FINAL REPORT

BARTON SPRINGS ZONE RETROFIT MASTER PLAN STUDY

VOL. II
ASSESSMENT OF WATER QUALITY

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3.2 Septic Systems

This section provides information on potential pollutant loads from septic systems in the Barton Springs Zone. The purpose of estimating potential loads is to determine whether septic systems are potentially a significant contributor to observed nitrogen concentrations in the Barton Springs/Edwards Aquifer, and to estimate the relative contributions of septic systems and urban stormwater runoff.

Septic systems treat wastewater effluent in areas where centralized wastewater service is not available. They are widely used to serve rural households. They have also been used in the Barton Springs Zone to serve suburban residential areas where wastewater lines to transmit sewage to Austin's centralized treatment system were not available. The Barton Springs Zone contains an estimated 4806 septic systems serving households in rural areas, residential subdivisions and some commercial and multifamily developments.

Homes built in the last decade typically use alternative on-site disposal systems with low-pressure dosing or evapotranspiration disposal rather than conventional septic systems. Because of liners and/or enhanced evapotranspiration, pollutant loads from these alternative systems to deep percolation should be significantly less than those from older designs. The majority of systems in the Barton Springs Zone, however, are over ten years old. The estimated number and approximate ages of systems within the Barton Springs Zone are presented in Table 3-13.

Septic System Processes and Pollutant Loads

Septic tanks potentially generate several types of pollutant loads: biochemical oxygen demand, nutrients, toxic organic chemicals, microorganisms and metals. Table 3-14 presents ranges for common constituents in untreated domestic wastewater, and mass loading rates. The mass and concentration of constituents in the septic tank effluent will be somewhat different than these values due to treatment within the septic tank.

Information on the migration of metals in septic system effluent is generally not available. Based on their fate and transport in soil and subsurface environments, however, they are not generally regarded as significant contaminants to groundwater below septic systems (Canter

A septic systems design life may be as short as 10 to 15 years. It has been estimated that only 40% to 50% of existing systems, nationwide, currently function properly (Canter and Knox, 1985). Failures may be due to design, to construction, or to maintenance. Where failure eliminates effluent treatment in the soil system, normally well-treated constituents like biochemical oxygen demand, phosphorus, and bacteria may contribute to either the surface or deep percolation pollutant load.

The Austin Health and Human Services/Travis County Health Department conducted a survey of septic systems in the Barton Creek watershed from 12 December 1991 to 7 February 1992. This inspection period occurred at the end of a year with record high rainfall. Approximately 1/3 of the inspections, however, were completed prior to the heavy December rains. All 308 known systems within the Barton Creek watershed in Oak Hill were surveyed. Each site was checked for the following: overflowing absorption field, overflowing septic tank, broken or damaged septic tank, heavy growth of vegetation, odors, and verbal accounts of sewage backup by occupants. No attempt was made to identify leaks contributing to deep percolation.

Of 308 systems surveyed, 22 (7.14%) were identified as failing. The largest percentages of failures were for multi-family residential (28.6%) and nonresidential high water use (44.4%). In addition to those which were identified as failing, 53 (17.2%) of the tanks are known to be constructed of metal, concrete block, or domed fiberglass. These inferior construction materials suggest a high likelihood that the tanks are leaking directly into the subsurface. For 83 of the tanks (27%), construction materials are unknown.

Parten, 1991, surveyed residential septic system owners in Rollingwood in 1987. Based on 156 responses, 22% of the septic tanks were undersized and 80% of the absorption fields were undersized. Fiberglass and metal accounted for 21% of the tank construction material, and 28% of the tanks were constructed of unknown materials.

Total Generated Septic Tank Nitrogen Load

The generated septic system nitrogen load in the Barton Springs Zone is a function of the number of systems; the number of users associated with each system, and the nitrogen load generated by each person. The number of septic tank systems in the Barton Springs Zone was estimated for this study using Austin Water and Wastewater Utility customer records; City of Sunset Valley records; the Barton Creek Community Master Plan; a survey of on-site sewage facilities by the Austin/Travis County Health Department; USGS topographic

slopes), when not accompanied by efforts to revegetate and protect the ground from erosion, and/or when not followed up by practices to prevent the juniper re-establishment.

(3) Resultant Water Quality/Water Quantity Problems

As shown in Figure 3-7, the above processes collectively lower water quality from a number of standpoints. During storm events, greater upland erosion and soil loss promote increased sedimentation and turbidity in creek waters. Larger, more frequent runoff events cause flooding and increase channel scour, contributing to sedimentation and harming riparian zones. Since so much precipitation is lost to storm runoff, interception, and/or juniper-enhanced evapotranspiration, infiltration necessary for subsurface flows and groundwater recharge is minimized. As a result, spring and creek baseflows are reduced during non-storm periods, subtracting from the quantity of clean baseflow available for aquifer recharge.

Grazing damage to riparian areas is especially noteworthy given that these areas serve as a buffer for stream environmental health.[2] Unmanaged grazing of these areas exacerbates problems with sediment, turbidity, nutrients, bacteria, species diversity, and water temperature. Unlike upland areas of rangelands, overgrazed riparian areas can contribute significant amounts of nutrients or bacteria to waterways. These nutrients can cause locally undesirable algal growth and dissolved oxygen depletion. Further, due to the great number of animal and plant species which depend upon riparian zones, degradation of these areas also means the loss in numbers and diversity of wildlife and the general health of the ecosystem.

Condition of Rangelands in the BSZ

No known analysis has been undertaken to catalogue rangeland conditions specifically for the BSZ. However, the Soil Conservation Service (SCS) performs natural resource audits every five years in its Natural Resource Inventory (NRI) on a much larger geographic scale. The BSZ is entirely contained within the larger hydrologic unit of "Austin-Lake Travis" (WRC No. 12090205). The NRI groups "rangeland condition" into the four traditional

[2]Tiedemann and Quigley (1993) warn: "Adverse impacts of grazing animals on soils, vegetation, and water quality in riparian areas is one of the most serious and intractable land management problems facing us today."