharged to the MS4 through routine maintenance. Various studies have indicated that bacteria have the ability to sorb to sediment, and thus remain in the drainage system for years (Ga. Tech, 2011; USGS, 2006). Reducing the amount of additional sediment entering the stream can thus potentially help reduce bacteria.

Table 5-1 ELEMENT 1 – MS4 MAINTENANCE BMPs				
Activities	***SWMP #***	***iPLAN #***	***Metric Tracked***	***Schedule***
Dallas Floodway Inspection& Maintenance				
Maintaineleven (11) identified sump areas by: a) Visually inspecting each sump area, including pump stations and trash racks, at least twice a year;	1.A.2.a.1.	-	# of sump inspections performed	Permit Year 1 - Permit Year 5
Cleaning trash racks after rain events, as needed; and	1.A.2.a.1.	-	# of trash rack inspections/pump station	Permit Year 1 - Permit Year 5
		-	Volume of debris removed from trash racks	Permit Year 1 - Permit Year 5
Cleaning the sumps by de-silting, removing litter and woody debris, mowing, managing vegetation to ensure access to structures, and excavating sediments, as needed.	1.A.2.a.1.c	-	# of maintenance activities per sump	Permit Year 1 - Permit Year 5
		-	Acres and types of vegetation management performed	Permit Year 1 - Permit Year 5
		-	Volume of materials removed during maintenance activities in CY	Permit Year 1 - Permit Year 5
Inlet System Inspection & Maintenance				
Clean and repair inlets as necessary year. Inlet cleaning and repair activities include: a) Cleaning inlets by removing material(s)	1.A.2.b.2	-	#, type, and locations of inlets cleaned	Permit Year 1 - Permit Year 5
	1.A.2.b.2	-	Volume of material removed from inlets in CY	Permit Year 1 - Permit Year 5

Table 5-1 (Continued) ELEMENT 1 – MS4 MAINTENANCE BMPs				
Activities	***SWMP #***	***iPLAN #***	***Metric Tracked***	***Schedule***
Retention/DetentionFacility Inspections & Maintenance				
Inspect at least ten (10) City-owned retention/detention ponds per year and each pond at least once during the permit term.	1.A.2.c.1	-	# of ponds inspected	Permit Year 1- Permit Year 5
Maintain the flood control capacity and water quality efficacy of City-owned detention/retention ponds.	1.A.2.c.2	-	# and type of pond maintenance activities performed (de-silting, litter removal, etc)	Permit Year 1 - Permit Year 5
			Volume of materials removed in CY	Permit Year 1 - Permit Year 5
Creek/Channel Maintenance				
Respond to service requests related to surface water quality	1.A.2.d.3	-	#, type(s) and locations of water-quality related response activities performed	Permit Year 1 - Permit Year 5
Investigate cause and effect for service requests related to fish kills	1.A.2.d.4	-	# of fish kill investigations performed	Permit Year 1 - Permit Year 5
		-	# of reported fish-kills with more than 50 identified fish/wildlife mortalities	Permit Year 1 - Permit Year 5
Stormwater Interceptor Program				
Clean the City-owned in-line stormwater interceptors.	1.A.3.2	-	# of Cleaning Events performed	Permit Year 1 - Permit Year 5
		-	Volume of Materials removed in Gallons	Permit Year 1 - Permit Year 5

Table 5-1 (Continued) *ELEMENT 1 – MS4 MAINTENANCE BMPs*				
Activities	***SWMP #***	***iPLAN #***	***Metric Tracked***	***Schedule***
Roadway Maintenance: Street Sweeping				
Sweep the prime network roads twelve (12) times per year.	1.C.1.1	-	# of gutter miles of prime network roads swept	Permit Year 1 - Permit Year 5
			Volume of debris collected in CY	Permit Year 1 - Permit Year 5
Sweep the Central Business District Roads five (5) times a week, and other areas as needed	1.C.1.2	-	# of gutter miles of CBD roads swept	Permit Year 1 - Permit Year 5
			Volume of debris collected in CY	Permit Year 1 - Permit Year 5
Road and Bridge Maintenance Program				
Incorporate temporary or permanent SCMs to reduce or prevent the discharge of pollutants from routine maintenanceactivities for roads and bridges. The SCMs may include but are not limited to: a) Temporary inlet protection b) Erosion control measures (e.g., silt fence, re-vegetative measures, soil stabilizing matting, etc.), c) Rock berms or check dams, d) Stabilized construction entrances, and/or e) Work area dewatering measures.	1.C.3	3.2.5	#, type and location of SCMs implemented	Permit Year 1 - Permit Year 5

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5.2 Element 2 - Post Construction Stormwater Control Measures

Stormwater discharges from new development and redevelopment sites have the potential to degrade water quality, either from soil disturbance during construction, or increased runoff from acorresponding increase in impervious (hard) surface cover. Stormwater control measures addressing post-construction discharges incorporate several different approaches to maintain and/or improve water quality.While post construction stormwater control measures are generally beneficial and should be considered for inclusion into most development and re-development projects, performance data on many of the commonly used low-impact design measures indicates limited effectiveness in addressing bacteria(Wright Water Engineers, et al, 2010). The benefits would be anticipated to be mostly secondary in nature such as providing filtering, slowing the overall urban hydrologic response or limiting the sediment and nutrients required for bacteria survival.

The activities under this element include an integrated Stormwater Management (iSWM) planning and design process, regular review and updates of the applicable Dallas City Codes, evaluating flood control projects for water quality opportunities, and evaluating performance of low impact development (LID) and green infrastructure controls.

The City aligned the local stormwater regulations to parallel the requirements of the MS4 permit from the TCEQ. Both the permit and the current code focus on the potential environmental impacts from physical sources such as litter or sediment, and chemical sources such as vehicle spills. There is very little mention of biological pollutants such as bacteria, or the nutrients necessary for bacterial survival. Several recent enforcement cases illuminated the opportunity for code revisions to address biological sources.

Dallas is also working under an EPA technical grant to review policy and codes for potential barriers to implementing sustainable design; it is anticipated that several code changes from this project will also be recommended.

Lastly, because of the limited local track record with respect to effectiveness and long-term maintenance requirements for many of the commonly used post-construction controls, the City will investigate implementing pilot projects where applicable to assess performance. Any data collected would be shared with the regional BMP database.

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Table 5-2 ELEMENT 2 – Post - Construction ControlStrategies				
Activities	***SWMP #***	***iPLAN #***	***Metric Tracked***	***Schedule***
Implement Comprehensive Master Planning Process for New and Redevelopment Projects				
Participate in City and regional implementation of integrated Stormwater Management (iSWM) master planning process for new and redevelopment projects	2.A.1	3.0	Number, size, type and location of projects implemented using iSWM within City Limits	Permit Year 1 - Permit Year 5
Investigate implementation of local and regional recognition program for projects that implement green infrastructure and other measures to improve water quality	-	3.1	Document progress towards implementation and participation	Permit Years 2 – Permit Year 5
Expand existing City iSWM program to apply to sites greater than one acre in size	2.A.2	3.0	Number, size, type and location of projects implemented using iSWM within City Limits	Permit Year 2
Review and UpdateDallasCity Code				
ReviewDallasCity Code with regard to federal, state, and local environmental regulations and design practices	2.B.1	2.2, 3.0, 4.2, 4.4	Number and types of updates made to Dallas City Code	Permit Years2 and 4
Evaluate Flood Control Projects				
Evaluate City capital construction projects for flood control on a case-by-case basis to assess feasibility of incorporating post-construction controls to address water quality	2.C.1	8.0	# of flood control and drainage projects evaluated for water quality measures	Permit Year 1 - Permit Year 5
		8.0	# of flood control and drainage projects with water quality measures initiated	Permit Year 1 - Permit Year 5
		8.0	# of flood control and drainage projects with water quality measures completed	Permit Year 1 - Permit Year 5
		8.0	Types and locations of measures implemented	Permit Year 1 - Permit Year 5

