

Permanent Stormwater Pollution Prevention Systems within the Edwards Aquifer Recharge Zone in Bexar County, Texas

An Overview and Assessment of Current Regulatory Agency Processes



Greater Edwards Aquifer Alliance
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Table of Contents

Executive Summary	3
The Edwards Aquifer Recharge Zone in Bexar County	5
Geologic and Physical Setting	5
Significance as Water Source	5
Stormwater Pollutant Effects on Surface and Groundwater	6
Edwards Aquifer Management and Protection Programs.....	7
Texas Commission on Environmental Quality.....	7
Edwards Aquifer Authority.....	8
San Antonio	8
Austin.....	9
Structural Best Management Practices	10
Permanent System Design	10
BMP Maintenance Enforcement Strategies	12
TCEQ Best Management Plan Enforcement	12
Edwards Aquifer Authority BMP Monitoring and Enforcement	13
San Antonio, Bexar County	14
Austin, Travis County.....	14
Recommendations.....	15
Eliminate Duplication of Efforts and Inconsistency of Enforcement between Agencies.....	15
Create a Central Database and Improve Accessibility.....	15
Streamline and Coordinate Field Inspection Scheduling and Processes	16
BMP Maintenance Incentives	16
Public Education	17
Conclusion	19
Acknowledgments.....	20
References.....	21
Addenda	24
Summary History of Edwards Aquifer Regulation.....	24
Texas Administrative Code, Title 30, Environmental Quality, Part 1 TECQ, Chapter 213 Edwards Aquifer, Rule §213.22.....	25
Texas Administrative Code, Title 30 Environmental Quality, Part 1 TECQ, Chapter 213 Edwards Aquifer, Rule §213.5 (IV) (D)	26
SAWS Aquifer Protection and Evaluation Summary	27
Edwards Aquifer Authority Report on Edwards Aquifer Protection Program Activities for Years 2006, 2007, and 2008.....	28
Edwards Aquifer Authority Act.....	29
Sample Notice of Violation from TCEQ	30
Sample Notice of Violation from SAWS.....	32
Sample Notice of Violation from the City of Austin.....	34
Sample Pond Registration and Fee Reduction Letter from the City of Austin.....	37
Sample Inspection Report from the EAA to TCEQ.....	39

Executive Summary

The Edwards Aquifer provides the vast majority of all water for the City of San Antonio and Bexar County. This aquifer is faulted, highly permeable, and produces large volumes of water. The water supply is withdrawn from the aquifer through wells without treatment other than chlorination. These aquifer characteristics and the lack of treatment leave the San Antonio and Bexar County water supplies vulnerable to contamination by human activities on its limestone outcrop.

Three agencies – the Texas Commission on Environmental Quality (TCEQ), the Edwards Aquifer Authority (EAA), and the San Antonio Water System (SAWS) – share the responsibility of protecting the Edwards Aquifer in Bexar County. Two of these agencies, TCEQ and SAWS, require intensive development of the land that funnels rainfall into the aquifer to treat storm runoff to remove pollutants. Those storm runoff treatment systems, also known as Best Management Practices, or BMPs, must be maintained if they are to protect the Edwards Aquifer water supply. This report assesses the effectiveness of TCEQ and SAWS regulations to achieve a reliable maintenance program.

This report is based on information collected from each of the three agencies with Bexar County aquifer protection authority. Comparative information was collected from the City of Austin, which implements similar BMP programs to protect the Barton Springs Edwards Aquifer. Based on our review of inspection data and staff interviews, GEAA researchers made the following findings:

- Bexar County BMP maintenance responsibility belongs to a hodge-podge of governmental, quasi-governmental, and private owners.
- There is no registration program or systematic tracking of BMP location, design type, construction or maintenance.
- BMP owners and the general public are often unaware of the sensitivity of the Edwards Aquifer to storm runoff pollution and of the purpose of BMPs to protect water quality.
- At least 10 to 15% of approximately 3,000 structural BMPs are persistently non-compliant.¹

In the face of significant urbanization of its recharge and contributing zones, structural BMPs can never provide comprehensive protection of Edwards Aquifer water quality. A comprehensive protection program must include impervious cover limits and easements or purchases for lands containing the most sensitive recharge features. Within the current regulatory framework for on-going inspection and maintenance, however, the already-constructed BMP storm runoff treatment systems fall short of achieving their design goals. Those goals will not be achieved unless:

- a centralized agency database is established with standardized formats to collect and share BMP information;

¹ Based on EAA inspection data (see Addenda) and SAWS data; James, Gregory, SAWS. Personal interview. October 6, 2009.

- duplicate and inconsistent BMP inspection and enforcement by TCEQ, SAWS and the EAA is reconciled and streamlined;
- a campaign to educate businesses and the public about the importance of BMP maintenance is created and implemented; and
- BMP owners are required and/or incentivized to maintain BMPs.

There is currently no estimate of the tax dollar price tag spent to achieve the current level of BMP oversight and inspection. Nor are there any estimates of how much it would cost to achieve a system that effectively regulates, monitors, inspects and enforces maintenance of BMPs spread over a wide geographical area within a complex regulatory and ownership framework. Given that other methods of pollution prevention and abatement may be both more effective and more cost effective (at least in terms of expenditure of public dollars), the question of what is equitable regarding the distribution of these costs between the general public and the long-term system owners and operators should be a factor when considering how to protect our groundwater resources.

The Edwards Aquifer Recharge Zone in Bexar County

Geologic and Physical Setting²

The Edwards Aquifer recharge zone is intensely faulted and fractured carbonate limestone known as karst topography that lies within the Balcones fault zone arcing from near Bracketville east along the northern boundary of Bexar County and then north to Hays County. The aquifer underlies approximately 3,600 square miles, is about 180 miles long and varies from 5 to 30 miles wide. In the San Antonio region, the Edwards group limestones comprising the Edwards Aquifer are approximately 450 to 500 feet thick. The dynamics and size of this geologic formation make it one of the most wondrous aquifers in the nation through its storage capacity, flow characteristics, water producing capabilities and efficient recharging ability. The Edwards Aquifer receives most of its water from the drainage basins located on about 4,400 square miles in the Edwards Plateau. In Bexar County, the recharge zone occurs as a relatively narrow band of approximately 128 square miles in surface area. Because the aquifer is highly permeable it can rapidly recharge and discharge over wide areas and produces large volumes of water. However, these same properties make the aquifer highly vulnerable to contamination where it is exposed at the surface in the recharge zone. Pollutants on and near the surface directly enter the aquifer with little natural attenuation and travel long distances in a relatively short period of time.

Significance as Water Source

The Edwards Aquifer is one of the most valuable water resources in the central Texas area and provides water for municipal, industrial, and agricultural uses. Several cities and towns rely on the aquifer, and it is the primary source of drinking water for over 1.7 million people in Central Texas.³ The Edwards Aquifer was the first aquifer in the United States to receive a sole source designation by the US Environmental Protection Agency in Title 40 of the Code of Federal Regulations (CFR), Part 149, Subpart B.

The average annual recharge to the Edwards Aquifer is estimated to be over 500,000 acre-feet but has fluctuated from as low as 43,700 in 1956 to as much as 2,486,000 acre-feet in 1992.⁴

Of the 1.7 million users of water from the Edwards Aquifer, SAWS presently serves approximately 1.2 million customers via 94 Edwards Aquifer wells. The 94 Edwards Aquifer water wells supplying SAWS customers are located in fields with 1 to 7 wells each at 38 stations throughout Bexar County. Their cumulative average daily pumping rate is about 172 million gallons per day or 528 acre-feet.⁵ These fields of 1 to 7 wells, their treatment systems, and large potable water storage tanks are located at

² “About the Edwards Aquifer.” *San Antonio Water System*. Oct 2009.
<http://www.saws.org/our_water/aquifer/aboutaquifer.shtml>.

³ “The Edwards Aquifer.” *Edwards Aquifer Authority*. 10 Nov 2009.< <http://www.edwardsaquifer.org/>>.

⁴ SAWS Water Statistics, Year Ending December 31, 2007

⁵ An acre-foot is 325,851 gallons.

over 30 widely separated locations throughout Bexar County, predominantly within the Edwards Aquifer's artesian zone. Unlike most major cities, there is no centralized potable water treatment plant or trunk-line water distribution system for most of its customers. Water is withdrawn from the Edwards Aquifer wells, treated with chlorine and fluoride and stored in large aboveground tanks. From these 20 or so well field locations, the water is transferred directly into pipelines extending spoke-like from the storage tanks to SAWS customers. Water from the Edwards Aquifer in Bexar County has been rated as 'superior' by the State since 1936.⁶

Stormwater Pollutant Effects on Surface and Groundwater

Storm runoff mobilizes particles of debris that have accumulated on surfaces such as parking lots, streets, sidewalks, and rooftops that often include contaminants. Increased stormwater runoff velocities from impervious surfaces also erode and scour bare soil and stream banks. Contaminants include hydrocarbons from vehicles and machinery, asphalt pavement particles, aromatic hydrocarbons used for pavement sealants, nutrients from landscape fertilizers and animal wastes, or toxic substances from pesticides and herbicides. These contaminants reduce biodiversity and degrade aquatic habitat. In the Edwards Aquifer recharge zone, contaminated water is channeled into the groundwater through recharge conduits.^{7,8}

⁶ "Water Quality." *San Antonio Water System*. Oct 2009. <http://www.saws.org/our_water/waterquality/>.

⁷ "The ecological response of small streams to stormwater and stormwater controls in Austin, Texas USA," John Maxted and Mateo Scoggins, Oct 2004.

⁸ "Stormwater Treatment Program." *City of Austin*. Oct 2009.
<http://www.ci.austin.tx.us/watershed/stormwater_treatment.htm>.

Edwards Aquifer Management and Protection Programs

There are multiple levels of governmental regulation and programs to protect the Edwards Aquifer. The first of these programs began in 1975 when the US Environmental Protection Agency designated the Edwards Aquifer as a Sole Source Aquifer, providing specific protections of federal law.⁹ Since 1975, the State of Texas has provided additional regulatory protection to the quality and quantity of water in the Edwards Aquifer through a series of agencies culminating in the Texas Commission on Environmental Quality (TCEQ); the Edwards Aquifer Authority; and the designated powers of municipalities. The outline of aquifer protection through each of these entities is described in the following sections.

