

Espey Consultants, Inc.

*Final Report*

**DRAINAGE UTILITY ASSESSMENT  
City of Sunset Valley**

**City of Sunset Valley**



**July 28, 2010**

Project No. 7074.06



**DRAINAGE UTILITY ASSESSMENT  
Final Report**

Prepared for:

**City of Sunset Valley**  
2 Lone Oak Trail  
Sunset Valley, TX 78745

TBPE No. F-293

By:

Espey Consultants, Inc.  
4801 Southwest Parkway, Parkway 2, Suite 150  
Austin, Texas 78735

EC Project No. 7074.06

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T (512) 326-5659  
F (512) 326-5723

[www.espeyconsultants.com](http://www.espeyconsultants.com)



*George E. Oswald*

## **Introduction**

A Drainage Utility Assessment study was conducted for the City of Sunset Valley, Texas. The study included:

- Development of customer billing rate structure recommendations,
- Development of customer billing rate/utility revenue projections, and
- Development of a multi-year enterprise fund budget model for budget planning.

The parcel specific land data set provided by the City on March 18, 2010 was used to compile information on impervious area and land area for all developed parcels within the City and the City's extraterritorial jurisdiction (ETJ). A total of 291 parcels were included in the utility rate structure evaluation. The following table and frequency histogram provides summary results. The availability of accurate parcel specific data allows for analysis that reflects the total impervious area attributed to each developed parcel within the City of Sunset Valley. Due to the direct hydrologic relationship between land parcel impervious area and stormwater runoff demand placed on the municipal drainage infrastructure system, impervious area is the recommended metric for assigning a drainage utility fee to property parcels.

## **Land Data Sources**

The following data were provided by the City to support drainage utility rate structure evaluation:

- City Parcel Impervious Area Data
- City Parcel Area Data
- City Land Parcel Boundary GIS Map
- Ortho Imagery (2009)

A CD containing the following files is included in a pocket at the end of this report:

- Microsoft Excel spreadsheet containing the extracted data subset used for the utility rate structure development and the statistical analysis of these data for rate structure evaluation
- Microsoft Excel spreadsheet utility Enterprise Fund Budget Model
- Microsoft PowerPoint presentation on findings and recommendations to the City Council on July 6, 2010
- PDF copy of this report.

## **Single-Family Residential**

The rate structure evaluation was based on the development and application of an Equivalent Residential Unit (ERU) which represents the stormwater runoff demand associated with the average single-family land parcel. The ERU is used to assign an equitable share of the cost of the drainage management program to each property parcel in proportion to the parcel's relative contribution to stormwater runoff that must be managed and conveyed by the City's drainage system. Installation of impervious surfaces such as rooftops and paved areas increase both the rate and volume of stormwater runoff and increase runoff pollutant loadings. Based on the distribution of residential property parcel impervious area (IA) values, it is recommended that the City adopt a rate structure with three tiers for single-family properties:

- Tier I-“Small”, <3,253 sf IA, 0.55 ERU
- Tier II- “Average”, 3,253-6,980 sf IA, 1.0 ERU
- Tier III-“Large”, > 6,980 sf IA, 1.7 ERU

The tiers above were developed based on an evaluation of the distribution of impervious area for all single-family land parcels. The impervious area distribution is presented in the frequency histogram. The

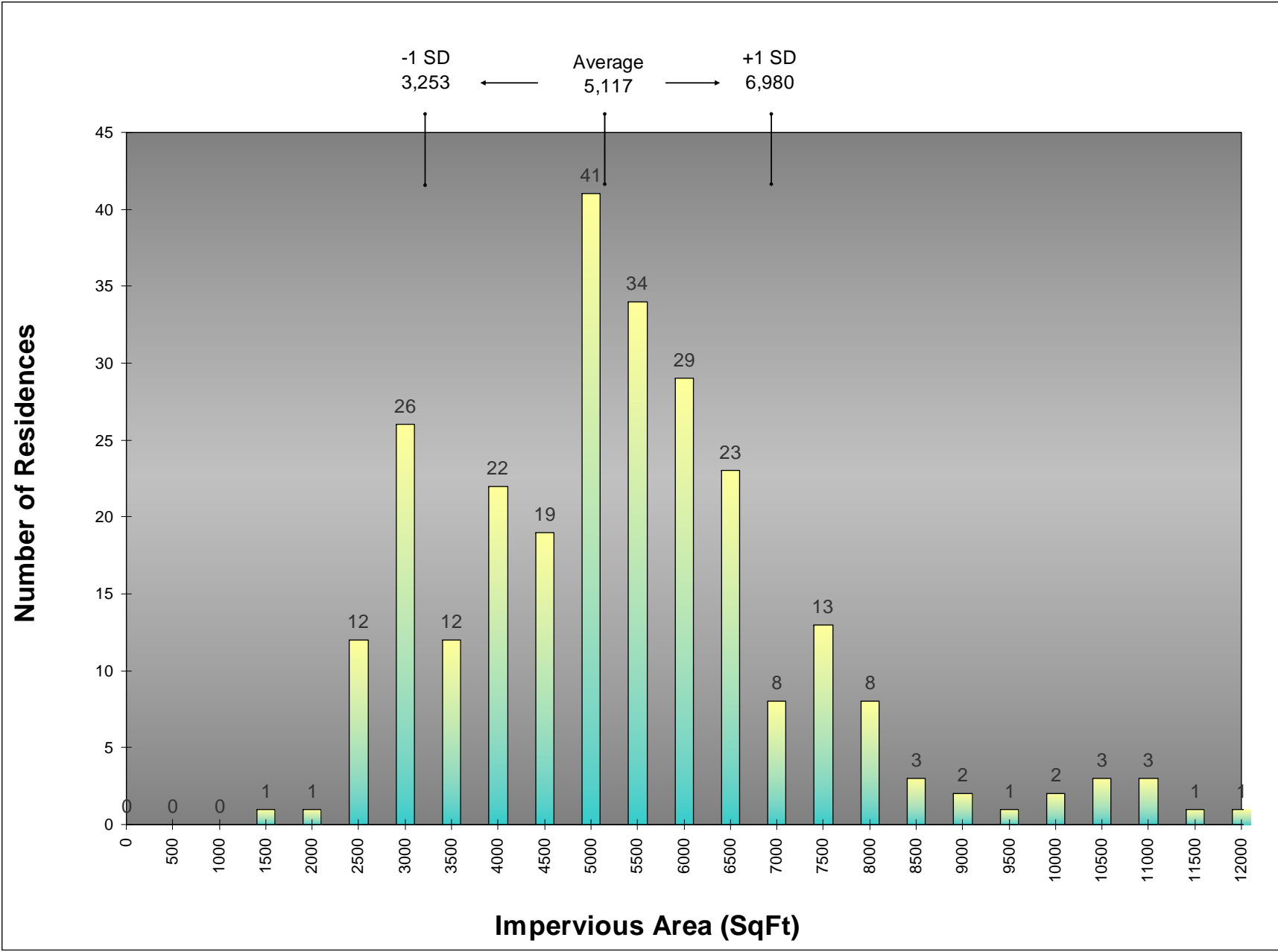
breakpoints between the three tiers were developed by applying the standard deviation of approximately 1,863 square feet above and below the average for all values.