Table 5-2 (Continued) *ELEMENT 2 – Post - Construction ControlStrategies*				
Activities	***SWMP #***	***iPLAN #***	***Metric Tracked***	***Schedule***
Implement and Track Performance of Structural/Non-Structural Controls				
Promote the use of Low Impact Development (LID) and green infrastructure controls including, but not limited to: 1. Green Roofs 2. Rain harvesting systems 3. Retention Ponds 4. Riparian buffer systems 5. Permeable pavement 6. Bio-swales 7. Constructed wetlands 8. Other	2.D.1	3.0	Number, type(s) and locations of LID features implemented at City facilities	Permit Year 1 - Permit Year 5
		3.0	Number, size, type(s), land use and locations of new and redevelopment projects over 1 acre	Permit Year 1 - Permit Year 5
		3.0, 8.0	Correlate water quality data with data concerning types and locations of post construction controls in order to assess effectiveness of LID/Green Infrastructure, other pilot projects	Permit Years 4 and5

5.3 Element 3 - Illicit Discharge Detection and Elimination

Illicit discharges, are formally defined as “any discharge to a municipal separate storm sewer that is not composed entirely of stormwater” with a few excepted discharges resulting from firefighting activities, certain water utility discharges, and discharges from TPDES/NPDES permitted sources (40 CFR 122.26(b)(2)).The City has a comprehensive illicit discharge detection and elimination (IDDE) program with activities to detect and eliminate illicit discharges to the storm sewer system, and to address sanitary sewer overflows, citizen response, yard waste and animal wastes, and illegal dumping.

The City’s IDDE program uses a combination of dry weather outfall inspections, closed circuit televiewing (CCTV), and storm drain system information from the asset inventory database to trace the origin of a suspected illicit discharge(s). Potential illicit discharges and disposal are also investigated through a coordinated City-wide complaint response process.

Grass clippings, leaf litter and animal wastes are addressed through several different initiatives to limit biological wastes and nutrient discharges into the MS4.Grass clippings and leaf litter are primarily addressed in the spring and fall through outreach and education. Because improper yard waste disposal is typically performed quickly with leaf blowers, it can be challenging to enforce. Seasonal “blitzes” are implemented a couple of times each year during heavy periods of spring and fall landscape activities. Staff drive residential areas, and provide education and, as necessary, notices of violation (NOV) to property owners and landscape contractors who are performing landscape maintenance during the blitz period. Code enforcement concerning proper yard waste management is provided year round.

The City also addresses animal wastes related to pets through outreach and education, and appropriate Code enforcement concerning leash and “pooper-scooper” laws.

The City has formed a Feral Hog Task Force to address the growing challenge posed by feral hog populations within the Dallas Floodway. The Task Force is developing recommendations for managing these populations to address damage to the levees, channels and flood control structures from these animals, and limiting related waste discharges in/near the waterways. Additional stormwater controls to address feral hogs may be developed through the Task Force recommendations.

As shown by the landuse mapping in Figure 2-2, the majority of the City’s permit area is developed into urban and ultra-urban landuse types with limited areas that support agricultural operations. The City will review data from the local county tax appraisal districts to identify properties with agricultural tax exemptions; these areas may support potential livestock grazing or other landuses that may warrant consideration of additional stormwater controls to address animal waste. Any necessary controls that may be identified will be coordinated with the applicable local soil and water conservation district personnel. Available public records do not indicate any permitted confined animal feeding operations (CAFOs) in the permit area (TCEQ, 2012).

Landuse mapping will also be used with GIS analyses of water and sewer utility service, to identify developing rural areas that may utilize either onsite sanitary sewage facilities (septic tanks and drainfields), or aerobic treatment units, another small onsite wastewater treatment technology. Identified facilities near existing sanitary sewers will be encouraged to tap into the public system with

proper closure of the OSSF. Outreach concerning proper maintenance of these facilities can also be provided.

In many cities across the United States, combined sewer systems and sanitary sewer overflows form the primary source of bacterial pollution to surface water. During dry weather periods, a combined sewer system conveys sanitary sewage and any miscellaneous drainage directly to the waste water treatment plant for treatment. During wet weather, some storm drainage is also conveyed to the treatment plant, until the line capacity is exceeded. When the combined sewer reaches design capacity, a mixture of raw sewage and stormwateroverflows directly into the creeks and rivers. ***The City of Dallas does not have any combined sewer systems.***

However, like many U.S. cities, the City has aging sanitary sewer infrastructure, and the related challenges of addressing sanitary sewer overflows (SSOs) and infiltration. The City actively implements several strategies to limit the inadvertent release of sewage from this system into the MS4. The City participates in the EPA Sanitary Sewer Overflow (SSO) Initiative to reduce the number of SSOs by improving the wastewater system and reducing the amount of grease build up, inflow, and infiltration(DWU, 2006). The City reduces SSOs and infiltration by conducting the following activities:

- Providing proper grease disposal information and education at public outreach events to residential customers, industry, and trade organizations;
- Inspecting grease generating establishments;
- Performing sewer main cleaning, conducting CCTV inspections of the wastewater system, inspecting manholes, and inspecting selected sewer basins and areas with exposed sewer mains due to creek/stream erosion;
- Completing system upgrades through sliplining and replacement;
- Inspecting and remotely monitoring collection system lift stations;
- Conducting smoke tests;
- Applying root control application; and
- Using GIS technology to identify areas that may require more frequent inspections and maintenance to proactively address issues before they become emergencies.

The City also has an active pre-treatment program that registers and tracks all liquid waste haulers within the City.

Table 5-3 ELEMENT 3 – Illicit Discharge Detection and Elimination BMPs				
Activities	***SWMP #***	***iPLAN #***	***Metric Tracked***	***Schedule***
Grass Clippings, Leaf Litter and Animal Waste Management				
Work to reduce improper disposal of grass clippings and leaf litter	3.A.2.a	-	# of Leaf Litter Blitzes provided	Permit Year 1 - Permit Year 5
		-	# of homes and businesses contacted through the blitz or other Code enforcement activities concerning yard waste	Permit Year 1 - Permit Year 5
		-	# of pamphlets and NOVs provided	Permit Year 1 - Permit Year 5
Work to reduce impacts from improper animal waste management by participating in local and regional Feral Hog initiatives	3.A.2.b	4.0	# of meetings attended by City personnel	Permit Year 1 - Permit Year 5
		4.0	# of recommendations developed and implemented	Permit Year 1 - Permit Year 5
Review tax records, and other data sources to identify areas where additional controls may be required to prevent animal wastes from impacting the MS4	3.A.2.c	4.1	# of tax records obtained	Permit Year 2
		4.1	# of properties identified through review	Permit Year 3
Assess city parks for pet and wildlife use and evaluate need for animal waste management measures	-	4.5	# of pet waste BMPs implemented	Permit Year 2 - Permit Year 5
Evaluate need for waterfowl management plan	-	4.3	Documentation of review and assessment in Annual Report	Permit Year 2 Permit Year 5
MS4 Screening and Illicit Discharge Inspections				
Detect, inspect, and investigate illicit discharges and/or improper disposals.	3.A.3.a	-	# of identified Illicit discharges or improper disposals	Permit Year 1 Permit Year 5
Facilitate public reporting and response to resident concerns regarding illegal dumping or improper discharge of non-stormwater materials.	3.A.3.b	-	# and types of illicit discharge related calls received per watershed	Permit Year 1 Permit Year 5