Texas Commission on Environmental Quality¹⁰

TCEQ regulations to protect the Edwards Aquifer are contained in Title 30 of the Texas Administrative Code Chapter 213. Implementation of the rules is further described in “Complying with the Edwards Aquifer Rules Technical Guidance on Best Management Practices” RG-348, revised July 2005. TCEQ rules require land developers to prepare and submit geologic and engineering data for proposed development as part of a Water Pollution Abatement Plan (WPAP). TCEQ reviews these submittals and sends copies to SAWS and the EAA for their comments. When all of the comments by the reviewing agency have been cleared, TCEQ issues a permit to construct.

Any development proposing to construct more than 20% impervious cover is required to construct a permanent structural BMP. Engineers calculate the amount of impervious surface that each development occupies to determine how much potential stormwater runoff may be generated during a given design storm; that is, as a result of a specific amount of rainfall over a specific amount of time. In general, BMPs are required to accommodate the volume of stormwater that would be accumulated on impervious surfaces after half inch of rainfall over a 24 hour period. This quantity is sometimes referred to as the “first flush” of stormwater runoff. The more impervious surface on a tract, the greater the quantity of stormwater that needs to be managed and treated.

From data through 2007, a rate of approximately 200 to 300 WPAP applications per year are approved within the regulated boundaries of the recharge zone in Bexar County. Each WPAP may include one or more structural BMP(s). Field investigations for each WPAP may or may not be conducted at the time of the submittal of applications. Over 800 tracts use one or more permanent BMP system(s) within Bexar County.¹¹

Although standard requirements for conducting inspections and monitoring structural BMPs are set forth by TCEQ, there is much variability in these activities due to the numerous configurations and

⁹ Title 40 of the Code of Federal Regulations (CFR), Part 149, Subpart B, September 29, 1977 (published in 42 Federal Register [FR] 51574 and re-designated June 26, 1987 in 52 FR 23986)

¹⁰ A summary of the history of regulations concerning the Edwards Aquifer is included in the Addenda of this paper.

¹¹ Fritz, Charlyne, TCEQ. Personal interview. July 2009.

technical designs necessary to accommodate the characteristics of each location and various needs of the developers. The unique geology and hydrology of each site within the recharge zone, variations in the types and design of structural BMPs, differences in training and experience of field personnel, and the aspects of maintenance which an agency chooses to focus upon in conducting inspections are all factors in disparities found in reports of the onsite assessments.

Edwards Aquifer Authority

The Edwards Aquifer Authority (EAA) Act grants broad “powers, rights, and privileges necessary to manage, conserve, preserve, and protect the aquifer and to increase the recharge of, and prevent the waste or pollution of water in, the aquifer.”¹² Whereas the EAA endeavors to identify potential impacts to the Edwards Aquifer, they do not evaluate engineering designs of systems at the same level as TCEQ or SAWS. (See the Addenda.)

San Antonio

San Antonio Municipal Ordinance No. 81491, updated February 16, 2006, “...adopts a goal of non-degradation which maintains or improves the quality of water entering the Edwards Aquifer. Pollution prevention will be assured by requiring best management practices and development criteria for point and non-point sources. The San Antonio Water System (SAWS) shall be responsible for the administration of this division.” SAWS requires the submittal of an Aquifer Protection Plan (For Activities Which Require Pollution Prevention Practices on the Edwards Aquifer Recharge Zone/ Drainage/ or Contributing Zone Area) subject to regulation by Chapter 34 of the City Code, Article VI, Division 6. The Aquifer Protection Plan requirements include a legal affidavit to be signed by the applicant and a Geologic Assessment sealed by a professional licensed geoscientist.

SAWS also obtains information regarding developers’ plans and designs for minimizing stormwater contamination within its jurisdiction boundaries that extend 5,000 feet beyond the San Antonio city limits.

In addition to completing a study of the region’s geology, ground water, and land use, SAWS has delineated a one-quarter mile radius from each public supply water well and inventoried potential sources of ground water degradation. Public education and outreach are also important components of SAWS’ program.

As urban development began encroaching upon the recharge zone in northern Bexar County, SAWS took steps to ensure that potential recharge features such as sinkholes, caves, faults and crevices were identified. Geologic Assessments and other detailed information regarding possible water infiltration into the subsurface are now recorded and submitted for review to TCEQ in Water Pollution Abatement Plans (WPAPs). A review of many Geologic Assessments, however, reveals that potential recharge and karst features on a site remain unknown due to disturbances of the natural surface and/or the presence of debris that obscure them.

¹² Edwards Aquifer Authority Act of May 30, 1993, 73rd Leg., R.S., ch. 626, § 1.08, 1993 Tex. Gen. Laws 2350, 2356
Greater Edwards Aquifer Alliance

Austin

The Austin Stormwater Treatment program designs, implements, and evaluates stormwater treatment systems to reduce pollution in the city's creeks, lakes, and aquifers.¹³ Areas of Austin developed before 1980 do not have water quality controls. In the early 1980s, due to rising concerns about urban non-point source pollution, the City of Austin began requiring new development to provide structural and nonstructural stormwater BMPs to prevent or reduce pollution.

The most common permanent stormwater BMP structure used in Austin is a water quality basin, usually referred to as a sand filter. The City categorizes all of its basins as either residential or commercial. Residential BMPs are located on single-family residences (i.e., subdivisions), and the City owns and maintains these after construction by the developer. Commercial BMPs are located on all other types of developments (i.e., apartment complexes and commercial properties), and owners are fully responsible for these BMPs under the City's regulatory authority. There are over 7,000 commercial and approximately 700 residential basins in Austin¹⁴.

In addition, the Austin Watershed Protection & Development Review Department created a program to retrofit water quality controls for runoff from developed areas. This program determines suitable locations and types of treatment systems. Austin has numerous water quality capital improvement projects throughout the city. The Austin stormwater treatment program also provides assistance to developers constructing controls via its guidance documents and technical information.¹⁵

Austin's jurisdictional limits lie outside of Bexar County and outside of the region contributing water to the San Antonio Edwards Aquifer. Nevertheless, Austin has taken numerous steps to regulate development and protect the Barton Springs Edwards Aquifer. Because of similar geologic and regulatory environments, Austin's Edwards Aquifer protection experience is relevant to protecting the San Antonio Edwards Aquifer.

¹³ "Stormwater Treatment Program." *City of Austin*. Oct 2009.

<http://www.ci.austin.tx.us/watershed/stormwater_treatment.htm>.

¹⁴ Barney, Rebekah, City of Austin. Personal interview. July 7, 2009.

¹⁵ "Stormwater Treatment Program." *City of Austin*. Oct 2009.

<http://www.ci.austin.tx.us/watershed/stormwater_treatment.htm>.

Structural Best Management Practices

Permanent System Design

Stormwater BMPs are measures taken to mitigate changes to the quality and quantity of urban runoff caused by land use changes. Though the term “BMP” refers to both structural and nonstructural practices, this report focuses on permanent structural BMPs. These systems are also sometimes called “engineered controls” or “engineered structures.”

The Texas Administrative Code (TAC) outlines BMP requirements to protect the Edwards Aquifer from storm runoff pollution. TCEQ oversees site-specific BMP plan approval and, in varying degrees, maintenance. According to 30 TAC §213.5, BMPs must perform the following functions:

- “prevent pollution of surface water, groundwater, or stormwater that originates up-gradient from the [development] site and flows across the site” or that “originates on-site or flows off the site, including pollution caused by contaminated stormwater runoff from the site”;
- “prevent pollutants from entering surface streams, sensitive features, or the aquifer”; and
- “maintain flow to naturally occurring sensitive features, to the extent practicable.”

BMP construction plans must be prepared by, or under the direct supervision of, a Texas licensed professional engineer. Further, the technical report prepared by the engineer and signed by the site owner “must include a plan for the inspection of the permanent BMPs and measures for their timely inspection, maintenance, repair, and, if necessary, retrofit.” This technical report must also “describe measures that will be used to avoid or minimize surface stream contamination and changes in the way water enters a stream as a result of the construction and development.”¹⁶

30 TAC §213.5 specifically states that BMPs must be designed to remove at least 80% of the increased total suspended solids (TSS) generated from any regulated activity. If a site is used for single-family residential development with an impervious cover of 20% or less, a permanent BMP is not required. If the site’s impervious cover increases over time, the property owner must notify the appropriate TCEQ office, and a permanent BMP may be required.¹⁷

Development applicants/owners are responsible for maintaining permanent BMPs. The applicant can subsequently transfer the maintenance obligation to another entity that has ownership or control of the property, but this must be done in writing and filed with TCEQ within 30 days of the transfer of maintenance responsibility.

Below are brief summaries of the most common types of permanent BMP structures used in the San Antonio area.

¹⁶ 30 TAC §213.5

¹⁷ 30 TAC §213.5

- A retention basin or wet pond holds a permanent pool of water. These permanent pools can be designed and landscaped attractively with vegetation around the perimeter or may be simple concrete holding basins. Retained water may be used for landscape irrigation, so this design also has a potential advantage to conserve water. Well maintained retention basins have high TSS removal efficiency.¹⁸
- A vegetated filter strip is a permanent, maintained strip of planted or indigenous vegetation located mostly along roads, streets, and highways. A grassy swale is a long, narrow grassy depression used to collect and convey stormwater runoff. These allow pollutants to settle and filter out as the water infiltrates into the ground or flows through the vegetated area. Both systems require sufficient soil and rainfall to support the vegetation.^{19,20}
- An extended detention basin is specifically designed as a dry basin to hold stormwater runoff temporarily for 24 but no longer than 48 hours, allowing particles and associated pollutants to settle before the stormwater runoff is released. Unlike wet ponds, these facilities do not have a large permanent pool of water. They can also be used to provide flood control by including additional flood detention storage.²¹ TCEQ cautions that extended detention basins alone may not achieve the 80% TSS removal requirement, but may be achieved when grassy swales are incorporated to convey runoff to the basins.²²
- Sand filters have been the primary stormwater treatment system in the Austin and San Antonio areas.²³ A sand filter consists of an open basin or buried trench that allows stormwater to pass through a specific depth of sand (or other similar media) before leaving the BMP. Sand filter maintenance requirements may be higher than some other control types. The sand filter media must be regularly cleaned of debris for proper operation, especially after significant rainfall events. Sand filters are generally constructed for land uses with high impervious cover and space constraints.²⁴
- Proprietary stormwater treatment system designs, such as filter cartridge systems, can achieve 95% TSS removal efficiency, and usually include a long-term maintenance contract for optimal

¹⁸ Barrett, Michael E. *Complying with the Edwards Aquifer Rules, Technical Guidance on Best Management Practices*. Austin: TCEQ, Revised July, 2005. Print.

