

Edwards Aquifer

Protection Plan

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Presented by the Greater Edwards Aquifer Alliance

Endorsed by:

Alamo Sierra Club

Austin Sierra Club

San Marcos River Foundation

Save Barton Creek Association

Save Our Springs Alliance

Smart Growth San Antonio

Travis County Green Party

Texas Public Interest Research Group

Wimberley Valley Watershed Association

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1. THE EDWARDS AQUIFER DECLARATION

The Edwards Aquifer Ecosystem of Central Texas is one of our most valuable, irreplaceable and endangered public treasures. It is our right and duty to preserve and protect the Aquifer, its contributing Hill Country watersheds, its great springs, and its native biodiversity for the benefit of all residents and all future generations. As individuals and community-based organizations, we invite everyone who shares the following principles to preserve the Edwards Aquifer to join with us:

1. Water is necessary to life. It must be conserved, reclaimed and protected for all future generations and its natural patterns respected;
2. Water is a fundamental human right and a public trust to be guarded by all levels of government.
3. The water in aquifers, rivers and lakes should not be privatized nor treated as a mere commodity to be sold or traded for commercial purpose.
4. Local communities must be respected as equal partners with governments in the protection and regulation of water.¹

2. SETTING

Hundreds of millions of years ago, limestone deposits formed on the landscape of Central Texas. Geological forces along the Balcones Escarpment uplifted some of this rock, creating the Edwards Aquifer and its Great Springs. For thousands of years these springs have flowed forth pure and unobstructed. During the entire period of human activity in Central Texas, these large Edwards Aquifer springs have been a community focus. In the most recent 200 years, the Aquifer and its Great Springs have dictated the location and provided the essential life blood for communities along the Balcones Escarpment, including Salado, Austin, San Marcos, New Braunfels, San Antonio, Brackettville, and Del Rio.

Today the Edwards Aquifer is the sole source of drinking water for more than 1.5 million residents and more than two dozen communities. The Aquifer, its contributing watersheds, and its clean and abundant flows are essential to the economic activity that sustains our communities. The Aquifer and its contributing watersheds are also home for more than fifty unique species of plants and animals. Many of these species are threatened with extinction and new species continue to be discovered.

The faulted and karstic limestone geology of the Edwards Aquifer Ecosystem makes it particularly vulnerable to pollution². Excessive pumping of the Southern

¹ Inspired by the people of Cochabamba, Bolivia, who defeated a bid by Bechtel Corporation to privatize their water supply.

² The Texas Commission for Environmental Quality has identified the Barton Springs segment of the Edwards Aquifer as the major aquifer in Texas most vulnerable to pollution.

Edwards segment has severely reduced spring flows; San Antonio and San Pedro Springs are frequently dry. Contamination from urban runoff threatens the San Antonio, Barton Springs, and northern segments of the Edwards Aquifer.

Despite immeasurable natural, spiritual, economic, aesthetic and recreational values and benefits, human development now threatens the basic integrity of the Edwards Aquifer Ecosystem. Without the decisive action recommended herein, population growth, expanding water demands, and suburban sprawl will irreversibly pollute and deplete this uniquely valuable and irreplaceable water source.

3. VISION

In our vision of the future, currently rural Hill Country watersheds of the Edwards Aquifer remain rural. The flows of the Aquifer and its contributing streams are managed to sustain spring flows, native wildlife, and downstream water needs, including the freshwater needs of coastal bay and estuary ecosystems. Children safely swim and play in all rivers and creeks that feed the aquifer.

Economic growth, supporting a living wage for all, is based on sustainable development. Urban growth is directed to preferred growth areas downstream of the Edwards Aquifer recharge zone. The rate, location, and design of development are managed to minimize water consumption and sprawl, protect air and water quality, provide affordable housing, prevent visual blight, and minimize dependence on the automobile. In our vision of the future, the Edwards Aquifer Hill Country watersheds provide water, recreational opportunities, and a scenic setting for downstream communities from Salado to San Antonio forever.

Since the Hill Country watersheds that feed the Aquifer are increasingly desirable areas for development—largely without restriction or regulation—we must take decisive action now to assure adequate protection through scientifically sound and fair regulation. We must steer development and supporting infrastructure to downstream areas, and acquire park and watershed preserves.

4. POSITIONS

A. Edwards Aquifer Watershed Parkland and Preserve System

Even without additional development, there is a serious deficit in parkland, preserves, and other open space in the Texas Hill country. A recent Texas Parks and Wildlife Department study³ recommended acquiring 1.4 million acres of new state parkland and 500,000 acres of local parkland.