Table 5-3 (Continued) *ELEMENT 3 – Illicit Discharge Detection and Elimination BMPs*				
Activities	***SWMP #***	***iPLAN #***	***Metric Tracked***	***Schedule***
Limit Sanitary Sewer Overflows and Infiltration				
Continue participation in the City's SSOI and CMOM programs	-	1.1, 1.4	Annual reporting on SSOI \CMOMs to iPlan coordinating committee	Permit Year 2 - Permit Year 5
Minimize the number and effects of sanitary sewer releases to storm drains by: a) Inspecting sanitary sewer pipes;	3.A.4.a	-	Miles of sanitary sewer inspected using CCTV	Permit Year 1 - Permit Year 5
b) Performing preventative maintenance of the sanitary sewer system; and	3.A.4.b	-	Miles of root control application completed to sanitary sewers	Permit Year 1 - Permit Year 5
c) Cleaning and repairing the sanitary sewer system.	3.A.4.c	-	Miles of sanitary sewer pipes cleaned	Permit Year 1 - Permit Year 5
		-	# and location of repairs completed per watershed	Permit Year 1 - Permit Year 5
Evaluate effectiveness of sanitary sewer overflow SCMs.	3.A.5	-	Identified wet weather and dry weather sanitary sewer discharges to the MS4	Permit Year 1 - Permit Year 5
		-	Locations of wet weather and dry weather sanitary sewer overflows per watershed	Permit Year 1 - Permit Year 5
Evaluate frequency, extent of SSOs due to lift station failures to determine the need for other BMPs	-	1.2	#, location and volume of SSOs related to lift station failures	Permit Year 2 - Permit Year 5
As practicable, consider relocating sanitary sewers out of waterways when planning and implementing capital sewer replacement projects	-	1.6	#, location and lineal of feet of sanitary sewer relocated	Permit Year 2 - Permit Year 5

Table 5-3 (Continued) ELEMENT 3 – Illicit Discharge Detection and Elimination BMPs				
Activities	**SWMP #**	**iPLAN #**	**Metric Tracked**	**Schedule**
Continue Liquid Waste and Waste Hauler Program				
Maintain existing liquid waste and waste hauler permit and tracking programs	-	1.7	# of liquid waste haulers permitted through program	Permit Year 2 - Permit Year 5
Review and as necessary revise City Code relative to use of portable sanitary sewer units to ensure placement away from MS4	-	1.7.2	Documentation of related Code revisions	Permit Year 2 - Permit Year 5
Review and as necessary revise City Code relative to requirements for appropriate maintenance and service scheduling for portable sanitary sewer units	-	1.7.2	Documentation of related Code revisions	Permit Year 2 - Permit Year 5
Investigate Onsite Sanitary Sewage System and Aerobic Treatment Unit Use				
Review appropriate public records and utility billing to identify areas in Dallas that are served by OSSFs and ATUs	-	5.4	# of properties served by OSSFs/ATUs	Permit Years 2,3
Assess need for implementing property owner, inspector, realtor education concerning operation and maintenance of OSSFs/ATUs	-	5.1, 5.2, 5.3	Description of findings in SWMP Annual Report	Permit Year 4
Assess areas with OSSFs and ATUs for availability of adjacent public systems, and available funding for any identified repairs or replacements	-	5.0, 5.5	# of systems repaired, or replaced	Permit Years 4,5

Table 5-3 (Continued) *ELEMENT 3 – Illicit Discharge Detection and Elimination BMPs*				
Activities	***SWMP #***	***iPLAN #***	***Metric Tracked***	***Schedule***
Continue Implementing Various Stormwater Program Strategies				
Continue participating in NCTCOG Regional Stormwater Management Program	-	2.0, 8.0	Documentation of Annual Participation in Annual SWMP Report	Permit Year 1 - Permit Year 5
Continue development of a Local Supplemental Environmental Project program to use as an available tool for environmental enforcement activities	-	2.1	Documentation of progress towards program implementation, and # of projects implemented	Permit Year 2 - Permit Year 5

5.4 Pollution Prevention and Good Housekeeping Strategies

The City of Dallas has an existing pollution prevention and good housekeeping program that focuses on continuous improvement processes to reduce pollutant runoff from municipal operations. This program incorporates the City's Environmental Management System (EMS), and provides for appropriate management of the waste removed from the MS4, facility-specific Spill Prevention Control and Countermeasure (SPCC) Plans (when required), and emergency response requirements that are accounted for and executed on a city-wide basis.

The City established an Environmental Management System (EMS) during the last permit term that is currently certified under the International Standards Organization (ISO) 14001 protocols for EMS. At the same time, the City also implemented several Administrative Directives (ADs) that govern City environmental policy and set forth specific requirements for all operations to minimize the impact of their activities on the environment. This program requires identification and implementation of good housekeeping and best management practices (BMPs), development of Standard Operating Guidance (SOGs) to promote reduction of discharge of pollutants to the MEP from road repair, equipment yards, and material storage facilities, water plants, and maintenance facilities, and regular trainingfor all employees responsible for municipal operations including, but not limited to information on preventing and reducing stormwater pollution (including bacteria) from all municipal operations.

The spill response program is supported through the activities of multiple City departments. The City responds to spills, reports the number of spill responses, and maintains a spill prevention program that includes the proper handling, storage, and disposal of hazardous and non-hazardous materials. The City uses the 311/911 system for receiving and dispatching notice of hazardous and non-hazardous spills. If a spill enters the City's MS4 system, attempts are made to mitigate the effects to the MEP and to prevent the materials from reaching Waters of the United States. The City tracks all spills, including those with a discharge to the MS4, and those that are successfully mitigated so there are no MS4 impacts.

Table 5-4 provides a list of the activities, measurable goals, or metrics to be tracked and the implementation schedule for the SCMs described in Element 4 – Pollution Prevention and Good Housekeeping Strategies.

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Table 5-4 ELEMENT 4 – Pollution Prevention & Good Housekeeping				
Activities	**SWMP #**	**iPLAN #**	**Metric Tracked**	**Schedule**
Spill Response Program				
Respond to spills of hazardous and non-hazardous substances that enter the City's storm drainage system for which the City is notified by mitigating the effects of the spill, and preventing the spilled substances, to the extent practicable, from entering a Water of the State.	D.1.a	-	# type and location of spill responses	Permit Year 1 - Permit Year 5
Prevent the spilled substances, to the extent practicable, from entering a Water of the State.	D.1.b	-	# of successfully mitigated spills	Permit Year 1 - Permit Year 5
		-	# of spills entering a Water of the State	Permit Year 1 - Permit Year 5
Pollution Prevention Program				
Implement EMS program to promote continuous improvement with respect to pollution prevention and good housekeeping at municipal operations	4.A.1	3.2.5	% of identified issues addressed within 90 days	Permit Year 1 - Permit Year 5
			# and type of BMPs utilized to prevent sediment and other pollutant discharges from routine maintenance	Permit Year 1 - Permit Year 5

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5.5 Element 5 - Industrial and High Risk Runoff Strategies

The City addresses industrial facility stormwater discharges to the MS4 that may pose a threat to water quality through a comprehensive industrial program that includes regular screening, monitoring and inspections. The industrial facilities are identified through a variety of methods and include facilities that are permitted under the TPDES Multi-Sector General Permit (MSGP) Number TXR 050000, facilities that are operating under a No Exposure Certification (NEC), and facilities that are identified through screening as facilities that need to be permitted.

Industrial and high risk facilities within the City limits with the potential to discharge pollutants to the MS4 are regularly inspected for adequate control measures to reduce the discharge of pollutants to the MS4. The inspection verifies that the structural and non-structural control measures as outlined in the Storm Water Pollution Prevention Plan (SWPPP) for the site are reflected on the site, and functioning as intended to prevent pollution from the site.

Facilities that are regulated under the TPDES MSGP are identified through their standard industrial codes (SIC Codes). The City conducts annual inspections of the TPDES MSGP Sector U (Food and Kindred Products) facilities that have the potential to generate biological waste, including high Biochemical Oxygen Demand (BOD5), nutrients, or bacteria in the site discharge. Additional sampling requirements are implemented for sites with these constituents as deemed necessary from a review of onsite monitoring data.

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Table 5-5 ELEMENT 5 – Industrial and High Risk Runoff Strategy				
Activities	***SWMP #***	***iPLAN #***	***Metric Tracked***	***Schedule***
Inspections and Control Measures				
Inspect Sector U, (Food Products and Kindred Products) and other similar facilities that have the potential to discharge biological constituents.	5.A.5	2.2	# and type of inspections performed	Permit Year 1 - Permit Year 5

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5.6 Element 6 - Construction Site Stormwater Runoff Strategies

Most pollution prevention efforts associated with construction sites focus on turbidity and suspended sediment that may result from disturbing onsite soils. The construction-related measures within this iBRP focus on bacteria's ability to affix to sediment, plant material, rocks and other solid surfaces as a biofilm and remain in the system for many years. Sediment from construction sites can carry bacteria, and or support bacteria within the environment (Ga. Tech., 2011). Other sources of bacteria from construction sites may include, but are not limited to the ubiquitous portable sanitary facilities (addressed under Element 3 - Illicit Discharge Detection and Elimination).