¹⁹ "Vegetated Filter Strip," *Pennsylvania Stormwater Management Manual*. 15 Aug 2009. <<http://www.bfenvironmental.com/pdfs/VegFilterStrips.pdf>>

²⁰ "Vegetated Swales," *City of Portland Development Services*. 14 Aug 2009. <<http://www.portlandonline.com/bds/index.cfm?a=79039&c=40878>>

²¹ "Dry Detention Ponds," *U.S. EPA*. 18 Aug 2009. <<http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=67>>

²² Barrett, Michael E. *Complying with the Edwards Aquifer Rules, Technical Guidance on Best Management Practices*. Austin: TCEQ, Revised July, 2005. Print.

²³ Barrett, Michael E. *Complying with the Edwards Aquifer Rules, Technical Guidance on Best Management Practices*. Austin: TCEQ, Revised July, 2005. Print.

²⁴ "Sand Filter," *NC DENR Stormwater BMP Manual*. 21 Aug 2009. <http://h2o.enr.state.nc.us/su/documents/Ch11-Sandfilter_001.pdf> and Barrett, Michael E. *Complying with the Edwards Aquifer Rules, Technical Guidance on Best Management Practices*. Austin: TCEQ, Revised July, 2005. Print.

performance.²⁵ They perform as well or better than conventional BMPs and can be customized to meet space constraints.²⁶

- Constructed wetlands are artificially created marsh or swamp systems designed to replicate the functions of natural wetlands. They can filter pollutants at a 93% TSS removal efficiency.²⁷ Constructed wetlands offer aesthetic benefits and provide habitat for wildlife, but in Central Texas most require supplemental water to sustain a permanent pool and wetland vegetation during some summer months. Wetlands require a large surface area compared to other controls. Often algae must be removed frequently; maintenance costs can be higher than other BMP designs.²⁸

BMP Maintenance Enforcement Strategies

TCEQ, the EAA, the City of San Antonio, and the City of Austin each have different BMP maintenance enforcement strategies as described in the following sections.

TCEQ Best Management Plan Enforcement²⁹

TCEQ formally notifies owners of non-compliant BMPs through a letter sent via certified mail. Notification includes a schedule that states when the responsible party must contact TCEQ and a deadline for restoring the BMP to compliance.

The notification letter also states that TCEQ has been granted “enforcement powers” by the Texas Legislature, but it makes no reference to monetary penalties for non-cooperation.³⁰ If the parties responsible for BMP maintenance contact TCEQ and explain that they cannot return the BMP to compliance within the specified timeframe, TCEQ inspectors can negotiate a more amenable deadline. If, after negotiation, the BMP owner still does not comply, the case is sent to TCEQ’s Enforcement Division to calculate a suitable monetary penalty. The penalty is determined on a case-by-case basis, but the central factors considered are “harm and severity” and size of the BMP site. As authorized through the federal Clean Water Act, TCEQ may levy fines up to \$10,000 per day per violation.

TCEQ staff noted that cases rarely arrive at this stage of the maintenance enforcement process. TCEQ's Edwards Aquifer Protection Program is underfunded and understaffed to meet the legislatively-mandated 60 day deadlines for WPAP review and approval. Out of 259 cases in the 2007-2008 yearly report, only six in the Edwards Aquifer Program had penalties assessed. Penalty payments are made

²⁵ “AquaLogic.” 23 Aug 2009. <<http://www.aqualogic-usa.com/frameset.html>>

²⁶ Barrett, Michael E. *Complying with the Edwards Aquifer Rules, Technical Guidance on Best Management Practices*. Austin: TCEQ, Revised July, 2005. Print.

²⁷ “Constructed Treatment Wetlands,” *U.S. EPA*. 24 Aug 2009. <<http://www.epa.gov/owow/wetlands/pdf/ConstructedW.pdf>>

²⁸ Barrett, Michael E. *Complying with the Edwards Aquifer Rules, Technical Guidance on Best Management Practices*. Austin: TCEQ, Revised July, 2005. Print.

²⁹ Fritz, Charlyne, TCEQ. Personal interview. July 15, 2009.

³⁰ A sample notification letter from TCEQ is included in the Addenda.

into the Texas general fund and do not specifically support TCEQ or the Edwards Aquifer Protection Program.

Edwards Aquifer Authority BMP Monitoring and Enforcement

The EAA assumes less robust enforcement authority for BMP maintenance than SAWS or TCEQ, and their enforcement program is informal. The EAA has no scheduled program of routine BMP monitoring. Citizen inquiries or complaints are registered by the EAA and field investigators are assigned in response. The EAA BMP monitoring and field investigation reports are typically detailed and informative.³¹

The EAA does not send out an official letter notifying the BMP owner of the structure's non-compliance. Communication between inspector and owner occurs via telephone, e-mail or in person. EAA inspectors encourage BMP owners to bring their structures back into compliance quickly, rather than wait for the agencies with regulatory power, TCEQ and SAWS, to intervene. The EAA makes several attempts to work with BMP owners, but if they do not resolve their BMP violation within a reasonable timeframe, the case and its reports are sent to either TCEQ or SAWS, depending on the jurisdiction of the property's location.³² TCEQ or SAWS may elect to proceed with their own investigation of the BMPs at their discretion.

We found that when TCEQ receives an EAA report on a persistently non-compliant BMP, the report receives the same treatment as a citizen complaint with no report.³³ TCEQ does not make use of the inspectional or investigational information submitted in the EAA reports; rather, TCEQ begins their investigation without relying on information in the professional report produced by the EAA.³⁴

The data that was collected from SAWS indicates that they, like TCEQ, treat the EAA's reports as general complaints; that is, they are of the same stature as any other complaint.³⁵ As was previously stated, the EAA sends violation reports to SAWS for BMPs that are within their jurisdiction.³⁶ Informal communication between the EAA and SAWS has occurred throughout the years concerning BMP violations and maintenance; however, this is a practice that is not openly adopted.

³¹ See Addenda for Edwards Aquifer Authority Report on Field Inspection Activities for 2006, 2007, and 2008.

³² A sample violation report from the EAA to TCEQ is included in the Addenda.

³³ For liability purposes, it is understandable that TCEQ cannot accept "uncertified" information from the EAA. That is, because EAA is a non-regulatory agency, their reports are not considered canonical.

³⁴ Frtiz, Charlyne, and Lynn Bumguardner, TCEQ. Personal interview. July 15, 2009.

³⁵ Hobson, Erik, SAWS. Personal interview. July 21, 2009.

³⁶ Urbanzyck, Ben, EAA. Personal interview. June 30, 2009.

San Antonio, Bexar County³⁷

Field inspections of both existing BMPs and BMPs under construction are central to SAWS' maintenance enforcement procedures. According to TCEQ database records, over 800 WPAPs that include structural BMPs have been approved in Bexar County, but this database does not readily indicate if there may be more than one structural BMP at a particular site. Therefore, field inspectors must be prepared to assess multiple structures of possibly more than one type and a variety of technical complexity. Based on available data, only about one-third of sites with structural BMPs can be visited within a calendar year resulting in an average inspection frequency of once every three years.³⁸ A review of selected SAWS files indicate that non-compliant BMP sites are inspected multiple times as necessary and at some point during the series of inspections, non-compliant BMPs are normally restored to compliance. SAWS usually initiates contact with non-compliant BMP owners.^{39,40}

Austin, Travis County⁴¹

The City of Austin's notice of violation is similar to that of TCEQ and SAWS, but it also explicitly states that a penalty of \$2,000 per day, per violation for constructed BMPs that are not in compliance may be levied.⁴² Stating the fine in the initial notice of violation is efficient for two reasons: firstly, transgressors are fully aware of the possible penalties at the beginning of the investigational process and are therefore more likely to resolve their BMP problem as soon as possible; and secondly, having the penalty assessed as a flat fee eliminates the labor and intricacy of having to custom tailor fines on an individual case basis. Like TCEQ, if the responsible parties are not able to restore their BMP(s) to compliance by the deadline provided, the City of Austin negotiates an alternative schedule.

The City of Austin also offers a positive incentive for proactive BMP maintenance compliance. BMP owners in Austin are given a 20% discount on the City's drainage fee if on-site BMPs remain in compliance.⁴³ Since establishing this positive incentive, the City of Austin has experienced wider compliance with BMP maintenance standards and plans to continue to offer it.

³⁷ "Source Water Protection Case Studies: San Antonio Protects Edwards Aquifer." *United States Environmental Protection Agency*. Nov 2009.

<http://cfpub.epa.gov/safewater/sourcewater/sourcewater.cfm?action=Case_Studies&view=specificresults&casestudy=71.

³⁸ Fritz, Charlyne, TCEQ. Personal interview. July 2009; and James, Greg, SAWS. Personal interview. July 2009.

³⁹ Information regarding the SAWS Aquifer Protection and Evaluation can be found at http://www.saws.org/our_water/ResourceProtComp/Aquifer_Protection/index.shtml, and a summary of it is in the Addenda of this paper.

⁴⁰ A sample notice of non-compliance from SAWS is included in the Addenda.

⁴¹ "Stormwater Treatment Program." *City of Austin*. Oct 2009.

<http://www.ci.austin.tx.us/watershed/stormwater_treatment.htm>.

⁴² A sample notice of violation from the City of Austin is included in the Addenda.

⁴³ A sample "Pond Registration and Fee Reduction" letter from the City of Austin is included in the Addenda.