To protect the Edwards Aquifer and promote a good quality of life for those who live on and around the aquifer, state and local governments should develop and implement plans to preserve 50% of the Edwards Aquifer Recharge Zone and 25% of the Contributing Zone as open space or no more than rural development. Priority should be given to acquiring lands targeted for near-term development on the recharge zone and within fifteen miles upstream of the recharge zone. Governments must use powers of eminent domain to acquire critical preserve areas.

At least 250,000 acres of the most threatened and critical Edwards Aquifer watershed lands must be immediately preserved through conservation easements, purchase of development rights, and land acquisition for a system of public parks and watershed preserves. To acquire and protect such acreage will require at least \$500 million. Government entities must pursue available funding for these purchases through the Safe Drinking Water Act, the Farm Bill, the Endangered Species Act and the Land and Water Conservation Fund.

Five hundred million dollars is a significant amount of money, but it is far less than the \$6 billion in parks acquisition recently approved by Florida voters and the \$4.7 billion recently approved by California voters. It is also far less than a single year of TxDOT highway expenditures in Austin and San Antonio and about one-half of the corporate personal property tax revenue that remains uncollected and unpaid in Texas each year.

No amount of money will clean up the Edwards Aquifer Ecosystem if it becomes contaminated through lack of foresight and action, chronic pollution from urban sprawl, or catastrophic spills of toxic materials.

B. Regional Plan

Residents need a Regional Plan for the Edwards Aquifer to limit development in the recharge and contributing zones to a level that will ensure the availability of water for current residents, springs and downstream users even in time of drought. The plan must preserve and restore the Edwards Aquifer and the rivers, creeks and streams that feed it. The residents' Regional Plan must be based on all available scientific information regarding the cumulative effects of development. It must be developed from a grass-roots process that empowers us to determine the future of our community and region.

In developing and implementing a residents' Regional Plan, we encourage and call on the participation of community organizations, academics, professional associations, and

³ *Texas Parks and Wildlife for the 21st Century*, David J. Schmidly, Robert J. Baker, and Nick C. Parker, 2001

private sector leaders who value the long term viability of the Edwards Aquifer region. We also call on real estate investors and land developers to respect the desires of Edwards Aquifer region communities who have declared that suburban development is inappropriate for the aquifer recharge and contributing zones; and to act now to direct private development dollars to preferred growth areas downstream.

Implementing a Regional Plan will require coordination among the many governmental agencies with regulatory power in the Edwards Aquifer region. Because much of the undeveloped land in the aquifer region lies beyond municipal jurisdictions, counties need zoning and subdivision powers and authority to implement ordinances to protect water quality and flow.

Moratorium on High Density Development in Rural Areas. Until a residents' regional plan that adequately protects the Edwards Aquifer Ecosystem is developed and implemented with all necessary legislation, city and county governments should limit interim development within rural areas of the recharge and contributing zones to no more than one house per 20 acres. This density level will protect the rural character of the landscape and water quality.

Moratorium on Infrastructure Expansion. Until the Regional Plan is in place and enabled with all necessary legislation, no public money should be spent to construct new or expand existing roads or utility infrastructure in the aquifer region.

C. Not on Our Aquifer—Not with Our Money

Billions of taxpayer dollars have financed the extension and expansion of roads and utilities over the Edwards Aquifer, enabling sprawling development that is degrading this uniquely precious resource. To halt this destructive use of public funds, no public expenditures or subsidies of any kind (including grants, fee waivers, loans, loan guarantees, sales tax refunds, utility fee or tax abatements) should be provided or extended to support further development in the Edwards Aquifer watersheds.

No special taxing development districts or municipal utility districts to finance or otherwise facilitate road or utility infrastructure construction or expansion in the recharge and contributing zones of the aquifer should be allowed or approved by any county, municipality, TCEQ or the Texas State Legislature .

Road funds matched with land acquisition funds. Any city, county, road district, or State of Texas money expended for highway and road construction and maintenance in the recharge and contributing zones should be matched by an equal amount expended for the acquisition and maintenance of parks and preserves over the aquifer.

D. Democracy

Conservation districts should be established over the entire aquifer to regulate groundwater consumption and development activities to promote aquifer restoration. All conservation districts should have authority within their boundaries to:

- apportion and limit the amount of water that is pumped to sustainable levels;
- impose water conservation regulations;
- educate;

- regulate land use and activities, including but not limited to hazardous materials and impervious cover; and
- impose taxes and fees.

