

US EPA ARCHIVE DOCUMENT

**PILOT PRETREATMENT PROGRAM PROJECT XL
ENVIRONMENTAL SERVICES DIVISION
CITY OF DENTON**

Summary of Project and Commitments

The City of Denton submitted a proposal to EPA outlining suggested modifications to the industrial user compliance inspection and monitoring schedule of Denton's Pretreatment Program to allow for more resources to be directed towards watershed and stormwater management. It was the City of Denton's desire to utilize the flexibility afforded by the United States Environmental Protection Agency's (USEPA) XL program to integrate the City of Denton's anticipated Phase II Stormwater requirements within the City of Denton's existing Industrial Pretreatment Program. The ultimate goal of this action was to develop a watershed protection program that integrated elements of the Phase II stormwater and Industrial Pretreatment Program, while simultaneously allocating resources towards broader municipal watershed protection goals. The final XL project agreement was enacted on February 22, 2000.

The intention of the City of Denton's XL project was to utilize resources derived from decreasing monitoring requirements for the City of Denton's Pretreatment Program to begin a comprehensive municipal watershed protection program. Work during the first two years of Project XL centered on integrating monitoring information collected stream and rain gages purchased as part of a previously received Environmental Monitoring for Public Access and Community Tracking (EMPACT) grant with automated gate closures and automated flooding alerts. The XL project then transitioned into the implementation of a temporally and spatially dense watershed monitoring effort that included continuously recording stream monitors and monthly surface water quality assessments. Eventually, the resources made available through project XL were combined with the resources provided by a locally imposed drainage fee to create Denton's Watershed Protection and Stormwater division. Over the past 8 years, this division has conducted a large amount of watershed and stormwater research, has been the recipient of numerous research grants, and has published numerous scientific articles. The activities of the division have also been a vital component of local stormwater and watershed code development.

The original XL Project Agreement and subsequent extensions were designed to accomplish several goals. These goals were based on decreasing the monitoring requirements of the pretreatment program and using the resulting resources to enhance watershed protection activities. Overall, the program was designed to combining the regulatory flexibility provided by project XL with the City of Denton's Drainage Division early warning system and the existing continuous monitoring system to create a state of the art watershed monitoring and

watershed protection program. Denton proposed to use this monitoring system to detect contaminants within the watershed, determine the changes that were occurring within Denton's surface water quality resources, and to ultimately influence public policy to create local ordinances for protecting water quality. The expected benefits for the XL program, as outlined in the original project agreement, were the creation of an extensive watershed monitoring network, the development of a buffer zone protection strategy as a component of the local development code, temporary increases to wastewater monitoring within lift stations to further refine loadings to the water reclamation facility, and increases in public education with regards to water quality issues. For all measures, Denton has been highly successful, as outlined below.