The City enforces compliance with the TPDES General Construction Permit Number TXR150000 for construction sites that disturb more than one acre of land. Stormwater runoff from construction sites is addressed by implementing effective controls per site-specific Stormwater Pollution Prevention Plans (SWPPPs), construction site inspections, and notifying building applicants of the applicable requirements that affect projects under the TPDES permit regulations. All sites that disturb more than an acre are required to implement appropriate controls to reduce sediment and other pollutants from being discharged from the construction site. In addition, appropriate pollution prevention and housekeeping measures to address litter, erosion and sediment transport, waste materials, concrete truck washouts, chemicals and sanitary waste are also required for every site, regardless of size.

The City evaluates the site planning checklist that building permit applicants and other contractors use to make sure that a SWPPP is submitted to the City, and to promote consideration of the iSWM comprehensive program to incorporate water quality benefits into the design and construction of the project (See Element 2). The City also informs the contractors and other building permit applicants of their responsibility to provide a copy of a Construction Site Notice (CSN) or Notice of Intent (NOI) to support appropriate coverage under the TPDES Construction General Permit.

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Table 5-6 *ELEMENT 6 – Construction Site Runoff BMPs*				
Activities	***SWMP #***	***iPLAN #***	***Metric Tracked***	***Schedule***
Inspection of Construction Sites and Enforcement of Control Measures Requirements				
Inspect construction sites for compliance with stormwater management practices. Conduct inspections as follows: a) Five (5) acres and greater in size, in the escarpment or geologically similar area, or part of a common plan of development: every two weeks; and b) Sites greater than or equal to one (1) acre and less than five (5) acres in size on a monthly basis	6.A.2.a.1	3.2.1	# and type of inspections performed	Permit Year 1 - Permit Year 5
Conduct supplemental inspections of construction sites in response to complaints	6.A.2.a.2	3.2.1	# and type of inspections performed	Permit Year 1 - Permit Year 5
Notifications of Applicant Responsibilities				
Review and revise the building permit procedures to ensure a process is in place that emphasizes notification of requirements under TPDES permit regulations, and incorporation of appropriate water quality measures and citizen involvement.	6.A.3.a	3.2.1	# and type of revisions to process procedures	Permit Year 1 - Permit Year 5

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5.7 Element 7 – Public Education, Outreach, Involvement and Participation

The City's public education and outreach program is diverse, multi-faceted, multi-generational, and is targeted towards children, residents, non-governmental entities, visitors, staff, businesses, and operators of commercial and industrial facilities within the permit area. Topics that relate to potential sources of bacteria include illicit discharges, improper disposal, fats, oils and grease, pet waste, yard waste, and fertilizers, construction practices, and raising overall environmental awareness. Education and outreach efforts are focused towards three primary groups: school age groups, community organizations, and business and trade organizations. As appropriate, electronic and print media are developed and used to help support the education efforts related to abating bacteria.

The City conducts an "Inreach" initiative to raise City employees' awareness and promote pollution prevention practices to reduce discharge of pollutants into stormwater. Educational information is disseminated to City employees through electronic announcements, internet websites, new employee orientation presentations, and stormwater education modules. Bacteria-related topics include illicit discharges, floatables and litter, animal waste management, landscape waste management, and proper use, application, and disposal of pesticides, herbicides, and fertilizers by city staff or contracted vendors. Project Managers are also invited to special workshops concerning appropriate construction site management SCMs, the TPDES General Construction Permit, Spill Response and other related issues.

The City also partners with the NCTCOG, and with other outreach and education forums such as the Trinity River Environmental Education (TREEs) Initiative, Keep Dallas Beautiful and others to provide greater level of influence towards addressing a shared regional problem.

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Table 5-7 ELEMENT 7 – Public Education, Outreach, Involvement and Participation				
Activities	***SWMP #***	***iPLAN #***	***Metric Tracked***	***Schedule***
Public Education				
Present at least one (1) annual presentation to community organizations in each ….target program: • Illicit discharge (IDDE) • Pet waste • Yard waste • Sediment discharges	7.A.1.1	3.2.3,4.2 7.0	# of presentations for each program, and attendees	Permit Year 1 - Permit Year 5
Present at least one (1) annual presentation to businesses/ trade organizations in each …. target program: • Illicit discharge (IDDE) • Yard waste • Animal waste • Sediment discharges	7.A.3.1	3.2.3, 4.2 7.0	#and geographic distribution of presentations	Permit Year 1 - Permit Year 5
Continue “Cease the Grease” public information and education program concerning Fats, Oils and Grease (FOG), including participation in regional FOG program	-	1.3, 7.0	# of presentations for each program, and attendees	Permit Year 2 – Permit Year 5
Distribute pet waste educational materials through various media	-	4.6, 7.0	Types and locations of information provided	Permit Year 2 – Permit Year 5
School Education				
1. Present five (5) educational presentations per year to K-12 students within the City’swatersheds, including assemblies, camps, story time, and library events.	7.A.2	7.0, 7.2	#and geographic distribution of presentations	Permit Year 1 - Permit Year 5

Table 5-7 (Continued) ELEMENT 7 – Public Education, Outreach, Involvement and Participation				
Activities	***SWMP #***	***iPLAN #***	***Metric Tracked***	***Schedule***
Municipal Staff Training				
Publish two (2) electronic announcements addressing stormwater management, per year.	7.B.3.1	3.2.2, 7.0	# of Announcements published	Permit Year 1 - Permit Year 5
Provide two (2) internal training events on current stormwater issues, such as bacteria per year.	7.B.3.2	3.2.2, 7.0	# training events and attendees	Permit Year 1 - Permit Year 5
Construction Site Operator Program				
Present two (2) workshops to contractors, operators and construction site affiliated personnel on acceptable construction site SCMs, per year.	7.B.1.a	3.2.2, 3.2.4	# of workshops provided and number of attendees	Permit Year 1 - Permit Year 5
Present on-site consultations to operators and construction site personnel on site-specific construction site SCMs, per year.	7.B.1.b	3.2.2, 3.2.4	# of consultations provided and number of attendees	Permit Year 1 - Permit Year 5
Present on-site tail-gate training sessions to operators and construction site personnel on acceptable construction site SCMs, per year.	7.B.1.c	3.2.2, 3.2.4	# of tailgate training sessions provided and number of attendees	Permit Year 1 - Permit Year 5
Outreach Partnerships				
Continue participation in regional outreach and education forums	-	7.1	Document participation in annual SWMP report	Permit Year 2 - Permit Year 5
Work with the local school districts, universities and Texas Education Agency to develop related school curricula	-	7.2	Document efforts in annual SWMP report	Permit Year 2 - Permit Year 5
Participate in local and regional litter abatement and other pollution prevention programs (eg, TREES, Keep Dallas Beautiful, Trinity Trash Bash, etc)	5.B.3.b	7.4	Document efforts in annual SWMP report	Permit Year 1 - Permit Year 5

Table 5-7 (Continued) ELEMENT 7 – Public Education, Outreach, Involvement and Participation				
Activities	***SWMP #***	***iPLAN #***	***Metric Tracked***	***Schedule***
Outreach Partnerships (Continued)				
Provide bacteria-related education and outreach to Volunteer Service Groups such as Groundwork Dallas, Master Gardeners, Master Naturalists, etc	-	7.6	Document efforts in annual SWMP report	Permit Year 2 - Permit Year 5
Contribute towards regional BMP library	-	8.0	Document information provided in Annual SWMP report	Permit Year 2- Permit Year 5
Outreach and Education Media Development				
Update existing, and as necessary develop new outreach brochures, presentations, print and electronic media to address pollution prevention in general, and specific topics related to bacteria	7.C.3	7.5, 8.0	Document # and types of media updates in Annual SWMP report	Permit Year 1- Permit Year 5
Use local and regional review of BMPs to focus implementation of outreach as needed	-	6.2, 8.0	Description of review process and input used, included into the Annual SWMP report	Permit Year 3- Permit Year 5