Recommendations

The current multi-agency system for BMP inspection and enforcement in Bexar County is inefficient and ineffective. Despite multiple agencies with enforcement authority, the vast majority of BMPs are not regularly inspected. When they are inspected and problems are identified, solutions are slow to manifest. The following recommendations are essential to achieve a reliable storm runoff treatment system of BMPs and the aquifer water quality that is promised by protection regulations.

Eliminate Duplication of Efforts and Inconsistency of Enforcement between Agencies

Three government agencies share responsibilities for monitoring and protecting the Edwards Aquifer and employ trained professionals to carry out these tasks. Field activities among the agencies, however, are uncoordinated and in some cases duplicative. Information gathered by one agency is not reliably shared with other agencies. A monitoring team from SAWS may issue a notice of violation for non-compliant BMPs, for example, but unless the violator is consistently non-compliant, TCEQ will not be appraised. TCEQ performs its own monitoring inspections independently of SAWS, or any other agency, and may not necessarily coordinate or communicate its findings to SAWS. The EAA also performs site inspections of BMPs as part of its aquifer protection program but its reports will usually only be considered by TCEQ as a new case that will be handled independently without further collaboration with the EAA, which currently has little enforcement authority for ensuring BMP compliance.

Create a Central Database and Improve Accessibility

TCEQ, SAWS, and the EAA each have a system for maintaining data on tracts that have been permitted within the recharge zone and compliance with stormwater pollution abatement requirements. However, these agencies do not share databases or integrate information relating to a particular tract. Furthermore, neither TCEQ nor SAWS could tell us the exactly how many BMPs have been constructed in Bexar County without going through each of hundreds of WPAPs to determine the number and location of BMPs on each developed site, a time-consuming and tedious process.

Although these agencies have somewhat different jurisdictions and areas of legal responsibility, a shared database with universal accessibility would streamline enforcement processes for all of them. A common identification format, mapping capability, and computerized BMP location function would reduce duplications and assure maintenance and enforcement oversight of the geographically dispersed and multi-jurisdictional systems. This database should have GIS compatibility (i.e. location coordinates, spatial data), owner and operator contact information, construction design data, and regulatory enforcement history. A Memorandum of Agreement for interagency cooperation and sharing of data is needed. This interagency cooperation and support should also include standardized training for conducting assessments of structural BMPs and WPAP compliance as well as a checklist for assessments and entry into the structural BMP database.

Information transparency would eliminate repeated data collection and quality control/quality assurance processes. Since differences in information formatting seem to hinder TCEQ and EAA cooperation on BMP management, standardized information sharing would enable interagency cooperation.⁴⁴

Streamline and Coordinate Field Inspection Scheduling and Processes

As with the acquisition and management of recharge zone property data, each regulatory agency has a slightly different approach and emphasis during field inspections. For example, SAWS might inspect a site, and TCEQ might inspect the same site a week later. Given the number of structures and the shortage of personnel qualified to conduct these inspections, coordination between agencies would allow the greatest number of BMPs to be inspected regularly at an appropriate time interval.

Since multiple enforcement agencies monitor BMPs in Bexar County, creating a standard investigational, reporting, and incentives procedure would help reduce duplication of work between agencies and increase efficiency. A Memorandum of Agreement between TCEQ, SAWS, and the EAA that establishes the EAA as a partner investigative and enforcement authority would save state and city resources currently wasted through work duplication.

Furthermore, property owners are confused by overlapping jurisdictions and reporting requirements. Along with a common database, a standardized inspection and monitoring process coordinated between agencies could facilitate better compliance by improving communication and reducing property owner frustration.

BMP Maintenance Incentives

The City of Austin has a successful fee system to encourage BMP maintenance. BMP property owners create escrow accounts for their stormwater pollution management programs regulated by the City. Rebates are offered as incentives to owners that are consistently compliant and maintain their systems properly.⁴⁵

By contrast, the incentive for non-compliance in Bexar County is avoidance of TCEQ enforcement fines. Pursuing responsible parties and levying fines is a costly and time-consuming administrative process. The current SAWS BMP fee structure is too low to create an effective incentive for BMP maintenance.

The burden of funding inspection and compliance for BMPs falls on the public agencies as an ongoing expense. Escrow accounts adequate to cover long term costs associated with these public services should be assessed and required as part of permitting approval process.

The City of San Antonio could adopt more stringent environmental ordinances than those of the state, like the City of Austin, therefore making it the primary regulatory agency for BMP compliance. This

⁴⁴ A review of violation reports from the EAA, SAWS and TCEQ shows that these organizations use very similar information in their reports, so sharing information would result in at least some improvement in efficiency.

⁴⁵ Rasberry, Kelly Jo, City of Austin. Personal interview. October 2009.

increased local authority would eliminate work duplication and interagency communication issues, which limit the efficiency of BMP maintenance tracking in San Antonio. Like Austin, any city can choose to take similar actions and enforce more stringent laws tailored to the local environment.

Bexar County should also examine the practice of requiring all residential BMPs to be deeded to the City of San Antonio, as does the City of Austin. Approval of residential BMPs should be contingent upon fees adequate to cover long term costs of inspection and maintenance.

Even with the incentive fee system in place, a fine could be exacted from owners who consistently fail to maintain BMPs. A history of inadequate BMP maintenance could also subject the owner or operator to additional scrutiny for any new WPAP submittals.

In addition, the identification of consistently non-compliant or deficient WPAP and structural BMPs should be disseminated among enforcement and monitoring agencies, along with information about the developers and their stormwater pollution management contractors. Tracking of repeat offenders should be done to correct substandard practices and prevent identified responsible parties from obtaining future WPAP approvals until satisfactory performance is verified.

Public Education

Educating the public is a first and vital step to improving BMP maintenance. Initiatives have already been taken by TCEQ as exemplified by their “Implementation and Enforcement Workshop,” which considered issues such as construction of BMPs and public and inter-organizational education programs. In particular, SAWS could take a leadership role in publicizing the need for stormwater pollution awareness, as it has with its successful water conservation campaign.

We recommend that TCEQ and SAWS allocate resources to educate the public about the importance of mitigating non-source point pollution, particularly within the confines of areas being heavily developed, such as Bexar and Comal counties. Programs and informational materials should stress the importance of recharge zone protection and the role that properly maintained BMPs play in mitigating non-point source pollution. Citizens in Bexar County should be informed that approximately 80% of their recharge zone has now been developed and that effective BMPs are essential to preserve future water quality.

Active participation of the public, engendered by a campaign to educate citizens on the importance of maintaining these structures and our reliance upon them to ensure that our aquifer is not polluted will result in hundreds of additional citizen inspectors. Presently SAWS and the EAA engage water users through information presented on their websites, in public outreach programs, environmental fairs, speakers’ bureaus, public forums on water, and bill stuffers – all of which could be employed to raise awareness about the importance of BMP maintenance.

Residents should be informed about how to recognize a BMP that is improperly maintained and who to contact if they suspect a BMP is out of compliance. Landscape contractors in particular should be educated about the purpose and importance of BMPs and what to be aware of when working in or around them. Public workshops regarding the purpose and importance of stormwater BMPs should be

provided at appropriate venues such as neighborhood and homeowners association meetings, expositions, fairs, and home and garden shows. These efforts could be coupled with information introducing those who live, work and shop in developed areas of the recharge zone in Bexar County to low impact development techniques, low maintenance landscapes, and awareness that we must all partner in efforts to keep our groundwater supplies clean.

Despite TCEQ's efforts to ensure that owners and responsible parties are well informed of their BMP maintenance responsibilities, many are often unaware of these requirements or the consequences of noncompliance. Although the transfer of real estate requires a signed affidavit acknowledging responsibilities for WPAP requirements, the maintenance of BMP structures by many new owners is disregarded or overlooked. This oversight can recurrently lead to high fixing costs owing to the fact that these BMPs go unattended for long periods of time.⁴⁶

In general many residents of Bexar County are unaware of the special precautions that developers on the recharge zone are required to take. There appear to be few members of the public knowledgeable enough to ask for assistance from regulatory agencies in identifying potentially non-compliant BMPs or to alert them of accidental or illegal discharges into permanent stormwater management systems.

Additionally, it is recommended that contact information for the local parties responsible for the structural BMPs be made available to the public to encourage their participation in stormwater pollution prevention. Agencies should maintain a response hotline for concerned citizens to report spills of pollutants into structural BMPs or other conditions that may potentially reduce their effectiveness or jeopardize the recharge zone.

⁴⁶ Urbanzyk, Ben, EAA. Personal interview. June 30, 2009, and Barney, Rebekah, City of Austin. Personal interview. July 27, 2009.

Conclusion

In the face of significant urbanization of its recharge and contributing zones, structural BMPs can never provide comprehensive protection of Edwards Aquifer water quality. A comprehensive protection program must include impervious cover limits and easements or purchases for lands containing the most sensitive recharge features. Within the current regulatory framework for on-going inspection and maintenance, however, the already-constructed BMP storm runoff treatment systems fall short of achieving their design goals. Those goals will not be achieved unless:

- a centralized agency database is established with standardized formats to collect and share BMP information;
- duplicate and inconsistent BMP inspection and enforcement by TCEQ, SAWS and EAA is reconciled and streamlined;
- a campaign to educate businesses and the public about the importance of BMP maintenance is created and implemented; and
- BMP owners are required and/or incentivized to maintain BMPs.

There is currently no estimate of the tax dollar price tag spent to achieve the current level of BMP oversight and inspection. Nor are there any estimates of how much it would cost to achieve a system that effectively regulates, monitors, inspects and enforces maintenance of BMPs spread over a wide geographical area within a complex regulatory and ownership framework. Given that other methods of pollution prevention and abatement may be both more effective and more cost effective (at least in terms of expenditure of public dollars), the question of what is equitable regarding the distribution of these costs between the general public and the long-term system owners and operators should be a factor when considering how to protect our groundwater resources.

Acknowledgments

We wish to thank the staff members of the Texas Commission on Environmental Quality, San Antonio Water System, the City of Austin, and the Edwards Aquifer Authority for their expertise and assistance in producing this report. We also wish to thank the members of the Technical Team of the Greater Edwards Aquifer Alliance who were responsible for the final product.

Terry Dudley

Carol Mendoza Fisher

Robert Moyer, P.E.