Conservation districts should *not* be empowered to facilitate construction of infrastructure and/or development.

Local Government Empowerment. All counties and water districts should have authority to regulate impervious cover and to limit and prevent activities and land uses detrimental to the Aquifer. When there are overlapping jurisdictions, the strictest requirements must apply.

Transparency in the development process. Development regulations should incorporate modern procedural changes to ensure transparency and public involvement in all stages of the application and permitting process. Cities and other regulatory authorities should adopt ordinances incorporating the provisions found in Exhibit A.

Grandfathering: Chapter 245. Chapter 245 of the Texas Local Government Code is being used by developers and cities to allow development construction in violation of current ordinances to protect water quality and the Edwards Aquifer. This application of the code has been interpreted to protect projects based on preliminary plans sometimes more than 20 years old. It is an unconstitutional abdication of government power, an unconstitutional delegation of legislative authority to private persons, and a violation of the right to clean water found in Article XVI, § 59 of the Texas Constitution. Even though Chapter 245 expressly exempts from its operation regulations intended to protect against injury to persons or imminent destruction to property, as do water protection ordinances, municipalities and other local governments are using this legislation to allow development that pollutes and degrades the Aquifer. The Texas Legislature should either eliminate or amend Chapter 245 to expressly exempt measures to protect water quality and quantity. We oppose any interpretation of Chapter 245 that exempts development from current water quality regulations, and we call on the Legislature to clarify to the people of Texas its intent to protect water and the Edwards Aquifer.

E. Water Quality

Any development in the Edwards Aquifer Recharge or Contributing Zones can adversely affect water quality in the aquifer. Specific recommendations to protect water quality are found in Exhibit B and below. Exhibit B does not reflect a recommended level of development and in no way is meant to suggest that increased levels of development are encouraged. Rather, should development over the aquifer proceed, the recommendations in Exhibit B must be implemented to minimize as much as possible the degradation of water quality that accompanies development.

Recommendations in Exhibit B include impervious cover limits, use restrictions, stream setbacks, flow volume limits, critical environmental feature protection, landscape chemical restrictions, construction phase controls, extended detention, wastewater line and pump station construction and maintenance standards, on-site sewage facility standards, effluent irrigation standards, water quality controls, fiscal surety, variance procedures, and operation and maintenance permits.

These recommendations are minimum requirements for long-term protection of the Edwards Aquifer. Additional measures may be needed to address particularly sensitive watersheds or circumstances, or to prevent drinking water or stream standards violations. These regulations alone, without large-scale park, preserve, easement, and open space acquisition will not ensure water protection and survival of the Edwards Aquifer.

Hazardous Substances & Groundwater Contamination. Chlorinated solvents,⁴ toxic metals,⁵ and pesticides⁶ are regularly detected in the Edwards Aquifer; at times in concentrations that threaten human health and sensitive plants and animals. Sources of many of these contaminants are unknown; but these man-made, toxic and carcinogenic chemicals are found in the Aquifer because we have failed to protect it from pollution. They result from storm runoff, leaks, spills, and illegal dumping. Hazardous substances will continue to contaminate the aquifer as long as they continue to be used over sensitive portions of the aquifer. Thus, the use of hazardous materials should be restricted in the Edwards contributing and recharge zones:

- *Commercial use:* Commercial use and storage of hazardous substances on the recharge zone and other sensitive portions of the aquifer must be prohibited. Exceptions should be made only where these substances are necessary to protect public health and safety, and only with robust precautions to protect drinking water, streams, and the aquifer.
- *Household use:* Outdoor use of hazardous substances must be prohibited. This prohibition would include man-made pesticides, fertilizers, and solvents like driveway cleaners. The prohibition would not include materials like paint and roofing materials normally required to maintain a house.

F. Use Restrictions

To prevent water pollution and unnecessary depletion of aquifer water, the following activities should be prohibited in the Edwards recharge and contributing zones:

- Mining;
- Oil pipelines;
- Racetracks for motor vehicles;
- Commercial pesticide manufacturing and storage;
- Commercial fuel storage;
- Cement plants;
- Commercial feedlots;

⁴ Trichloroethylene; tetrachloroethylene; 1,2 dichloroethylene; 1,1,2,2 tetrachloroethane; vinyl chloride; dichlorobenzene; dichloroethane; chlorobenzene; trichloroethane; 1,1,1 trichloroethane; 1,1,2 trichloroethane; methylene chloride; dichloromethane.