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5.8 Element 8 – Monitoring, Evaluation and Reporting

A comprehensive monitoring and assessment program has been established to track progress in complying with permit provisions and to protect water quality of receiving waterbodies in the MS4. The City of Dallas performs the required storm event discharge monitoring under Permit Section IV, Option 1, NCTCOG Regional Wet Weather Characterization Program (RWWCP), and Option 3, Representative Rapid Bioassessment sampling, as augmented by dry weather monitoring, local wet weather sampling, and supplemental monitoring along the Trinity River performed as part of the TRA CRP. All sample locations are indicated Figure 3-3. As described in Section 3.0 of the iBRP, the City performs the following types of monitoring and screening efforts:

- **Dry Weather Screening:** The dry weather screening program focuses on identifying and eliminating illicit connections and improper discharges to the MS4 by inspecting all outfalls within the MS4 permit term during dry weather conditions, and investigating any observed discharges. Watersheds and subwatersheds are prioritized for dry-weather screening by age of the neighborhood, age and condition of the infrastructure, and areas with heavy industrial and commercial land uses.
- **Wet Weather Monitoring:** Wet weather water quality data from each watershed that is located entirely within the City limits are collected at least once during the permit term. The City's wet weather screening efforts are coordinated with the NCTCOG Regional Wet Weather Characterization Program to identify regional water quality trends, as data availability permits. Because the pollutant load is typically higher during wet weather events, these data reflect a "worse-case scenario" with respect to pollutants conveyed into the Trinity River.
- **Rapid Bioassessment Protocol (RBP) Monitoring:** The City performs rapid bioassessment protocol (RBP) monitoring for all 32 HUC watersheds in accordance with the TCEQ "Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data" (TCEQ, 2007, RG-416). The RBP monitoring evaluates the chemical, physical, and biological in-stream features that promote a healthy and diverse habitat; as such, this method provides a good overall assessment of watershed conditions, and provides the best dataset to use in trend analyses. Two dry-weather sampling events are conducted each year for two to three locations within each watershed in accordance with the spring and summer index periods outlined in TCEQ guidance.
- **Clean Rivers Program:** The City also performs water quality monitoring at several places along the West Fork Trinity River, Elm Fork Trinity River, Upper Trinity River (Main Stem), Lake Ray Hubbard, and East Fork Trinity River as a participant in the Clean Rivers Program. The City collects quarterly data in accordance with the Quality Assurance Project Plan (QAPP), as managed by the Trinity River Authority (TRA) under contract with the TCEQ (TRA, 2012).
- **Wastewater Treatment Plan Effluent Monitoring:** As part of the TPDES Permit for the Central Wastewater Treatment Plant, the City monitors water quality of the plant effluent discharge.

These data are evaluated to guide efforts of the SWMP and to evaluate overall effectiveness of the SWMP (including this iBRP) towards making measurable improvements in the water quality in the Dallas. Results

are used with trend analyses to focus implementation of these strategies, and as necessary, revisions to these proposed BMPs and strategies. Location-specific data can be used to identify areas where there is water quality improvement or degradation. Areas with degrading water quality trends, and/or water quality criteria exceedences can be targeted for additional investigation to determine potential sources. This can help determine appropriate BMPs and strategies that can be applied to address localized water quality challenges.

Dallas has a very strong stake in the success of the regional water quality program because a majority of the identified impaired water bodies in the DFW metroplex are located upstream of Dallas. The West Fork Trinity River, Grapevine Creek, Cottonwood Branch and Elm Fork Trinity River all contribute drainage to the Upper Trinity River though Dallas and thus actively contribute to the water quality (see figure 4-1). Data collected as a part of the Dallas stormwater and wastewater management programs will be shared with the regional NCTCOG i-plan coordinating committee to help support an understanding of regional water quality trends, to implement the regional i-Plan and to support development of recommendations as necessary concerning any changes or revisions to the local and regional programs.

Table 5-8 ELEMENT 8 – Monitoring, Evaluation and Reporting				
Activities	**SWMP #**	**iPLAN #**	**Metric Tracked**	**Schedule**
Monitoring and Screening				
Investigate flows from outfalls during dry weather, sample the discharge, investigate the source, and act to eliminate the discharge.	8.A.1	6.0	# of outfalls inspected, discharges found, and sources identified	Permit Year 1 - Permit Year 5
Perform bi-annual wet weather screening within designated watersheds once per permit term in accordance with the local Wet Weather Sampling Program.	8.A.2.a	6.0	Wet weather screening results for eachwatershed sampled in SWMP annual report	Permit Year 1 - Permit Year 5
Coordinate with the NCTCOG Regional Wet Weather Characterization Program and perform sampling per RWWCP schedule.	8.A.2.b	6.0	Wet weather screening results for eachwatershed sampled in SWMP annual report	Permit Year 1 - Permit Year 5
Perform Rapid Bioassessment Protocol monitoring in at least three (3) watersheds plus a reference site, per year.	8.A.3	6.0	RBP monitoring results for sampling program in SWMP annual report	Permit Year 1 - Permit Year 5
Provide ambient conditions sampling at three (3) locations along the Upper Trinity River in accordance with protocols included in the TRA CRP QAPP.	8.C.4	6.0	Provide ambient water quality results in SWMP Annual report	Permit Year 1 - Permit Year 5
Monitor discharge from City WWTFs for compliance with TPDES Permit limits for bacteria	-	1.0, 6.0	Provide report concerning monitoring and compliance to regional iPlan coordinating committee	Permit Year 2- Permit Year 5
Perform trend analyses and other data correlation to assess BMP effectiveness, and/or identify focus areas for additional BMP implementation	-	6.1, 6.2	Document data trends as part of SWMP Annual Report	Permit Year 2 - Permit Year 5

Table 5-8 (Continued) ELEMENT 8 – Monitoring, Evaluation and Reporting				
Activities	***SWMP #***	***iPLAN #***	***Metric Tracked***	***Schedule***
Data Evaluation				
Identify, and prioritize the industrial facilities that have the potential to discharge bacterial pollutants to the MS4	8.A.4.a	-	# of facilities required to submit monitoring plan for bacteria	Permit Year 1 - Permit Year 5
			# of data sets received and reviewed	Permit Year 1 - Permit Year 5
Evaluate SCMs, or inspection and monitoring programs, for effectiveness.	8.A.4.b	-	# of Facilities required to submit an Action Plan and/or more frequent monitoring to reduce bacteria discharges into the MS4	Permit Year 1 - Permit Year 5
			# of recommended changes to SWMP/iBRP to include measures to reduce bacteria loads	Permit Year 1 - Permit Year 5
TMDL Implementation Plan				
Develop Interim Bacteria Reduction Plan (iBRP) that outlines measures the City will implement to reduce Bacteria concentrations within the City MS4	8.C.1	-	Append iBRP to SWMP	Permit Year 1
Participate in development and implementation of a Total Maximum Daily Load (TMDL) Implementation Plan for bacteria.	8.C.2	-	DocumentCity participation	Permit Year 1 - Permit Year 5

6.0 IMPLEMENTATION SCHEDULE

The schedule for implementing the BMPs outlined in this interim Bacteria Reduction Plan has been incorporated into the each of the MS4 Permit element tables, as outlined in Section 5. Most of the BMPs have already been included in the City's SWMP, and as such are ongoing efforts. Unless otherwise shown, the schedule for these BMPs is as shown in the SWMP. New BMPs as identified in the regional Draft i-plan are shown beginning in Permit Year 2. BMPs that rely on data collection and assessment are scheduled to begin later in this permit term.

Table 6-1 on the following pages, compiles a summary of these BMPs, their correlation with the SWMP and Draft i-Plan, and the schedule for implementation.