Annalisa Peace

G. Lauren Ross, P.E.

Elena Serna

Niniane Tozzi

References

- “About the Edwards Aquifer.” *San Antonio Water System*. Oct 2009.
<http://www.saws.org/our_water/aquifer/aboutaquifer.shtml>.
- “AquaLogic.” 23 Aug 2009. <<http://www.aqualogic-usa.com/frameset.html>>
- “Aquifer Protection and Evaluation.” *San Antonio Water System*. Nov 2009.
<http://www.saws.org/our_water/ResourceProtComp/Aquifer_Protection/index.shtml>.
- Barrett, Michael E. Ph.D., P.E., “Complying with the Edwards Aquifer Rules Technical Guidance on Best Management Practices” RG-348 (Revised), Center for Research in Water Resources, Bureau of Engineering Research, University of Texas at Austin, July 2005.
- City of Austin**
- Barney, Rebekah. Planning and Development Review Department. Personal interviews.
Notice of Ordinance/ Land Development Code Violations. Site plan Number/Subdivision Case Number SP-93-0137C, Reference Pond ID 87. September 9, 2008.
Pond Registration and Fee Reduction Form.
- Rasberry, Kelly Jo. Watershed Protection and Development Review Department. Personal interviews.
“Stormwater Treatment Program.” *City of Austin*. Oct 2009.
<http://www.ci.austin.tx.us/watershed/stormwater_treatment.htm>.
- Watershed Protection Master Plan, Phase 1 Watersheds Report, EXECUTIVE SUMMARY (continued). August 24, 2009. Web.
- City of San Antonio, Original Ordinance No. 81491, JANUARY 12, 1995 Updated Ordinance No. 2006-02-16-0241, § 2, February 16, 2006. “Article VI Pollution Prevention and Control, Division 6. Aquifer Recharge Zone and Watershed Protection, Subdivision A. General”.
- Coastal Plain Workshop – Survivor’s Guide to the New Era of Stormwater BMPs, Breakout Session – Notes, March 23-24, 2009, Williamsburg, VA.
- “Constructed Treatment Wetlands,” *U.S. EPA*. 24 Aug 2009.
<<http://www.epa.gov/owow/wetlands/pdf/ConstructedW.pdf>>
- “Dry Detention Ponds,” *U.S. EPA*. 18 Aug 2009.
<<http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=67>>
- Edwards Aquifer Authority**
- Edwards Aquifer Authority Act (includes amendments through September 1, 2009 effective date); Act of May 30, 1993, 73rd Leg., R.S., ch. 626, § 1.01, 1993 Tex. Gen. Laws 2350.
Edwards Aquifer Authority Section 1.08 General Powers. Act of May 30, 1993, 73rd Leg., R.S., ch. 626, § 1.08, 1993 Tex. Gen. Laws 2350, 2356.
Permanent Stormwater BMP Report. File No. 6.10-2.3-110, EAPP File No. 1713.00. January 5, 2008.
Report on Edwards Aquifer Protection Program Activities for Year 2008.
Report on Edwards Aquifer Protection Program Activities for Year 2007.
Report on Edwards Aquifer Protection Program Activities for Year 2006.

“The Edwards Aquifer.” *Edwards Aquifer Authority*. 10 Nov 2009.< <http://www.edwardsaquifer.org/>>. Urbanczyk, Ben. Environmental Coordinator, Aquifer Management Division. Personal interviews. WPAP Mod Site Inspection Report. File No. 6.10-2.7-100, Edwards Aquifer Protection Program (EAPP) File No. 0859.03. June 5, 2008.

Maxted, John and Mateo Scoggins, “The ecological response of small streams to stormwater and stormwater controls in Austin, Texas USA”, Oct 2004.

“Sand Filter,” *NC DENR Stormwater BMP Manual*. 21 Aug 2009.
<http://h2o.enr.state.nc.us/su/documents/Ch11-Sandfilter_001.pdf>

San Antonio Water System

Full Report on Basin No. 374.1.

Hobson, Erik. Environmental Protection Specialist II. Personal interviews.

James, Gregory. Supervisor, Aquifer Protection and Evaluation. Personal interviews.

Pollution Abatement Basin. Basin ID 374.1. January 08, 2009.

Water Statistics, Year Ending December 31, 2007.

“Source Water Protection Case Studies: San Antonio Protects Edwards Aquifer.” *United States Environmental Protection Agency*. Nov 2009.

<http://cfpub.epa.gov/safewater/sourcewater/sourcewater.cfm?action=Case_Studies&view=specificresults&casestudy=71>.

Texas Administrative Code, Title 30 Environmental Quality, Part 1 TECQ, Chapter 213 Edwards Aquifer, Subchapter B, Rule §213.22 Definitions.

Texas Commission on Environmental Quality

Bumguardner, Lynn. Water Section Leader, San Antonio Regional Office. Personal interviews.

“Enforcement Initiation Criteria.” Revision No. 10. Effective December 8, 2005.

Edwards Aquifer Protection Program Seminar. Austin. TCEQ. February 21, 2008.

Fritz, Charlyne. Edwards Aquifer Protection Program, San Antonio Region. Personal interviews.

Investigation Report. RN 1027482621, Investigation No. 739778, EAPP File No. 1713.00. February 26, 2009.

Municipal Separate Storm Sewer System: Stormwater Management Program, Implementation and Enforcement Workshop. December 6-7, 2007.

Notice of Violation. Reference Number (RN) 102748621, Investigation No. 739778, EAPP File No. 1713.00. May 11, 2009.

“Regulatory History of the Edwards Aquifer.” *Texas Commission on Environmental Quality*. Nov 2009.
<http://www.tceq.state.tx.us/compliance/field_ops/eapp/history.html>.

RG 348 “Complying with the Edwards Aquifer Rules, Technical Guidance on Best Management Practices”, revised July 2005

Water Pollution Abatement Plan Application. Effective June 1, 1999.

Title 40, CFR, Part 149, Subpart B, September 29, 1977 (42 FR 51574 and 52 FR 23986).

United States General Accounting Office. United States. Water Quality: Better Data and Evaluation of

Urban Runoff Programs Needed to Assess Effectiveness. 2001.

“Vegetated Filter Strip,” *Pennsylvania Stormwater Management Manual*. 15 Aug 2009.

<<http://www.bfenvironmental.com/pdfs/VegFilterStrips.pdf>>

“Vegetated Swales,” *City of Portland Development Services*. 14 Aug 2009.

<<http://www.portlandonline.com/bds/index.cfm?a=79039&c=40878>>

“Water Quality.” *San Antonio Water System*. Oct 2009. <http://www.saws.org/our_water/waterquality/>.

Addenda

*Summary History of Edwards Aquifer Regulation*⁴⁷

Water-pollution abatement plans (WPAP) for development in the RZ were first required in 1974. By 1984, the plans were required for regulated developments including residential, commercial, and industrial. A geologic assessment was required for housing developments with 100 or more family living units, and non-residential developments greater than 5 acres. Also in 1984, ongoing testing requirements for sewer lines were established. Beginning in 1977, the installation of new underground storage tank sites within the RZ had to be approved prior to construction. The sites were required to have double walled tanks and piping as well as a method of leak detection. These standards were in advance of the statewide regulations on underground storage tank systems that first went into effect in 1989.

In 1988, the TCEQ assessed fees for all types of development. As a result of legislation, the schedule of fees was increased in 1997 and again in 2007. These one-time fees cover the review of the protection plans as well as inspections during and after construction is complete. The money is used to support program efforts.

In 1990, geologic assessment requirements for residential developments were decreased to 25 or more units, plus notification of recharge features was made mandatory. Today, a geologic assessment prepared, signed and sealed by a licensed Professional Geologist is required for all new, regulated developments except residential sites less than 10 acres.

Significant rules changes went into effect in 1999. The changes included a design performance standard for permanent best management practices. The standard applies to water quality systems used for stormwater treatment. Examples include sand filtration basins, extended detention basins, and retention ponds with irrigation systems. The rules also require engineers to certify the construction of the systems and to ensure maintenance of these systems. The 1999 rules changes brought the Edwards Aquifer contributing zone, the drainage areas north of the RX, into regulation. Regulated activities are those that have the potential for polluting surface streams that will cross the recharge zone, including large construction projects and installation of petroleum storage tanks.

In 2001, the agency began distributing contributing-zone plans to affected municipalities, counties, or groundwater conservation districts according to House Bill 2912 (71st Legislative Session), which added Texas Water Code 26.137, mandating a 30-day public comment period for the applications. The public can be automatically notified by subscribing to TCEQ to obtain postal or email notifications. Also as a result of this House Bill, the program has posted annual expense reports.

⁴⁷ "Regulatory History of the Edwards Aquifer." Texas Commission on Environmental Quality. Nov 2009. <
http://www.tceq.state.tx.us/compliance/field_ops/eapp/history.html>.

***Texas Administrative Code, Title 30, Environmental Quality, Part 1 TECQ,
Chapter 213 Edwards Aquifer, Rule §213.22***

Definitions:

Regulated activity--

(A) Any construction or post-construction activity occurring on the contributing zone of the Edwards Aquifer that has the potential for contributing pollution to surface streams that enter the Edwards Aquifer recharge zone.

(i) These activities include construction or installation of:

- (I) buildings;
- (II) utility stations;
- (III) utility lines;
- (IV) underground and aboveground storage tank systems;
- (V) roads;
- (VI) highways; or
- (VII) railroads.

(ii) Clearing, excavation, or other activities which alter or disturb the topographic or existing stormwater runoff characteristics of a site are regulated activities.

(iii) Any other activities that pose a potential for contaminating stormwater runoff are regulated activities.

***Texas Administrative Code, Title 30 Environmental Quality, Part 1 TECQ,
Chapter 213 Edwards Aquifer, Rule §213.5 (IV) (D)***

Requirements for BMPs and measures:

(ii) Permanent BMPs and measures.