⁵ Lead, mercury, arsenic.

⁶ Atrazine, diazinon.

- Landfills; and
- Auto salvage yards.

The following activities should only be permitted for pre-existing, currently-operating sites:

- Gas stations;
- Golf courses; and
- Water-based amusement parks.

G. Water Quantity

Water in the Edwards region is limited. The Aquifer is replenished by only a small fraction of rainfall runoff. These limits to aquifer recharge require responsible stewardship of Aquifer water to provide for human health, agricultural and economic uses and to maintain the natural environment which depends upon stream and aquifer spring flows. Prudent water management demands a cautious approach emphasizing water conservation, shared shortage rules, development limitations, and water rights transfers from wasteful uses to more efficient and environmentally beneficial uses. Water use must be balanced with long-term sustainable yields to protect natural spring flows in times of drought.

Sustainable yield models should be developed to determine how much Aquifer recharge is needed to support aquatic ecosystems, spring flows, downstream flows, bay and estuary fishing and ecology, and current users of aquifer water.

Water Conservation. Municipalities, river authorities, and groundwater districts should enact aggressive efficiency measures to reduce average water use to no more than 125 gallons per capita daily (gpcd)⁷. Municipal utilities should be required to maintain water loss rates on their systems to below 10% and given incentives to reduce system losses to below 5%. Achieving the 125 gpcd goal requires coordination between utilities, the Edwards Aquifer Authority and other oversight bodies, as well as guidance through Best Management Practices (BMP) and technical assistance in implementing water use efficiency program.

Rainwater collection systems should be required on new construction with a minimum storage capacity of the first inch of rain over all roof surfaces.

Conservation pricing should be implemented by all ground and surface water suppliers in the Edwards Aquifer so that essential water use is affordable and excessive and wasteful consumption is progressively more expensive.

Agriculture. Pivot and other low-energy precision application methods should become standard agricultural irrigation practice. Agricultural water transmission should be

⁷ Measured as all water uses divided by total population. The 125 gpcd standard is achievable based upon the experience of Tucson, Arizona (a desert community with much lower annual rainfall, and similar daily high temperatures to the Edwards region), and as indicated in *Beneficial Use Without Waste: An Analytical Review of Historical Use by Municipal Applicants of the Edward Aquifer Authority*, Brown et al, EAA, 2000.

improved by lining irrigation canals or replacing canals with closed pipes. Funding for agricultural water conservation should be provided through low-interest loan programs or by direct purchase by municipal users. Municipalities on the Edwards Aquifer can provide funding for agricultural water conservation in exchange for the direct benefit of less water waste of the overall resource. Water saved by agricultural water conservation can either be directly transferred to municipal use, or left in the aquifer to help provide a boost for overall water levels during dry years. “Dry-year options” or the purchase of agricultural water rights during the pre-irrigation season when the aquifer levels are below historical mean should remain a vibrant management tool in the region.

Interbasin transfers of water should be prohibited. Development should occur only to the extent it can be supported by the natural water ecology of the region.

River authorities or other entities should not extend water lines to rural or low density areas within the Aquifer recharge or contributing zones. These water lines encourage more development than can be supported by existing water supplies, and promote increases in impervious cover and development density, as well as unsustainable water use.

EXHIBIT A:
REGULATIONS TO PROMOTE TRANSPARENCY
IN THE DEVELOPMENT PROCESS

Development regulations should incorporate modern procedural changes to ensure transparency and public involvement in all stages of the zoning change, subdivision, or any other application and permitting process for new nonresidential construction or new residential construction involving more than 10,000 total square feet. These changes should be as follows:

1. Before filing any permit application, a developer must send a notice to owners of land within 1000 feet of the boundaries of the area subject to the application; and must also send notice to any registered neighborhood association having jurisdiction over the area subject to the application or any areas within 1000 feet of the boundaries of the area subject to the application. In this notice the developer should briefly describe the project and offer to meet with interested parties. The developer must meet with interested parties before submitting any project application.
2. Simultaneously with submitting an application, the developer must place and maintain a sign visible to passers-by at least 4 foot by 6 foot in dimension within four feet of a street adjacent to the property to be developed. On the sign the developer must describe in layman's terms the application sought, the project to be developed and include any drawings of the project that have been submitted to the City or regulatory authority. On the sign additionally shall appear prompt notice of any hearings involving the permit and government phone numbers, web site addresses, and listserv specifications where additional information can be obtained.
3. Simultaneously with the submission of the application, the City or regulatory body should create a listserv for each project providing for notification to interested persons of any events relating to the application.
4. The entire application, review and communication process should be public and available online in real time on a web page. All applications should be submitted online, all correspondence should be online and records of phone calls and calendars for all officials and regulatory staff dealing with the development process should be kept online and accessible to the public.
5. All meetings between city or regulatory staff and representatives of the developer should be public with prior notice through the listserv and web site given.
6. Staff should not make any recommendations to City Council or commissions or boards but should provide technical assistance and opinions as to whether the applicant has complied with the law.

