00-1135

Northern Hays and Southwestern Travis Counties

WATER SUPPLY SYSTEM PROJECT ENVIRONMENTAL IMPACT STUDY

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Prepared for:

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P.O. Box 220
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each gauging station. Best fit trend lines were applied to the plotted data using regression techniques. The equations of these trend lines were then used to apply concentration values to average daily flow data to calculate average daily loads in kg/day. This was summed for each day over the four year period and then divided by the number of years to determine the average annual load over the most recent time period. The methods require strong correlations between streamflow and pollutant concentrations (see Figures 3-11, 3-12, and Attachment 4 of Appendix D) and daily discharge values over a long period of time. The 1996 through 1999 water years were used to represent the most recent conditions given the current land uses in the study area. Table 3-15 describes the results.

Table 3-15. Total Annual Pollutant Loads Based on Direct Calculations of Flow and Constituent Concentration Values from Established Monitoring Sites in the Study Area.

GAUGING STATION	TOTAL SUSPENDED SEDIMENT [a]	TOTAL PHOSPHORUS [a]	TOTAL NITROGEN [a]	FECAL COLIFORM [b]
Barton Creek at Lost Creek	13,823,966	8,484	80,586	3,245
Onion Creek near Driftwood	13,479,909	6,230	No Data	4,847

[a] kilograms per year.
[b] millions of colonies per year.

3.4.5 Quantitative Analysis: Year 2000 Water Quality Conditions

In order to make it possible to quantitatively compare baseline water quality conditions with projections of water quality conditions under the various alternatives, an approach was developed that uses existing and projected land-use characteristics to calculate existing and projected pollutant loads. For a detailed description of the methods used, please see Appendix D.

3.4.5.1 Sub-basin Delineation

The study area was divided into a total of 47 sub-basins for analysis (see Figure 3-10). These sub-basins were delineated to define distinct portions of the major streams within the study area as well as tributary drainage areas, and they were further subdivided to distinguish between areas within the Austin ETJ and areas outside the Austin ETJ. The purpose of distinguishing areas within the Austin ETJ is to account for pollution reduction associated with the City of Austin's SOS Ordinance and other storm water runoff control programs, which are believed to be more protective of water quality than the TNRCC's Edwards Rule applied without the SOS Ordinance to areas outside the Austin ETJ (see discussion of water quality protection measures and effective storm water runoff control programs in Appendix E). Pollutant load calculations were performed for each individual sub-basin and summed to determine total loads for each stream at the point where it exits the recharge zone. Summary values are reported in Table 3-16 for the

Table 3-16. Characteristics of Major Streams within the Study Area.

STREAM NAME	DRAINAGE AREA (SQUARE MILES)	YEAR 2000 IMPERVIOUS COVER LEVEL (PERCENT)
Barton Creek	119.78	6
Williamson Creek	16.19	16
Slaughter Creek	20.35	7
Bear Creek	24.25	5
Little Bear Creek	20.08	3
Onion Creek	165.46	3
Sunset Valley Creek	1.12	29
Brodie Creek	1.62	12

following streams: Barton Creek, Williamson Creek, Slaughter Creek, Bear Creek, Little Bear Creek, Onion Creek, Sunset Valley Creek, and Brodie Creek.

The drainage areas and impervious cover levels for these streams are listed in Table 3-16. Barton, Williamson, Slaughter, Bear, Little Bear, and Onion Creeks are the major drainages that cross the recharge zone boundary within the study area. Sunset Valley Creek is a tributary to Williamson Creek, but it enters Williamson Creek downstream of the recharge zone and the study area boundary. Similarly, Brodie Creek is a tributary to Slaughter Creek, but it enters Slaughter Creek downstream of the recharge zone and the study area boundary. Therefore, Sunset Valley and Brodie Creeks were retained as separate entities for analysis rather than being combined with the larger streams.