(I) BMPs and measures must be implemented to control the discharge of pollution from regulated activities after the completion of construction. These practices and measures must be designed, constructed, operated, and maintained to insure that 80% of the incremental increase in the annual mass loading of total suspended solids from the site caused by the regulated activity is removed. These quantities must be calculated in accordance with technical guidance prepared or accepted by the executive director. BMPs must be designed to remove at least 80% of the total suspended solids generated from any regulated activity. TCEQ calculates total suspended solids (TSS) generated and removed to ensure compliance. If a site is used for single-family residential development with an impervious cover of 20% or less, a permanent BMP is not required upon completion of site construction. If the site's impervious cover increases over time, the property owner must notify the appropriate TCEQ office and may be required to install a permanent BMP.

SAWS Aquifer Protection and Evaluation Summary⁴⁸

The SAWS Aquifer Protection and Evaluation Section is engaged in the development process over the Recharge Zone in Bexar County as it relates to the protection of our predominant source of water. Staff is involved in:

- Reviewing Aquifer Protection Plans for Category 2 and 3 properties over Recharge Zone and issue approval letter to applicant.
- Reviewing and authorizing building permits when appropriate.
- Reviewing blasting procedures for sites over the Recharge Zone.
- Determining Category 1, 2, or 3 designations on property on the Recharge Zone and issue letters to applicant indicating Category designation. Evaluate variance requests for changes of Category status.
- Providing Category Determination Request Letters
- Reviewing and approving certificate of occupancies to ensure land use is permitted within the Recharge Zone.
- Enhancing Geographic Information System (GIS) capabilities. Display flood plains, caves, plats, zoning cases, WPAPs, Category letters, etc. with associated databases over landuse map.
- Utilizing GPS (Global Positioning System) to identify locations of sensitive features on the Recharge Zone (can then be displayed on a map).
- Coordinating with municipal departments, review Master Development Plans (MDP) and Planned Unit Development Plans (PUD) for completeness based on the requirements of the Aquifer Water Quality Ordinance No. 81491 for properties over the Recharge Zone and Contributing Zone.
- Enforcing provisions of the Aquifer Protection Ordinance No. 81491. Also known as the Water Quality Ordinance.
- Conducting site evaluations on plats located over the Recharge Zone and Transition Zone (when applicable).
- Reviewing sewage collection system plans for sensitive recharge features on the Recharge Zone and potential impact to water quality.
- Providing emergency response to accidental spills over the Recharge Zone.
- Conducting quarterly inspections of stormwater quality basins over the Recharge Zone and within COSA jurisdiction to ensure compliance with WPAP and technical guidance manual for water quality protection.
- Reviewing and providing written comments on Water Pollution Abatement Plans (WPAP) and/or Contributing Zone Plans (CZP) submitted to the Texas Commission on Environmental Quality (TCEQ).
- Conducting site evaluations on zoning cases located over the Recharge Zone and Transition Zone (when applicable).

⁴⁸ “Aquifer Protection and Evaluation.” *San Antonio Water System*. Nov 2009.
<http://www.saws.org/our_water/ResourceProtComp/Aquifer_Protection/index.shtml>.

Edwards Aquifer Authority Report on Edwards Aquifer Protection Program Activities for Years 2006, 2007, and 2008

2006 Field Inspection Activities

In July 2006, the Board of Directors requested that Authority staff implement a field inspection program in support of TCEQ's EAPP. In 2006, Authority staff conducted 87 site inspections for proposed developments on the RZ, CZ, and TZ. Most inspections were performed between July and December 2006.

...

Minor deficiencies are reported to the developer or their agent. Major deficiencies were reported to the developer or their agent and to TCEQ staff along with documentation of the violation. Two major deficiencies were noted in the 2006 inspections and both were cases where construction was initiated prior to TCEQ approval for the plan.

2007 Field Inspection Activities

In July 2006, the Board of Directors requested that Authority staff implement a field inspection program in support of TCEQ's EAPP. In 2007 Authority staff conducted 318 site inspections representing 249 sites on the RZ, CZ, and TZ. Site inspections were performed for active and post construction sites.

...

During the year, 27 minor and 13 major violations were encountered during the field inspections. Most of these were resolved on site. Those that were not resolved were referred to either TCEQ, or SAWS, depending upon which agency has regulatory primacy in the site area. Twenty-seven sites with violations were referred to regulatory authorities; 11 to TCEQ and 16 to SAWS.

2008 Field Inspection Activities

In 2008, Authority staff conducted 237 site inspections representing 216 sites on the RZ, CZ, and TZ. Site inspections were performed for active and post-construction sites.

...

During the year, three minor and 15 major violations were encountered during the field inspections. Most were resolved on site, but those that were not resolved were referred to either TCEQ or the San Antonio Water System (SAWS), depending upon which agency has regulatory primacy in the site area. In 2008, nine sites with violations were referred to regulatory authorities – three to TCEQ and six to SAWS.

Edwards Aquifer Authority Act

(includes amendments through September 1, 2009 effective date)

CHAPTER 626 (S.B. No. 1477)

Act of May 30, 1993, 73rd Leg., R.S., ch. 626, § 1.08, 1993 Tex. Gen. Laws 2350, 2356.

ARTICLE 1

SECTION 1.01 FINDINGS AND DECLARATION OF POLICY. The legislature finds that the Edwards Aquifer is a unique and complex hydrological system, with diverse economic and social interests dependent on the aquifer for water supply. In keeping with that finding, the Edwards Aquifer is declared to be a distinctive natural resource in this state, a unique aquifer, and not an underground stream. To sustain these diverse interests and that natural resource, a special regional management district (the Edwards Aquifer Authority) is required for the effective control of the resource to protect terrestrial and aquatic life, domestic and municipal water supplies, the operation of existing industries, and the economic development of the state. Use of water in the district for beneficial purposes requires that all reasonable measures be taken to be conservative in water use.

Act of May 30, 1993, 73rd Leg., R.S., ch. 626, § 1.01, 1993 Tex. Gen. Laws 2350

Edwards Aquifer Authority Act Section 1.08, General Powers, grants the Edwards Aquifer Authority:

- “(a) The authority has all of the powers, rights, and privileges necessary to manage, conserve, preserve, and protect the aquifer and to increase the recharge of, and prevent the waste or pollution of water in, the aquifer. The authority has all of the rights, powers, privileges, authority, functions, and duties provided by the general law of this state, including Chapters 50, 51, and 52, Water Code, applicable to an authority created under Article XVI, Section 59, of the Texas Constitution. This article prevails over any provision of general law that is in conflict or inconsistent with this article regarding the area of the authority’s jurisdiction.
- (b) The authority’s powers regarding underground water apply only to underground water within or withdrawn from the aquifer. This subsection is not intended to allow the authority to regulate surface water.
- (c) The authority and local governments with pollution control powers provided under Subchapters D and E, Chapter 26, Water Code, in order to prevent pollution and enforce water quality standards in the counties included within the authority’s boundaries and within a buffer zone that includes all of the area less than five miles outside of those counties, shall apply pollution control regulations equally and uniformly throughout the area within the counties and the buffer zone. The buffer zone does not include the territory within a water management district created under Chapter 654, Acts of the 71st Legislature, Regular Session, 1989.”

Sample Notice of Violation from TCEQ

Buddy Garcia, *Chairman*
Larry R. Soward, *Commissioner*
Bryan W. Shaw, Ph.D., *Commissioner*
Mark R. Vickery, P.C., *Executive Director*



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

May 11, 2009

CERTIFIED MAIL No.: 91 7108 2133 3934 3871 5817
RETURN RECEIPT REQUESTED

Store Operation and Maintenance Manager
Exxon Mobil Corporation

Re: Notice of Violation for the Complaint Investigation at:
Exxon Mobil,
RN102748621, TCEQ Additional ID 13-01070502A, Investigation No. 739778

Dear _____

On February 26, 2009, Charlyne Fritz of the Texas Commission on Environmental Quality (TCEQ) San Antonio Region Office conducted an investigation of the above-referenced regulated entity to evaluate compliance with applicable requirements for the Edwards Aquifer Protection Program. Enclosed is a summary which lists the investigation findings. During the investigation, some concerns were noted which were alleged noncompliances that have been resolved as an Area of Concern and subsequent corrective action. In addition, certain outstanding alleged violations were identified for which compliance documentation is required. Please submit to this office by June 8, 2009 a written description of corrective action taken and the required documentation demonstrating that compliance has been achieved for each of the outstanding alleged violations.

In the listing of alleged violations, we have cited applicable requirements, including TCEQ rules. If you would like to obtain a copy of the applicable TCEQ rules, you may contact any of the sources listed in the enclosed brochure entitled "Obtaining TCEQ Rules."

The TCEQ appreciates your assistance in this matter. Please note that the Legislature has granted TCEQ enforcement powers which we may exercise to ensure compliance with environmental regulatory requirements. We anticipate that you will resolve the alleged violations as required in order to protect the State's environment. If you have additional information that we are unaware of, you have the opportunity to contest the violation(s) documented in this notice. Should you choose to do so, you must notify the San Antonio Region Office within 10 days from the date of this letter. At that time, Mr. Tom Haberle will schedule a violation review meeting to be conducted within 21 days from the date of this letter. However, please be advised that if you decide to participate in the violation review process, the TCEQ may still require you to adhere to the compliance schedule included in the attached Summary of

REPLY TO: REGION 13 • 14250 JUDSON RD. • SAN ANTONIO, TEXAS 78233-4480 • 210-490-3096 • FAX 210-545-4329

P.O. Box 13087 • Austin, Texas 78711-3087 • 512-239-1000 • Internet address: www.tceq.state.tx.us

Mr.
May 11, 2005
Page 2

Investigation Findings until an official decision is made regarding the status of any or all of the contested violations.

If you or members of your staff have any questions, please feel free to contact Ms. Charlyne Fritz in the San Antonio Region Office at (210) 403-4065.

Sincerely,



Lynn Bumgardner, Water Section Work Leader
San Antonio Region Office

LMB/CEF/eg

Enclosures: **Summary of Investigation Findings**
Obtaining TCEQ Rules

Sample Notice of Violation from SAWS



January 08, 2009

**CERTIFIED # 91 7108 2133 3934 3409 3087
RETURN RECEIPT REQUESTED**

J

San Antonio TX 78260

RE: Pollution Abatement Basin - Basin ID: 374.1 TCEQ Project #

San Antonio TX 78260-

Dear Sir / Madam:

The San Antonio Water System (SAWS) Resource Protection and Compliance Department conducted an inventory of pollution abatement basins located within the Edwards Aquifer Recharge Zone and inspected the above-referenced site on January 06, 2009.