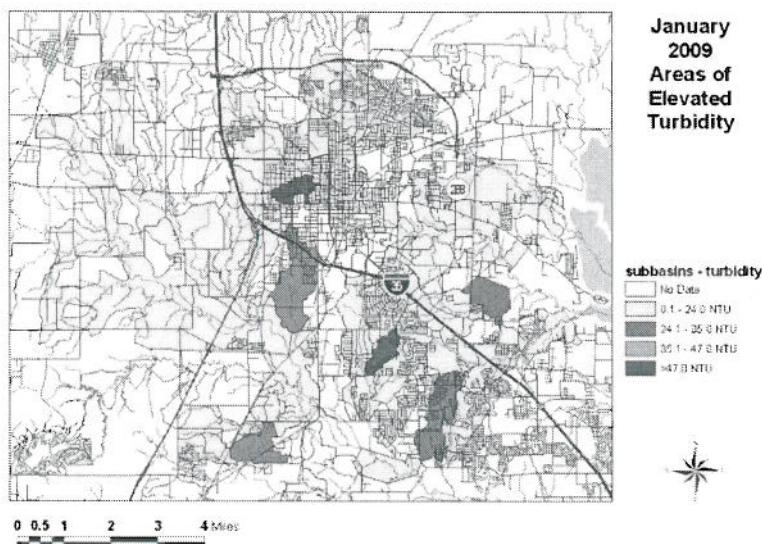
Watershed Monitoring

Cooper Creek, Hickory Creek, and Pecan Creek are the three main watersheds that convey water through Denton. During the early stages of Project XL, Denton staff utilized several sources to delineate water resources, including city zoning information, digital ortho-quad aerial photography, soils data, and topographical data. All information was combined within an ArcView® GIS (geographical information system) database (Environmental Systems Research [ESRI]). Using topographical information, surface water coverages, and professional judgment, the three main watersheds of the city were initially divided into 65 sub-basins of various sizes. The majority of these sub-basins represent first order streams. During subsequent years, Denton staff used additional information and professional judgment to add 17 more monitoring stations, for a present day total of 82. Monitoring stations were established in order to give a representation of water quality of the watershed area draining to the sampling point. Monitoring of these sampling stations (also referred to as "screening stations") has been conducted on a monthly basis during normal flow conditions, since January 2001.

Permanent monitoring stations were established near the ends of the three major watersheds prior to the confluence of the watersheds with Lewisville Lake. These include a station above and below the Pecan Creek Water Reclamation Plant's outfall. More extensive monitoring is conducted at these stations to provide a more comprehensive assessment of the combined effects of larger scale water quality issues as the surface waters flowing through Denton enter into the city's main drinking water source, Lake Lewisville. These stations have been set up to collect in-situ monitoring data using deployed water quality monitoring devices. Most data collection occurs at 30 minute intervals during all flow conditions. This monitoring network has also been in place since January 2001. The data collected at one of these stations and at the drinking water intake structure are available as a part of a larger monitoring network at the following web site at <http://www.teo.unt.edu>. This web site is a much expanded version of the original EMPACT web site that is referenced in the City of Denton's Project XL agreement.

Data from monthly monitoring at Denton's screening stations has been extremely useful for determining the overall status of Denton's surface water quality resources and assessing the impacts of changing land-uses on overall water quality. The City of Denton has published numerous research articles using this information, and has presented research results at many local, national, and international conferences. A publication and presentation list has been provided within this report. Details of monthly water quality reports are combined within Geographical Information System to provide a powerful tool for assessing water quality in the surface waters of Denton (see Figure 1). Monitoring information is published on Denton's watershed protection web page at <http://www.cityofdenton.com>, under "Departments", "Water Utilities", then "Watershed Protection".

Figure 1. Example of water quality map for the City of Denton. Maps are created on a monthly basis and are provided on the City of Denton's watershed protection web page.



Buffer Zone Development: Using Monitoring Data to Support Public Policy

The City of Denton has utilized the watershed monitoring network to derive a better understanding of our watersheds and to make more informed public policy decisions. One of the key features of the watershed research conducted by Denton was the implementation of floodplain, riparian buffers, watershed related habitat protection provisions. Collectively, these areas are referred to as "Environmental Sensitive Areas", and are protected by ordinance as a

component of Denton's Development Code. Currently, all riparian buffers within the City of Denton are mapped, and are required to remain undeveloped within defined distances from the center line of the streams. Distances are based on the size of the watershed draining to the point in question within the stream. Details of this development code can be found at the City of Denton's web site (www.cityofdenton.com). Riparian buffer, water related habitat, and floodplain protection provisions are located in Subchapter 17, entitled "Environmentally Sensitive Areas" of the Denton Development Code.

The stated purpose of Subchapter 17 of the Development Code is to:

- Protect the natural and ecological resources that are essential elements of the City's health and community character and which provide irreplaceable plant and wildlife habitat;
- Establish a development framework for the City that is respectful of private property rights, while encouraging the responsible use of property for the benefit of the entire community;
- Preserve and enhance the City's distinctive community character and quality of life by ensuring that its natural and built environments are consistent with the community vision and values embodied in the Denton Comprehensive Plan; and
- Establish regulations that conform to the requirements of the state and federal government regarding air quality, water quality, and environmental protection.