3.4.5.2 Geographic Information System Analysis

A geographic information system analysis was performed that intersected the coverages for land-use type (year 2000 base map), City of Austin water regulation zone (Barton Spring Zone [BSZ], urban, etc.), hydrologic soil group (A, B, C, D), and the Austin ETJ boundary. For each sub-basin, the total land area with different combinations of characteristics (for example, the area in the "Rocky Branch-inside ETJ" sub-basin in commercial land use, BSZ zone, and C soil type) was determined. This information was then used to determine an overall impervious cover level for each sub-basin based on land-use/impervious cover relationships established by the City of Austin. Land use and hydrologic soil group data were also used to determine a composite runoff curve number (CN) for each sub-basin using values established by the SCS (NRCS 1986).

4.1.4 Effects on Surface Water

4.1.4.1 Direct Effects

The direct effects of the No Action Alternative on surface water resources in the study area would be minimal as described in the Draft Environmental Assessment Report for the Northern Hays and Southwestern Travis County Water Supply System (PBS&J Document) (PBS&J 1999), as no new action is being taken that would directly impact the surface water resource.

4.1.4.2 Indirect Effects

Indirect effects to surface water quality under the No Action Alternative were evaluated as the difference between existing conditions (year 2000 values) and projected 2025 water quality conditions under the No Action Alternative (year 2025 values). The detailed methodology for surface water projections for the No Action Alternative is presented in Appendix D. Pollutant loads, potential maximum concentrations, peak discharge, and PAH concentration values under the No Action Alternative were calculated based on information derived from the year 2025 land-use map and Vehicle Miles Traveled (VMT) projected for the No Action Alternative. These values represent the effects projected for the year 2025 under the No Action Alternative.

Overall, population is predicted to increase throughout the study area, thereby causing increased levels of impervious cover. Therefore, indirect effects under the No Action Alternative would be adverse for surface water quality primarily because of the unmitigated relationship between increasing levels of impervious cover and greater pollutant loads and constituent concentrations.

Projected impervious cover levels for the eight study streams are shown in Table 4-6. Overall, impervious cover values would increase 54 percent between existing conditions and the No Action Alternative (year 2025) with the greatest amount of change occurring in Slaughter Creek, which would have a 71 percent increase. The Sunset Valley Creek Watershed shows the least amount of change over baseline conditions (9 percent increase); however, it started with the highest levels (28.9 percent) of impervious cover in the entire study area and is projected to reach 31.6 percent impervious cover under the No Action Alternative. The Brodie Creek and Williamson Creek Watersheds are projected to become the next most developed, with 19.0 and 19.3 percent impervious cover, respectively.

Table 4-6. Projected Impervious Cover Levels under the No Action Alternative Compared with Existing Conditions.

STREAM	AVERAGE IMPERVIOUS COVER LEVEL (PERCENT)		PERCENT CHANGE
	Year 2000	No Action Alternative (Year 2025)	
Barton Creek	5.6	9.2	64
Williamson Creek	16.0	19.3	21
Slaughter Creek	7.5	12.8	71
Bear Creek	4.9	7.9	61
Little Bear Creek	3.4	5.4	59
Onion Creek	3.2	4.8	50
Sunset Valley Creek	28.9	31.6	9
Brodie Creek	12.0	19.0	58
Study Area	5.0	7.7	54

4.1.4.2.1 Pollutant Loads

Indirect effects of the No Action Alternative on pollutant loads for each stream are summarized in Table 4-7. The results show that the total pollutant load increase under the No Action Alternative is dominated by loads in Barton Creek and Onion Creek. This is to be expected, since these two watersheds represent the largest portion of the study area. Indirect effects on total study area loads, shown as percent change, are summarized for each constituent in Table 4-8. The constituents that changed the least were total nitrogen (TN) and nitrates (NO3) with an increase of 9 and 10 percent over baseline conditions, respectively. This is consistent with previous study results (COA 1997b), showing that nitrogen in surface water is not as sensitive as other constituents to increased levels of urbanization. The pesticide constituents, diazinon and prometon, increased by 41 and 36 percent, respectively, over baseline conditions. These constituents increase more than any other under the No Action Alternative, indicating that the these pesticides are the most sensitive constituents to increased levels of impervious cover. Pesticides and other organic chemical use is purely anthropogenic, and they are used in the study area mainly for agriculture, residential, commercial, and golf course land uses. Although expressed in terms of average annual loads, the increases are expected to be accompanied by a greater frequency of polluted storm water runoff events and accumulation and transport of toxic materials in stream sediments.