During our site investigation, we inspected the pollution abatement basin(s) servicing your site. Deficiencies that were observed are indicated by a checkmark below:

- Standing Water _____
- Sand Filtration Bed _____
- Trash and Debris Remove trash and debris (fence posted) from sand filter basin.
- Vegetation Vegetation over 18 inches will need to be removed.
- Structural Repair PVC cleanout valves and replace missing caps.
- Basin Bypassed _____
- Basin Inlet _____
- Basin Outlet _____
- Underdrain System _____
- Other _____

2800 U.S. Hwy. 281 North • P.O. Box 2449 • San Antonio, TX • 78298-2449 • www.saws.org

January 08, 2009

Page 2

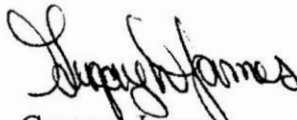
The pollution abatement basin at this location is required by the Water Pollution Abatement Plan (WPAP) that was approved for this site by the Texas Commission on Environmental Quality. These basins serve an important purpose by protecting the Edwards Aquifer from pollution caused by stormwater runoff. For that reason, the WPAP provides that the Owner/Developer is responsible for the continued maintenance and performance of each basin.

Please contact SAWS within thirty (30) days of the date of this letter to confirm the letter has been received. An inspection will be conducted within ninety (90) days of the date of this letter to confirm that all corrective actions have been completed.

For your review and consideration, we have attached an inspection compliance history report based on recorded inspections by SAWS. The Owner/Developer is responsible for ensuring that this basin is properly maintained for the continued performance of the basin. Please take the necessary appropriate actions to correct any deficiencies to prevent the basin from being non-compliant on a recurring basis.

Please update your contact information on the attached General Information Sheet for our records. If you have any questions or require additional information, please contact Lydia Ramirez, Environmental Protection Specialist II at (210) 233-3515 or Gregory James at (210) 233-3520.

Sincerely,



Gregory James

Supervisor

Aquifer Protection and Evaluation

GDJ:/LMR

Sample Notice of Violation from the City of Austin



City of Austin

Founded by Congress, Republic of Texas, 1839
Watershed Protection and Development Review Department
P.O. Box 1088, Austin, Texas 78767

NOTICE OF ORDINANCE / LAND DEVELOPMENT CODE VIOLATIONS

9/18/2008

Parcel Location:

Property ID:

Site Plan Number/Subdivision Case Number: SP-93-0137C

Document Name: SPL-SP-93-0137C_0

Reference Pond ID: 87

Linking Pond ID: 87

Dear Sir or Madam:

The record owner of a detention facility in Austin and the Austin ETJ that is associated with a commercial or multifamily development, or with a single family development where the facility has not been accepted for maintenance by the City, is responsible for maintaining the facility in accordance with Section 25-7-153 of the Austin City Code, Section 8.5.0 of the Drainage Criteria Manual and section 1.6.3.C of the Environmental Criteria Manual. You have been identified as record owner for the above referenced facility.

An inspection of the facility on 09/16/2008 identified maintenance deficiencies as outlined in the attached report. In order to bring the site into compliance with the released site plan or subdivision construction plan and the Environmental Criteria Manual, you must correct these deficiencies and call for a re-inspection of the detention facility by 11/17/2008

Failure to comply with this Notice may result in criminal penalties and fines of up to \$2,000 per day per violation.

Please contact Kelly Jo Rasberry at (512) 974-1873 for information and assistance in complying with these requirements. Technical manuals can be viewed on the City of Austin Website at www.cityofaustin.org/development.

Sincerely,

A handwritten signature in cursive script that reads 'Kelly Jo Rasberry'.

For: Victoria Li, P.E.
Director
Watershed Protection and Development Review Department



City of Austin

Founded by Congress, Republic of Texas, 1839
Watershed Protection and Development Review Department
P.O. Box 1088, Austin, Texas 78767

MAINTENANCE DEFICIENCY REPORT DETENTION FACILITY

Parcel Location:

Site Plan Number/Subdivision Case Number: SP-93-0137C

Reference Pond ID: 87

Excessive Vegetation: Vegetation within the basin shall not exceed eighteen (18) inches in height at any time. Environmental Criteria Manual Section 1.6.3.C.

Standing Water: Corrective maintenance is required any time draw-down does not occur within twenty-four (24) hours. Environmental Criteria Manual Sections 1.6.3.C.

Watershed Protection Department

Commercial Pond Inspection Form

Pond ID 87 Multiple Pond: **Pond Type:** Flood Detention
Linking Pond ID: 87 Watershed: SHL Zone: NERZ
Insp. Area: 11 **Map Page:** 524M **Austin Grid:** H29 **Owner ID:** _____
Business Name: _____
Address: _____
Location Description: _____

Case #: SP-93-0137C **Document Name:** SPL-SP-93-0137C 0
Respons. Maint: Private **Property ID:** _____ **Parcel ID:** _____
(COA, PUD, MUD, Private or Decomm)
Acceptance Date: _____ **Warranty End Date:** _____
Operating Permit (Y/N): **Operating Permit #:** _____
Subdivision Name: _____
Pond Comments : _____

- Please check pond type if not listed.**
- Biofiltration
 - Filtration only
 - Flood Detention
 - Grassed Swale
 - Infiltration Trench
 - Parking Lot Detention
 - Retention/Infiltration
 - Retention/Irrigation
 - Sediment / Filtration / Infiltration
 - Sediment Filtration / Irrigation
 - Sedimentation only
 - Sediment/Sand Filtration
 - Vegetative Filter Strip
 - Wet Pond

Inspection Type: Compliance

Inspected By: Kelly Jo Rasberry **Inspection Date:** 9/16/2008

Problem Area	Problem Exists (Y/N):
Excessive Vegetation Growth	<u>Yes</u>
Sedimentation Build-up	<u>No</u>
Trash and Debris	<u>No</u>
Structural Integrity/Soil Erosion	<u>No</u>
Standing Water	<u>Yes</u>
Send Letter (Y/N)	<input checked="" type="checkbox"/>

Pond must be restored to all design specifications as per approved plans or until in compliance with City code.

Inspection Comments:

- 1) Remove all reeds;
- 2) Re-grade or find another way to prevent standing water in the basin;
- 3) Remove excess sediment buildup from around outlet structures, consider installing rocks;
- 4) Clean splitter box.

Sample Pond Registration and Fee Reduction Letter from the City of Austin



**Watershed Protection
Development Review**

July 9, 2009

Pond # Parcel Location: *(Insert physical address of pond).*

A review of our records indicates that the pond on your property is not currently receiving a 20% reduction for the drainage fee on your utility bill. In order to be eligible for the reduced fee the pond on your property is required to be properly maintained.

A recent field inspection shows that the pond is not properly maintained. Once your pond is compliant please complete the enclosed "Pond Registration and Fee reduction Request Form" to qualify for a 20% reduction for your Drainage Fee on future utility bills. Our fax number is 974-7294.

If you have any questions concerning the Comprehensive Drainage fee please call 974-7112.



Watershed Protection and Development Review Department

Pond Registration and Fee Reduction Request Form

Please complete all information, so the Watershed Protection and Development Review Department can evaluate if you are eligible for a reduced charge. Incorrect information or failure to properly maintain ponds may cause you to be ineligible for the reduced Drainage Fee charge. The City will conduct a pond verification inspection to ensure eligibility for the reduced fee.

Please Print

Utility account number: _____

Account name as it appears on the utility bill: _____

Please describe the business address and specific location of each pond.

Business address: _____

Specific pond location(s):

Type of ponds or basins: _____ Number of ponds or basins: _____

Contact name: _____

Contact phone number: _____

Name of owner or property manager name: _____

Phone number of owner or property manager: _____

Please return the completed registration form to:

City of Austin
Watershed Protection and Development Review Department-Fee Administration
Tele: 974-7112 Fax: 974-7294
P. O. Box 1088, Austin, Texas 78767-1088

***** For City of Austin Staff Use Only *****

Pond Verification: (Y) (N) Verification Date: _____

Maintained: (Y) (N) City Inspector: _____

Pond Identification #: _____

Sample Inspection Report from the EAA to TCEQ

TCEQ Submission
Edwards Aquifer Authority
Permanent Stormwater BMP Report

ANONYMOUS

Bexar County

Inspection Date: 11/21/08, 12/16/08

Edwards Aquifer Protection Program File Number: 1713.00

Edwards Aquifer Authority (EAA) File Number: 6.10-2.3-110

Inspectors: Ben Urbanczyk

Report Date: 1-5-08

Date of TCEQ Approval: 8/6/2001

Date Submitted to the Authority: 7/31/2001

Location: **Anonymous**

The project consists of approximately 2.03 acres to be developed as a convenience store with a drive through car wash, seven fueling stations, and corresponding drives and parking. The site was designed to have approximately 55.7% impervious cover. A sedimentation/filtration pond has been constructed to treat stormwater. The basin was designed in accordance with the TNRCC Technical Guidance Document RG-348 (1999) to remove the increased TSS for the proposed development.

11/21/08 Inspection:

Using information provided in the WPAP, Edwards Aquifer Authority staff arrived on site and began to inspect the sedimentation/filtration basin. Instantly the inspector noticed the filter media within the basin had a strange gray color. The inspector observed tracks in the filtration bed that appeared to be left by a walk behind tiller. The inspector found an accumulation of sediment, debris, and vegetation within the basin's splash pad. While walking the perimeter of the basin the inspector observed several large cracks in the side walls of the basin. A total of nine large cracks were observed in the basin's side wall. Both security gates were open. Please see the attached images to view the site conditions at the time of inspection.



The inspector believes a walk behind tiller was used to level the sand filtration bed, which would mix any deposited sediment into the filtration media.



Staff found the basin's filtration media to have a strange grayish brown color.



While inspecting the basin the inspector found heavy accumulation of sediment, debris, and vegetation within the splash pad.



Staff was puzzled by the design of the basins splash pad. Further research was conducted to determine design characteristics.