To accomplish these goals, several classes of ESAs were defined. Specific uses and activities were prohibited within these areas by code. The following classes of ESAs are identified within Subchapter 17: Developed floodplain, Undeveloped Floodplain, Riparian Buffers, Water Related Habitats, and Upland Habitats.

In general, developed floodplains are areas that exist within the Federal Emergency Management Agency (FEMA) established 100-year floodplains, but that have at some time in the past been channelized, graded, filled, or otherwise disturbed. Subchapter 17 states that development within these areas is restricted by the typical FEMA fill requirements, as well as by local drainage ordinances. Although environmental resources within the developed floodplains are offered virtually no protection within Subchapter 17, it is important to realize that these areas typically represent sections of the City that were completely built out at some time in the past. Consequently, environmental resources within the developed floodplain tend to be very sparse. Undeveloped floodplains are also areas within FEMA's 100-year floodplains, but that generally remain in an undeveloped or natural state. Within these areas, the provisions of Subchapter 17 prevent:

- The handling, processing, or storage of hazardous wastes;
- Any land disturbing activities not authorized by a United States Army Corps of Engineers (USACE) 404 permit or letter of permission AND not authorized by the Director of Planning;

- Any new structures or additions; and
- Any tree or understory vegetation removal.

Riparian Buffers are established at 100 feet from the centerline of a stream draining a basin that is greater than 1 square mile, and 50 feet from the centerline of a stream draining basins that are less than or equal to a square mile. It is important to note that measurements are made from the centerline in either direction, which creates a buffer that is approximately equal in distance on either side of a stream. In general, riparian buffers have the same protective measures as undeveloped floodplains. However, these protective measures are crucial for maintaining the water quality of surface water resources, as the riparian buffers often are the main protective measures for small headwater (zero and first order) streams.

Water Related Habitats are defined as wetlands, or areas containing significant stands of predominantly native hydrophytic vegetation. These areas are designed to capture ESAs that may not fall into the definition of a Riparian Buffer, but still contain significant water related environmental features. The protection given to water related habitats is essentially the same as protection given to either Riparian Buffers or Undeveloped Floodplains.

The Upland Habitat category is defined as any area containing remnants of the Eastern Crosstimbers Forest habitat that is at least 10 acres in size. The City of Denton contains a relatively large amount of Eastern Crosstimbers forests in some of the more rural sections of the City, and environmental managers and other municipal decision-makers felt that it was important to preserve these areas whenever possible.

The overall amount of ESAs protected through the Subchapter 17 represents a substantial amount of area within each of Denton's three major watersheds. Table 1 illustrates the amount of each ESA category that is protected within these watersheds. Note that in many cases the 50-foot or 100-foot Riparian Buffers represents a component of the larger Undeveloped Floodplain ESA. In other words, a given area may have 2 acres of "100 foot Stream Buffer" contained within 10 acres of "Undeveloped Floodplain".

Table 1. Amount of Environmentally Sensitive Areas (ESAs) protected within each major watershed in Denton. Values are expressed in acres.

| | Cooper Creek | Pecan Creek | Hickory Creek |
|-------------------------|--------------|-------------|---------------|
| Overall Watershed Area | 6,747 | 14,510 | 34,229 |
| Riparian Buffer, 50ft | 266 | 527 | 1,964 |
| Riparian Buffer, 100 ft | 41 | 916 | 2,950 |
| Upland Habitat | 563 | 1,501 | 1,295 |
| Undeveloped Floodplain | 871 | 3,452 | 7,522 |

It is important to note that there is no lower bound property size or drainage area for the ESA protection strategies used in Denton. Thus, many small zero and first order streams within the headwaters of our watersheds receive the same protective measures as larger order streams. Since small headwater streams can make up at least 80 percent of the overall stream network, Denton's ordinance was structured to protect swales, ditches, and smaller conveyances that may lack well-defined stream banks but are still important conduits of water, sediments, nutrients, and other materials during storm events. Because of their small size and immediate connection with the surrounding landscape, these small streams are very susceptible to influence by human activities and were therefore deemed to be in great need of protective measures during the development of the ESA ordinances.