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Table 6-1 SUMMARY OF BMP IMPLEMENTATION				
Activities	***SWMP #***	***iPLAN #***	***Metric Tracked***	***Schedule***
ELEMENT 1 – MS4 MAINTENANCE BMPs				
Dallas Floodway Inspection& Maintenance				
Maintaineleven (11) identified sump areas by: a) Visually inspecting each sump area, including pump stations and trash racks, at least twice a year;	1.A.2.a.1.	-	Sump inspections performed	Permit Year 1 - Permit Year 5
Cleaning trash racks after rain events, as needed; and	1.A.2.a.1.	-	# of trash rack inspections/pump station	Permit Year 1 - Permit Year 5
		-	Volume of debris removed from trash racks	Permit Year 1 - Permit Year 5
Cleaning the sumps by de-silting, removing litter and woody debris, mowing, managing vegetation to ensure access to structures, and excavating sediments, as needed.	1.A.2.a.1.c	-	# of maintenance activities per sump	Permit Year 1 - Permit Year 5
		-	Acres and types of vegetation management performed	Permit Year 1 - Permit Year 5
		-	Volume of materials removed during maintenance activities in CY	Permit Year 1 - Permit Year 5
Inlet System Inspection & Maintenance				
Clean and repair inlets as necessary year. Inlet cleaning and repair activities include: a) Cleaning inlets by removing material(s)	1.A.2.b.2	-	Number, type, and locations of inlets cleaned	Permit Year 1 - Permit Year 5
	1.A.2.b.2	-	Volume of material removed from inlets in CY	Permit Year 1 - Permit Year 5

Table 6-1 (Continued) ELEMENT 1 – MS4 MAINTENANCE BMPs (Continued)				
Activities	***SWMP #***	***iPLAN #***	***Metric Tracked***	***Schedule***
Retention/DetentionFacility Inspections & Maintenance				
Inspect at least ten (10) City-owned retention/detention ponds per year and each pond at least once during the permit term.	1.A.2.c.1	-	# of Ponds inspected	Permit Year 1 - Permit Year 5
Maintain the flood control capacity and water quality efficacy of City-owned detention/retention ponds.	1.A.2.c.2	-	Number and type of pond maintenance activities performed (de-silting, litter removal, etc)	Permit Year 1 - Permit Year 5
			Volume of materials removed in CY	Permit Year 1 - Permit Year 5
Creek/Channel Maintenance				
Respond to service requests related to surface water quality	1.A.2.d.3	-	Number, Type(s) and locations of water-quality related response activities performed	Permit Year 1 - Permit Year 5
Investigate cause and effect for service requests related to Fish Kills	1.A.2.d.4	-	Number of Fish Kill investigations performed	Permit Year 1 - Permit Year 5
		-	Number of reported Fish-kills with more than 50 identified fish/wildlife mortalities	Permit Year 1 - Permit Year 5
Stormwater Interceptor Program				
Clean the City-owned in-line stormwater interceptors.	1.A.3.2	-	# of Cleaning Events performed	Permit Year 1 - Permit Year 5
		-	Volume of Materials removed in Gallons	Permit Year 1 - Permit Year 5

Table 6-1 (Continued) *ELEMENT 1 – MS4 MAINTENANCE BMPs (Continued)*				
Activities	***SWMP #***	***iPLAN #***	***Metric Tracked***	***Schedule***
Roadway Maintenance: Street Sweeping				
Sweep the prime network roads twelve (12) times per year.	1.C.1.1	–	Total number of gutter miles of prime network roads swept	Permit Year 1 - Permit Year 5
Sweep the Central Business District Roads five (5) times a week, and other areas as needed	1.C.1.2	–	Volume of debris collected in CY	Permit Year 1 - Permit Year 5
Road and Bridge Maintenance Program				
Incorporate temporary or permanent SCMs to reduce or prevent the discharge of pollutants from routine maintenanceactivities for roads and bridges. The SCMs may include but are not limited to: a) Temporary inlet protection b) Erosion control measures (e.g., silt fence, re-vegetative measures, soil stabilizing matting, etc.), c) Rock berms or check dams, d) Stabilized construction entrances, and/or e) Work area dewatering measures.	1.C.3	3.2.5	Number, type and location of SCMs implemented	Permit Year 1 - Permit Year 5

Table 6-1 (Continued) *ELEMENT 2 – Post - Construction Control BMPs*				
Activities	***SWMP #***	***iPLAN #***	***Metric Tracked***	***Schedule***
Implement Comprehensive Master Planning Process for New and Redevelopment Projects				
Participate in City and regional implementation of integrated Stormwater Management (iSWM) master planning process for new and redevelopment projects	2.A.1	3.0	Number, size, type and location of projects implemented using iSWM within City Limits	Permit Year 1 - Permit Year 5
Investigate implementation of local and regional recognition program for projects that implement green infrastructure and other measures to improve water quality	-	3.1	Document progress towards implementation and participation	Permit Years 2 – Permit Year 5
Expand existing City iSWM program to apply to sites greater than one acre in size	2.A.2	3.0	Number, size, type and location of projects implemented using iSWM within City Limits	Permit Year 2
Review and UpdateDallasCity Code				
ReviewDallasCity Code with regard to federal, state, and local environmental regulations and design practices	2.B.1	2.2, 3.0, 4.2, 4.4	Number and types of updates made to Dallas City Code	Permit Years2 and 4
Evaluate Flood Control Projects				
Evaluate City capital construction projects for flood control on a case-by-case basis to assess feasibility of incorporating post-construction controls to address water quality	2.C.1	8.0	# of flood control and drainage projects evaluated for water quality measures	Permit Year 1 - Permit Year 5
		8.0	# of flood control and drainage projects with water quality measures initiated	Permit Year 1 - Permit Year 5
		8.0	# of flood control and drainage projects with water quality measures completed	Permit Year 1 - Permit Year 5

		8.0	Types and locations of measures implemented	Permit Year 1 - Permit Year 5
Table 6-1 (Continued)				
ELEMENT 2 – Post - Construction Control BMPs				
Activities	***SWMP #***	***iPLAN #***	***Metric Tracked***	***Schedule***
Implement and Track Performance of Structural/Non-Structural Controls				
Promote the use of Low Impact Development (LID) and green infrastructure controls including, but not limited to: 1. Green Roofs 2. Rain harvesting systems 3. Retention Ponds 4. Riparian buffer systems 5. Permeable pavement 6. Bio-swales 7. Constructed wetlands 8. Other	2.D.1	3.0	Number, type(s) and locations of LID features implemented at City facilities	Permit Year 1 - Permit Year 5
		3.0	Number, size, type(s), land use and locations of new and redevelopment projects over 1 acre	Permit Year 1 - Permit Year 5
		3.0, 8.0	Correlate water quality data with data concerning types and locations of post construction controls in order to assess effectiveness of LID/Green Infrastructure, other pilot projects	Permit Years 4 and5
ELEMENT 3 – Illicit Discharge Detection and Elimination BMPs				
Activities	***SWMP #***	***iPLAN #***	***Metric Tracked***	***Schedule***
Grass Clippings, Leaf Litter and Animal Waste Management				
Work to reduce improper disposal of grass clippings and leaf litter	3.A.2.a	-	# of Leaf Litter Blitzes provided	Permit Year 1 - Permit Year 5
		-	# of homes and businesses contacted through the blitz or other Code enforcement activities concerning yard waste	Permit Year 1 - Permit Year 5
		-	# of pamphlets and NOVs provided	Permit Year 1 - Permit Year 5

Table 6-1 (Continued) *ELEMENT 3 – Illicit Discharge Detection and Elimination BMPs*				
Activities	***SWMP #***	***iPLAN #***	***Metric Tracked***	***Schedule***
Grass Clippings, Leaf Litter and Animal Waste Management (Continued)				
Work to reduce impacts from improper animal waste management by participating in local and regional Feral Hog initiatives	3.A.2.b	4.0	# of meetings attended by City personnel	Permit Year 1 - Permit Year 5
		4.0	# of recommendations developed and implemented	Permit Year 1 - Permit Year 5
Review tax records, and other data sources to identify areas where additional controls may be required to prevent animal wastes from impacting the MS4	3.A.2.c	4.1	# of tax records obtained	Permit Year 2
		4.1	# of properties identified through review	Permit Year 3
Assess city parks for pet and wildlife use and evaluate need for animal waste management measures	-	4.5	# of pet waste BMPs implemented	Permit Year 2 - Permit Year 5
MS4 Screening and Illicit Discharge Inspections				
Detect, inspect, and investigate illicit discharges and/or improper disposals.	3.A.3.a	-	# of identified Illicit discharges or improper disposals	Permit Year 1 - Permit Year 5
Facilitate public reporting and response to resident concerns regarding illegal dumping or improper discharge of non-stormwater materials.	3.A.3.b	-	# and types of illicit discharge related calls received per watershed	Permit Year 1 - Permit Year 5