Here you can see just a few of the large cracks found in the side wall of the basin. These cracks could allow stormwater to exit the basin untreated by the filtration system.

12/10/08 File Review:

During the 11/21/08 inspection staff questioned the design of the basin's splash pad. Referring to the EAA copy of the WPAP the inspector was unable to locate the necessary design schematics. Arrangements were made to review the TCEQ's copy of the WPAP.

While reviewing the TCEQ copy of the WPAP the inspector found a letter from CEC, Civil Engineers Consultants. The letter informs the TCEQ that the site was completed in accordance to the WPAP with the following exceptions:

- The plans called for a concrete lined basin up to the top of the sand layer, and then a sod topped clay liner from that point up to the top of the basin. To facilitate construction and to reduce the potential for damage to the concrete the contractor extended the concrete liner up the side slope to a point 1/2 foot to 1 foot below the top of the slope. From that point a one foot clay liner was installed and then topped with sod.
- The plan calls for a chain link fence to be constructed at the top of the basin. The contractor placed the fence at the top of the concrete to facilitate installation and allow for landscaping maintenance operation to take place outside of the fence.

EAA Comments:

- 1.) The letter states that changes were made to the approved design, were the changes approved by the TCEQ?
- 2.) If the fence was installed at the top of the concrete, instead of the top of the basin slope, then the fence is within the basin, and thus the decorative plants along the fence are within the basin. If the fence is within the basin then holes dug for each fence post could have been dug through the one foot clay liner. This would result in a preferential pathway for stormwater to short circuit the filtration basin. If the fence is within the basin then the decorative plants that line the fence are within the basin. The root systems of the decorative plants could short circuit the filtration basin by creating a preferential pathway through the clay liner.

Using the TCEQ copy of the WPAP the inspector was able to compare the basin condition observed during the 11/21/08 inspection to approved design schematics. As the inspector reviewed the WPAP several questions arose concerning the basin's installation and maintenance. A follow-up inspection was scheduled.

12/16/08 Inspection:

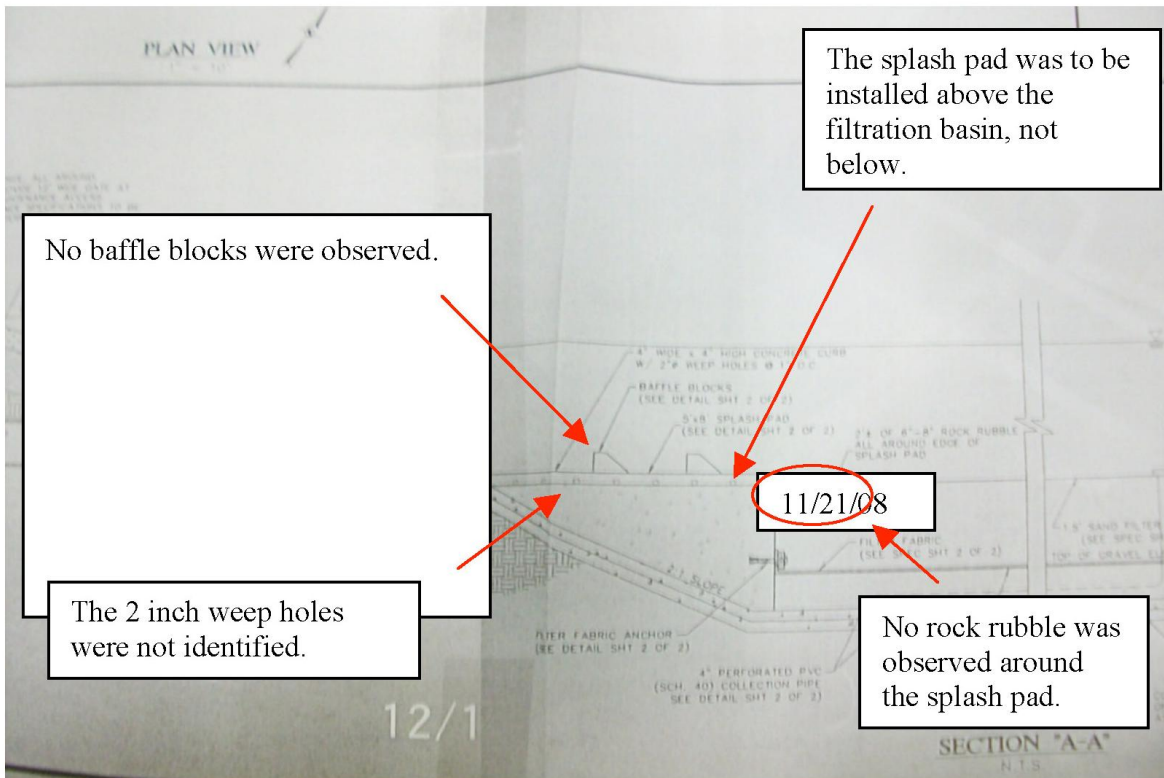
A follow-up inspection was conducted on 12/16/08. The issues identified during the file review were investigated. The section below lists the issues found during the 12/16/08 inspection.

- 1.) The splash pad was constructed below the filtration bed. The approved design shows the splash pad was to be installed above the filtration bed.
- 2.) A 4"X4" concrete curb with two inch weep holes was to be constructed around the splash pad. A concrete curb was identified, but the weep holes were not observed. The size of the identified curb could not be determined.
- 3.) Two feet of six to eight inch rock rubble was to surround the splash pad. No rubble was observed. Instead rocks had been stack atop the above mentioned curb. The stacked rock was not part of the approved splash pad design.
- 4.) The approved plan called for baffle blocks to be installed within the splash pad. None were observed.
- 5.) The rock rubble around the overflow structure was found to be overgrown with grass; staff questions the effectiveness of the rock rubble.
- 6.) The filtration basin doesn't appear to be constructed of the right filter material. Instead of the washed concrete sand called for by the Technical Guidance Manual, staff found the filter material to have a very high concentration of fine sediment particles.
- 7.) The heavy amount of sediment and plant debris that has accumulated within the splash pad causes the inspector to believe that basin maintenance has not occurred at the facility in some time.
- 8.) No sediment depth marker was observed during the 12/16/08 inspection.

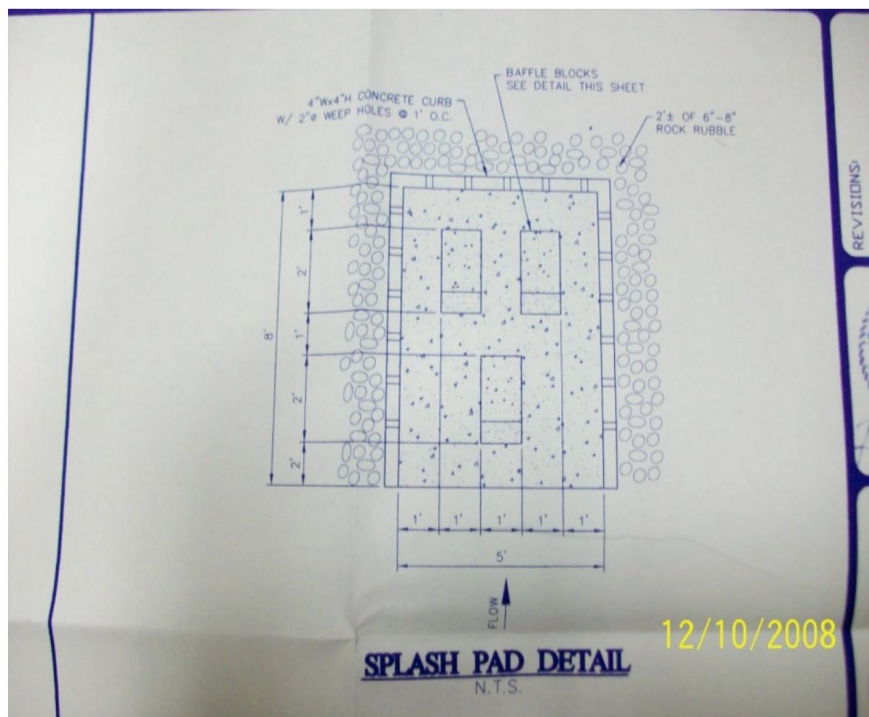
Report Conclusion:

The EAA has submitted this report to the TCEQ in the hopes that the TCEQ will help bring the **ANONYMOUS** facility into compliance with the approved plan and other state requirements. Please see the following images to aid you with your inspection. Please use the information provided in this report to aid you in completing the inspection process.

If you have any questions regarding he comments presented above, please contact Mr. Ben Urbanczyk, Environmental Coordinator, at (210) 477-8516.



Both of these images were taken during the 12/10/08 TCEQ file review. The photo above shows a side view of the splash pad.



Here you can see a detailed view of the splash pad.

***Please compare these images below to the approved design schematics seen on the previous page.



The plan called for two feet of 6” to 8” rock rubble was to surround the splash pad. No rubble was observed. Instead rocks had been stack atop the above mentioned curb. Baffle block were to be installed within the splash pad, none were observed.



The splash pad was constructed below the filtration bed. A 4”X4” concrete curb with two inch weep holes was to be constructed around the splash pad. A concrete curb was identified, but the weep holes were not observed.



The filter media appears to have a high concentration of fine particles, instead of the washed concrete sand required in the Technical Guidance Manual.





The approved plan called for a chain link fence to be constructed at the top of the basin. Instead CEC set a letter informing the TCEQ that the contractor installed the fence at the top of the concrete to facilitate installation and allow for landscaping maintenance operation to take place outside of the fence.



The letter also informed the TCEQ that the contractor extended the concrete liner up the side slope to a point $\frac{1}{2}$ to 1 foot below the top of the slope. The area seen highlighted above is greater than 1 foot, why does the concrete not continue to a point $\frac{1}{2}$ to one foot below the top of the slope?

EAA staff would like to know where the top of the basin is located. If the top of the basin is $\frac{1}{2}$ to 1 foot below the top of the slope then it appears that the fence post, decorative tree and bushes are within the basin. If the tree, bushes, and fence post are within the basin, did the installation of the fence post and/or have the plants roots penetrated the one foot clay liner and geotextile fabric that was installed below the sod?