Storm Water Best Management Practices

The original agreement mentioned implementation of the Phase II stormwater program as a component of Denton's XL project. It is important to note that implementation of the Phase II program would have been required of Denton whether project XL existed or not. However, the difference made by Project XL was that resources that would have otherwise been devoted to Industrial Pretreatment were initially available to help develop Denton's Phase II stormwater program during its inception. Having these extra resources allowed Denton to build a highly effective Phase II program, as well as expand the program out to conduct research and additional assessments that are well beyond the 6 minimum measures that are required to be addressed by Phase II municipalities. Although details of this body of work are well beyond the scope of this summary, interested readers are encouraged to review the publication and presentation information provided at the end of this document. The research conducted to assess the stormwater impacts of gas well development and the development of the water quality and economically based Best Management Practice optimization strategies for the Hickory Creek Watershed Protection Plan have gained national attention.

Wastewater Collection System Monitoring

The City of Denton has conducted extensive lift station monitoring during the Project XL time period. Lift Station monitoring has helped the Pretreatment Department to better understand system inputs, overall loadings, and the way in which loadings have changed. The information has also been very useful in developing and revising Denton's Technically Based Local Limits, which was a component of the water reclamation facility permit revisions that occurred during 2005-2006. During these permit revisions, the Pecan Creek Water Reclamation facility discharge limit was increased from 15 million gallons per day (MGD) to 21 MGD.

For the last several years, the Pecan Creek facility has sent all of the sludge from the plant to the City of Denton's composting operation, where sludge is combined with yard waste collected from City of Denton residents to create compost. This compost is utilized for a variety of municipal applications, as well as being available for the citizens of Denton. The increased understanding of the metals loading coming into the City of Denton's Pecan Creek water reclamation facility has allowed plant and compost operators to optimize the system so that metal concentrations within the compost are well below all applicable standards. Currently, concentrations and loadings for all monitored metals coming into the Pecan Creek facility are well below applicable regulatory standards and are in compliance with the limits set through Denton's Technically Based Local Limits program.

Public Education

The City of Denton has greatly increased public education efforts with regards to the subject of wastewater treatment, watersheds and stormwater. A detailed description of all of the programs conducted by Denton is beyond the scope of this document. However, examples include a large number of regular wastewater treatment plant tours, a wastewater treatment plant video, a citizen scientist / citizen monitoring program where citizens are trained to monitor and report surface water quality, storm drain marking programs, annual Stream Clean events, a benthic invertebrate training and monitoring program for citizens, neighborhood presentations, and numerous workshops conducted each year concerning the issue of stormwater management during development. Many of these programs utilize the monitoring data collected as a part of Denton's Watershed Protection Program. All new employees for the City are required to receive training on stormwater management issues for municipal operations, and all inspectors for the City have received specialized training regarding storm water and watershed management. The City of Denton has also created the Clear Creek Natural Heritage Center, which is a large facility located on the "green belt" between Lewisville Lake and Lake Ray Roberts. The Center partners with the Denton Independent School District and the University of North Texas and facilitates research, training, and educational programs for students of all ages. Many of these programs focus on the importance of our water resources and how to positively influence these

resources through watershed and stormwater management. Details concerning Clear Creek can be found at <http://www.cityofdenton.com/index.aspx?page=122>

Conclusions

Project XL has provided numerous benefits to Denton, and is considered a resounding success by the City. The initial resources provided by the regulatory flexibility of Project XL allowed City of Denton staff to pursue numerous activities regarding watershed and storm water management. Without this initial work, the City of Denton's Watershed and Stormwater division would likely not be as successful as the division is today. Now that watershed and stormwater activities are autonomous, Denton feels it is appropriate to revert back to the original monitoring requirements of our Pretreatment program. Denton would like to take this opportunity to thank the United States Environmental Protection Agency for the opportunity to participate in the XL program.

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