Table 6-1 (Continued) ELEMENT 3 – Illicit Discharge Detection and Elimination BMPs (Continued)				
Activities	**SWMP #**	**iPLAN #**	**Metric Tracked**	**Schedule**
Limit Sanitary Sewer Overflows and Infiltration				
Continue participation in the City's SSOI and CMOM programs	-	1.1, 1.4	Annual reporting on SSOs to iPlan coordinating committee	Permit Year 2 - Permit Year 5
Minimize the number and effects of sanitary sewer releases to storm drains by: a) Inspecting sanitary sewer pipes;	3.A.4.a	-	Miles of sanitary sewer inspected using CCTV	Permit Year 1 - Permit Year 5
b) Performing preventative maintenance of the sanitary sewer system; and	3.A.4.b	-	Miles of root control application completed to sanitary sewers	Permit Year 1 - Permit Year 5
c) Cleaning and repairing the sanitary sewer system.	3.A.4.c	-	Miles of sanitary sewer pipes cleaned	Permit Year 1 - Permit Year 5
		-	Number and location of repairs completed per watershed	Permit Year 1 - Permit Year 5
Evaluate effectiveness of sanitary sewer overflow SCMs.	3.A.5	-	Identified wet weather and dry weather sanitary sewer discharges to the MS4	Permit Year 1 - Permit Year 5
		-	Locations of wet weather and dry weather sanitary sewer overflows per watershed	Permit Year 1 - Permit Year 5
Evaluate frequency, extent of SSOs due to lift station failures to determine the need for other BMPs	-	1.2	Annual reporting on program to iPlan coordinating committee	Permit Year 2 - Permit Year 5
As practicable, consider relocating sanitary sewers out of waterways when planning and implementing capital sewer replacement projects	-	1.6	Annual reporting on program to iPlan coordinating committee	Permit Year 2 - Permit Year 5

Table 6-1 (Continued) *ELEMENT 3 – Illicit Discharge Detection and Elimination BMPs*				
Activities	***SWMP #***	***iPLAN #***	***Metric Tracked***	***Schedule***
Continue Liquid Waste and Waste Hauler Program				
Maintain existing liquid waste and waste hauler permit and tracking programs	-	1.7	# of liquid waste haulers permitted through program (?)	Permit Year 2 - Permit Year 5
Review and as necessary revise City Code relative to use of portable sanitary sewer units to ensure placement away from MS4	-	1.7.2.	Documentation of related Code revisions	Permit Year 2 - Permit Year 5
Review and as necessary revise City Code relative to requirements for appropriate maintenance and service scheduling for portable sanitary sewer units	-	1.7.2	Documentation of related Code revisions	Permit Year 2 - Permit Year 5
Investigate Onsite Sanitary Sewage System and Aerobic Treatment Unit Use				
Review appropriate public records and utility billing to identify areas in Dallas that are served by OSSFs and or ATUs	-	5.4	# of properties served by OSSFs/ATUs	Permit Years 2,3
Assess need for implementing property owner, inspector, realtor education concerning operation and maintenance of OSSFs/ATUs	-	5.1, 5.2, 5.3	Description of findings in SWMP Annual Report	Permit Years 4
Assess areas with OSSFs and ATUs for availability of adjacent public systems, and available funding for any identified repairs or replacements	-	5.0, 5.5	# of systems repaired, or replaced	Permit Years 4,5

Table 6-1 (Continued)				
ELEMENT 3 – Illicit Discharge Detection and Elimination BMPs				
Activities	**SWMP #**	**iPLAN #**	**Metric Tracked**	**Schedule**
Continue Implementing Various Stormwater Program Strategies				
Continue participating in NCTCOG Regional Stormwater Management Program	-	2.0, 8.0	Documentation of Annual Participation in Annual SWMP Report	Permit Year 1 – Permit Year 5
Continue development of a Local Supplemental Environmental Project program to use as an available tool for environmental enforcement activities	-	2.1	Documentation of progress towards program implementation, and # of projects implemented	Permit Year 2 - Permit Year 5
Evaluate need for waterfowl management plan	-	4.3	Documentation of review and assessment in Annual SWMP Report	Permit Year 2 - Permit Year 5
ELEMENT 4 – Pollution Prevention & Good Housekeeping BMPs				
Activities	**SWMP #**	**iPLAN #**	**Metric Tracked**	**Schedule**
Spill Response Program				
Respond to spills of hazardous and non-hazardous substances that enter the City's storm drainage system for which the City is notified by mitigating the effects of the spill, and preventing the spilled substances, to the extent practicable, from entering a Water of the State.	D.1.a	-	# type and location of spill responses	Permit Year 1 - Permit Year 5
Prevent the spilled substances, to the extent practicable, from entering a Water of the State.	D.1.b	-	# of successfully mitigated spills	Permit Year 1 - Permit Year 5
		-	# of spills entering a Water of the State	Permit Year 1 - Permit Year 5

Table 6-1 (Continued) ELEMENT 4 – Pollution Prevention & Good Housekeeping BMPs (Continued)				
Activities	**SWMP #**	**iPLAN #**	**Metric Tracked**	**Schedule**
Pollution Prevention Program				
Implement EMS program to promote continuous improvement with respect to pollution prevention and good housekeeping at municipal operations	4.A.1	3.2.5	% of identified issues addressed within 90 days	Permit Year 1 - Permit Year 5
			# and type of BMPs utilized to prevent sediment and other pollutant discharges from routine maintenance	Permit Year 1 - Permit Year 5
ELEMENT 5 – Industrial and High Risk Site BMPs				
Inspections and Control Measures				
Inspect Sector U, (Food Products and Kindred Products) and other similar facilities that have the potential to discharge biological constituents.	5.A.5	2.2	# and type of inspections performed	Permit Year 1 - Permit Year 5
ELEMENT 6 – Construction Site Runoff BMPs				
Inspection of Construction Sites and Enforcement of Control Measures Requirements				
Inspect construction sites for compliance with stormwater management practices. Conduct inspections as follows: a) Five (5) acres and greater in size, in the escarpment or geologically similar area, or part of a common plan of development: every two weeks; and b) Sites greater than or equal to one (1) acre and less than five (5) acres in size on a monthly basis	6.A.2.a.1	3.2.1	# and type of inspections performed	Permit Year 1 - Permit Year 5

Table 6-1 (Continued) ELEMENT 6 – Construction Site Runoff BMPs (Continued)				
Activities	**SWMP #**	**iPLAN #**	**Metric Tracked**	**Schedule**
Inspection of Construction Sites and Enforcement of Control Measures Requirements (Continued)				
Conduct supplemental inspections of construction sites in response to complaints	6.A.2.a.2	3.2.1	# and type of inspections performed	Permit Year 1 - Permit Year 5
Notifications of Applicant Responsibilities				
Review and revise the building permit procedures to ensure a process is in place that emphasizes notification of requirements under TPDES permit regulations, and incorporation of appropriate water quality measures and citizen involvement.	6.A.3.a	3.2.1	# and type of revisions to process procedures	Permit Year 1 - Permit Year 5
ELEMENT 7 – Public Education, Outreach, Involvement and Participation				
Public Education				
Present at least one (1) annual presentation to community organizations in each ….target program: • Illicit discharge (IDDE) • Pet waste • Yard waste • Sediment discharges	7.A.1.1	3.2.3,4.2 7.0	Number of presentations for each program, and attendees	Permit Year 1 - Permit Year 5
Present at least one (1) annual presentation to businesses/ trade organizations in each …. target program: • Illicit discharge (IDDE) • Yard waste • Animal waste • Sediment discharges	7.A.3.1	3.2.3, 4.2 7.0	Number and geographic distribution of presentations	Permit Year 1 - Permit Year 5