7. All components of all applications should be submitted at least 5 days before the matter is to be considered by city council or a board or commission and no supplementary or amendatory changes should be allowed to be made to the submissions within 5 days before consideration by the decision-making or deliberative body.

If the city or other regulator or developer is found to have violated any of these provisions, the permit is void and invalid, all development of the affected lots must cease and no certificate of occupancy issued until the defective procedure is revisited and the application process performed in a lawful manner. Violations additionally should be a class A misdemeanor prosecutable in municipal court and any other court of competent jurisdiction. Any resident should be granted qui tam authority to prosecute violations and obtain injunctive relief to enforce these provisions.

EXHIBIT B: RECOMMENDED MINIMUM WATER QUALITY REGULATIONS

Impervious Cover Limits

Impervious cover limits are essential to preserve the natural quality, quantity, and timing of flow into streams and springs. We recommend an impervious cover limit of 10% of net site area in the recharge zone and 15% of net site area in the contributing zone. Net site area should be defined as all land with slopes less than 15% outside of stream or Critical Environmental Feature (CEF) setbacks, golf courses, managed turf, and effluent-irrigated land. All building and transportation features except pedestrian walkways and bicycle trails shall be considered impervious.

Stream Setbacks

Natural soil, vegetation, and land forms adjacent to streams store flood water, remove water pollutants, provide baseflow from adjacent shallow soil seepage, keep water cooler by shading, stabilize stream bank soils, and provide riparian habitat. Development close to streams therefore has a larger negative impact on water quality and stream flow than development in upland areas. Storm runoff from adjacent development is often channeled directly into the stream without treatment. Destroying natural riparian areas, including tree removal, accelerates erosion, eliminates flood overflow areas, eliminates natural vegetative pollutant removal, and eliminates natural shading.

The width of the stream setback can depend on the sensitivity of the creek, its importance to spring flows or drinking water supplies, the width of the flood plain, and the size of the contributing watershed area. We recommend these minimum setbacks from streams based on the size of the contributing drainage area:

- 5-100 acre drainage area – 100 foot setback
- <100-500 acre drainage area – 200 foot setback
- <500 acres – 400 foot setback

Additionally, the setback shall never be less than the 100-year flood plain.

Storm Runoff Volume Limits

Storm runoff volumes after development are much larger than from natural sites, depending on the amount of constructed impervious area. This storm runoff volume increase represents a decrease in soil water infiltration: water available to plants, trees, and to sustain baseflow and aquifer recharge between rain events. The storm runoff volume increase also contributes to downstream erosion and flooding.

We recommend no increase in storm runoff volume more than 10% above that which is released from a site prior to proposed development.

Critical Environmental Feature Protection

Critical environmental features include karst solution openings, faults, fractures, springs, bluffs, and wetlands. Their identification and protection, usually by setbacks, reduces the

risk of pollutants moving into the underlying aquifer and preserves natural water purification by surrounding vegetation and soils and aquifer recharge. Our ability to protect these features is limited by our ability to identify all of the features prior to development, and by the expense or unfeasibility of redesign if features are discovered during construction.

We recommend a 300-foot setback from any feature with the potential for transmitting flow directly to the aquifer, a 150-foot setback on the upstream side and 50-foot setback on the downstream side of any feature without the potential for transmitting flow to the aquifer.

Further, we recommend a ban on plugging of critical environmental features.

Landscape Chemicals

Many of the pesticides, herbicides, and fungicides applied to lawns, landscaped areas, and golf courses are toxic or carcinogenic in very small quantities. Excess nutrients can impair fertility of native plants and wildlife and disrupt ecosystems. They can be persistent and mobile through soils, rainfall runoff, and groundwater flow.