Table 6-1 (Continued) *ELEMENT 7 – Public Education, Outreach, Involvement and Participation (continued)*				
Public Education (Continued)				
Continue "Cease the Grease" public information and education program concerning Fats, Oils and Grease (FOG), including participation in regional FOG program	-	1.3,7.0	Number of presentations for each program, and attendees	Permit Year 2 – Permit Year 5
Distribute pet waste educational materials through various media	-	4.6,7.0	Types and locations of information provided	Permit Year 2 – Permit Year 5
School Education				
1. Present five (5) educational presentations per year to K-12 students within the City'swatersheds, including assemblies, camps, story time, and library events.	7.A.2	7.0, 7.2	Number and geographic distribution of presentations	Permit Year 1 - Permit Year 5
Municipal Staff Training				
Publish two (2) electronic announcements addressing stormwater management, per year.	7.B.3.1	3.2.2, 7.0	# of Announcements published	Permit Year 1 - Permit Year 5
Provide two (2) internal training events on current stormwater issues, such as bacteria per year.	7.B.3.2	3.2.2, 7.0	# training events and attendees	Permit Year 1 - Permit Year 5
Construction Site Operator Program				
Present two (2) workshops to contractors, operators and construction site affiliated personnel on acceptable construction site SCMs, per year.	7.B.1.a	3.2.2, 3.2.4	# of workshops provided and number of attendees	Permit Year 1 - Permit Year 5
Present on-site consultations to operators and construction site personnel on site-specific construction site SCMs, per year.	7.B.1.b	3.2.2, 3.2.4	# of consultations provided and number of attendees	Permit Year 1 - Permit Year 5
Present on-site tail-gate training sessions to operators and construction site personnel on acceptable construction site SCMs, per year.	7.B.1.c	3.2.2, 3.2.4	# of tailgate training sessions provided and number of attendees	Permit Year 1 - Permit Year 5

Table 6-1 (Continued) ELEMENT 7 – Public Education, Outreach, Involvement and Participation (Continued)				
Activities	***SWMP #***	***iPLAN #***	***Metric Tracked***	***Schedule***
Outreach Partnerships				
Continue participation in regional outreach and education forums	-	7.1	Document participation in annual SWMP report	Permit Year 2 - Permit Year 5
Work with the local school districts, universities and Texas Education Agency to develop related school curricula	-	7.2	Document efforts in annual SWMP report	Permit Year 2 - Permit Year 5
Participate in local and regional litter abatement and other pollution prevention programs (eg, TREES, Keep Dallas Beautiful, Trinity Trash Bash, etc)	5.B.3.b	7.4	Document efforts in annual SWMP report	Permit Year 1 - Permit Year 5
Provide bacteria-related education and outreach to Volunteer Service Groups such as Groundwork Dallas, Master Gardeners, Master Naturalists, etc	-	7.6	Document efforts in annual SWMP report	Permit Year 2 - Permit Year 5
Contribute towards regional BMP library	-	8.0	Document information provided in Annual SWMP report	Permit Year 2- Permit Year 5
Outreach and Education Media Development				
Update existing and as necessary develop new outreach brochures, presentations, print and electronic media to address pollution prevention in general, and specific topics related to bacteria	7.C.3	7.5, 8.0	Document # and types of media updates in Annual SWMP report	Permit Year 1- Permit Year 5
Use local and regional review of BMPs to focus implementation of outreach as needed	-	6.2, 8.0	Description of review process and input used, included into the Annual SWMP report	Permit Year 3- Permit Year 5

Table 6-1 (Continued) ELEMENT 8 – Monitoring, Evaluation and Reporting				
Activities	**SWMP #**	**iPLAN #**	**Metric Tracked**	**Schedule**
Monitoring and Screening				
Investigate flows from outfalls during dry weather, sample the discharge, investigate the source, and act to eliminate the discharge.	8.A.1	6.0	# of Outfalls inspected, discharges found, and sources identified	Permit Year 1 - Permit Year 5
Perform bi-annual wet weather screening within designated watersheds once per permit term in accordance with the local Wet Weather Sampling Program.	8.A.2.a	6.0	Wet weather screening results for eachwatershed sampled in SWMP annual report	Permit Year 1 - Permit Year 5
Coordinate with the NCTCOG Regional Wet Weather Characterization Program and perform sampling per RWWCP schedule.	8.A.2.b	6.0	Wet weather screening results for eachwatershed sampled in SWMP annual report	Permit Year 1 - Permit Year 5
Perform Rapid Bioassessment Protocol monitoring in at least three (3) watersheds plus a reference site, per year.	8.A.3	6.0	RBP monitoring results for sampling program in SWMP annual report	Permit Year 1 - Permit Year 5
Provide ambient conditions sampling at three (3) locations along the Upper Trinity River in accordance with protocols included in the TRA CRP QAPP.	8.C.4	6.0	Provide ambient water quality results in SWMP Annual report	Permit Year 1 - Permit Year 5
Monitor discharge from City WWTFs for compliance with TPDES Permit limits for bacteria	-	1.0, 6.0	Provide report concerning monitoring and compliance to regional iPlan coordinating committee	Permit Year 2- Permit Year 5
Perform trend analyses and other data correlation to assess BMP effectiveness, and/or identify focus areas for additional BMP implementation	-	6.1, 6.2	Document data trends as part of SWMP Annual Report	Permit Year 2 - Permit Year 5

Table 6-1 (Continued) *ELEMENT 8 – Monitoring, Evaluation and Reporting*				
Activities	***SWMP #***	***iPLAN #***	***Metric Tracked***	***Schedule***
Data Evaluation				
Identify, and prioritize the industrial facilities that have the potential to discharge bacterial pollutants to the MS4	8.A.4.a	-	# of facilities required to submit monitoring plan for bacteria	Permit Year 1 - Permit Year 5
			# of data sets received and reviewed	Permit Year 1 - Permit Year 5
Evaluate SCMs, or inspection and monitoring programs, for effectiveness.	8.A.4.b	-	# of Facilities required to submit an Action Plan and/or more frequent monitoring to reduce bacteria discharges into the MS4	Permit Year 1 - Permit Year 5
			# of recommended changes to SWMP/iBRP to include measures to reduce bacteria loads	Permit Year 1 - Permit Year 5
TMDL Implementation Plan				
Develop Interim Bacteria Reduction Plan (iBRP) that outlines measures the City will implement to reduce Bacteria concentrations within the City MS4	8.C.1	-	Append iBRP to SWMP	Permit Year 1
Participate in development and implementation of a Total Maximum Daily Load (TMDL) Implementation Plan for bacteria.	8.C.2	-	DocumentCity participation	Permit Year 1 - Permit Year 5

7.0 ANTICIPATED LOAD REDUCTION

The established TMDLs for the Upper Trinity River through Dallas require a **44** percent reduction of bacteria loads in the reach from the confluence with the West Fork Trinity River to the confluence with Cedar Creek, and a **67** percent reduction for the segment extending from Cedar Creek to Five Mile Creek.

Predicting water quality improvement or degradation for a biological pollutant is challenging at best, because of the large number of variables that can affect the numbers and types of sources, the methods of contaminant transport, and ultimately the conditions of the receiving waters. Climate, geology, land use and cover, hydrologic watershed response, and human activities all play important roles with respect to pollutant discharge, fate and transport. Additionally, there is a large drainage area located outside of the Citys' jurisdictional boundary that contributes runoff to the Trinity River through Dallas. Dallas has very little direct control over the quality of these waters, or implementation of measures to improve the quality of these waters. Lastly, a majority of the identified local bacteria sources that contribute to the pollutant load in the Upper Trinity River through Dallas are of unknown origin. So, identifying specific waste load allocations for a particular watershed, or for any one of the over 11,000 stormwater outfalls in Dallas is challenging at best.

However, trend analyses of the data collected over the last 5 to 12 years for both the local watersheds and the Trinity River through Dallas show consistent trends towards significant water quality improvement. These positive water quality trends are anticipated to continue by consistently implementing the strategies outlined in this plan. Future data evaluation and trend analyses will be used to determine continuous improvement(s), and any necessary revisions to this plan.

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