We recommend a prohibition on the application of any nitrogen fertilizers in a form, during any time, or at a rate that might result in nitrogen migration to surface or groundwater; prohibition on the application of herbicides and pesticides except those shown to represent no risks of migration and/or water contamination (except during a public health crisis); and prohibition on the use of non-native plants for landscaping in new developments.

Construction Phase Controls

Approximately 20% of all pollution from urban development is generated during construction. Construction phase controls to limit sediment migration include silt fences, rock berms, and sediment basins, as well as requirements for construction sequencing that puts these protections in place before clearing vegetation and moving dirt.

These regulations are usually not controversial. The largest problem is implementation, enforcement and maintenance. Without careful oversight by committed staff, these controls are not constructed as designed, are breached to make construction more convenient, and are not maintained.

We recommend implementation, strict enforcement, and maintenance of construction phase controls at least as strict as the City of Austin and TCEQ Edwards Rules.

Extended Detention

An estimated 80% of suspended sediment in streams is derived from bank erosion. Development contributes to this load by increasing storm runoff peak flows and/or runoff volumes. Extended detention regulations require storm runoff to be detained on a site and released slowly back to the stream channel over longer time periods: 24 to 48 hours. Extended detention regulations require much larger storage volumes than those required for no increase in the pre-developments peak flow rate.

We recommend a requirement to detain a one year, three hour rain event for at least 24 hours.

Wastewater Line and Pump Station Construction and Maintenance Standards

Wastewater lines leak. They contribute pollution, including nutrients, pathogens, and toxic chemicals, to the Edwards Aquifer. They are widespread and underground. Leaks are difficult to identify, locate or repair.

We recommend a requirement for zero-discharge standards for new wastewater lines and regular testing and maintenance of all lines at least every 5 years to repair leaks.

On-Site Sewage Facilities

On-site sewage facilities include septic systems to serve individual homes and small businesses, as well as cluster systems to serve flows in excess of 5,000 gallons per day. Major issues associated with on-site sewage facility regulations include minimum lot sizes, minimum separation distances for wells, streams, or critical environmental features, minimum depth to groundwater or bedrock, soil specifications, treatment requirements, and on-going inspection and maintenance requirements.

We recommend nitrogen reduction in all treated wastewater to no more than 2.0 mg/l total nitrogen, or 5.0 mg/l total nitrogen where discharge is to a vegetative system with demonstrated nutrient uptake capacity for the effluent loads applied, as well as an annual operating permit required to demonstrate maintenance.

Effluent Irrigation Standards

Effluent irrigation standards should include minimum creek setbacks, requiring water and nutrient (particularly nitrogen) balances, and requiring adequate storage capacity to hold wastewater effluent during high rainfall periods when soils are saturated.

We recommend nitrogen reduction in all treated wastewater to no more than 2.0 mg/l total nitrogen, or 5.0 mg/l total nitrogen where discharge is to a vegetative system with demonstrated nutrient uptake capacity for the effluent loads applied, and storage required to prevent nitrogen leaching from the disposal area for rainfall conditions during the entire period of record based on daily nitrogen balance analysis.

Water Quality Controls

Water quality control standards typically establish the design basis for engineered systems to remove storm runoff pollutants.

We recommend water quality controls designed to remove 100% of the increase in average annual pollutant load for any pollutant based on a demonstration for at least these constituents: total suspended solids, chemical oxygen demand, nitrogen, phosphorous, and lead. A demonstration must be made for any other constituent determined to be limiting on the design. We recommend a requirement for an annual operating permit to ensure proper maintenance and repair.

Fiscal Surety

We recommend fiscal surety or construction bonding in the amount of 100% of the water quality control construction and installation costs in escrow or as a letter of credit. The letter must be irrevocable for two years from the final plat approval date. Ten percent of the construction costs are maintained for two years after acceptance of the completed construction as a maintenance security. If the developer fails to construct the approved

plans or comply with conditions, the agency can use the fiscal surety to construct permanent controls as designed, or maintain construction-phase controls.

Variance Procedures

All regulations are written with some method to allow adjustment for individual circumstances. Water quality regulations should require a demonstration of one or more of the following as a basis for granting a variance:

- Implementation of the ordinance without variance results in a violation of state or federal law;
- Implementation of the ordinance would deprive the property owner of all reasonable use of their property; and/or
- Granting the requested variance will result in water quality equal to or better than what would result from strict application of the regulations.

Operation and Maintenance Permits

Ongoing permits must be implemented to provide a mechanism for ensuring adequate long-term maintenance for water quality controls, on-site sewage facilities, and recreational turf facilities.