**Non-Residential**

The recommended billing unit standard for non-residential properties is 3,350 sf IA/ERU. The City’s single-family land use is characterized by very large lots with low percentage of impervious area. Because of the significant difference in average percent impervious area between the single-family and commercial land parcels-11% vs. 55%, the non-residential billing unit was derived from the single-family average by the ratio of Rational Method run-off coefficients for land with 11% and 55% impervious area. This adjustment accounts for the increased run-off drainage system demand associated with the significantly more intense commercial development in the City of Sunset Valley. Through this analysis it was determined that the run-off potential for 3,350 sf of commercial impervious area is equivalent to the single-family land parcel average value of 5,035 sf impervious area. The analytical process used to derive the non-residential ERU value is described in Appendix A.

**Table 1: Data Summary**

	Total Parcels	Average Impervious Area (SqFt)	Total Impervious Area (SqFt)	Average Parcel Size (SqFt)	Total Land Area (SqFt)	Average Percentage of Impervious Cover
<b>Single-Family</b>	<b>265</b>	<b>5,117</b>	<b>1,355,880</b>	<b>46,128</b>	<b>12,223,790</b>	<b>11%</b>
I ≤ 3,253 ft <sup>2</sup>	44	2,646	116,424	13,593	598,073	19%
II 3,253-6,980 ft <sup>2</sup>	184	5,035	926,485	44,904	8,262,370	11%
III 6,980 ft <sup>2</sup> - 11,966 ft <sup>2</sup>	37	8,459	312,971	90,901	3,363,347	9%
<b>Non-Residential</b>	<b>26</b>	<b>234,820</b>	<b>6,105,317</b>	<b>429,065</b>	<b>11,155,690</b>	<b>55%</b>
Civic	1	89,000	89,000	469,795	469,795	19%
Commercial	22	169,877	3,737,300	307,010	6,754,216	55%
Multifamily	1	186,360	186,360	937,796	937,796	20%
AI&SD	2	1,046,329	2,092,657	1,496,942	2,993,883	70%
<b>Total</b>	<b>291</b>	<b>25,640</b>	<b>7,461,197</b>	<b>80,342</b>	<b>23,379,480</b>	<b>32%</b>



**Extra Territorial Jurisdiction (ETJ)**

The areas of the City’s ETJ that are tributary to the City’s drainage system can be included in the utility rate base at the City’s discretion. A review of topography indicates that the eight single-family properties fronting Brodie Lane/Country White Lane and the multi-family property fronting Brodie Lane/Home Deport Boulevard are tributary to the City’s drainage system. There are 6.65 billing units associated with the single-family properties and there are 55.6 billing units associated with the multi-family property. These properties are included in the revenue estimates and the enterprise fund budget model. The single-family properties fronting Stearns Lane are not tributary to the City’s drainage system. There are 3.65 billing units associated with these properties and they are not included in the utility rate base.

**Drainage Utility Revenue Estimates**

Based on the recommended utility rate structure, the total number of billing units is as follows:

Single-Family (number of parcels X billing unit rate)

$$41 \times 0.55\text{ERU} + 182 \times 1.0\text{ERU} + 37 \times 1.7 \text{ ERU} = 267 \text{ ERUs}$$

Non-Residential (Total Impervious Area/ Impervious Area per Billing Unit)

$$4,012,660 \text{ sf IA}/3350 \text{ sf IA per ERU} = 1,198 \text{ ERUs}$$

Austin Independent School District (AISD) Properties

The City has the option to include AISD properties in the drainage utility rate base. Billing unit assignments to these properties are as follows:

Bus Barn and Burger Center

Parcel Land Area-2,495,121 square feet  
Impervious Area-1,944,351 square feet, (78% impervious cover)  
Number of Billing Units- 1,944,351/3,350 = 580 ERU

Sunset Valley Elementary School

Parcel Land Area-498,762 square feet  
Impervious Area-148,306 square feet, (30% impervious cover)  
Number of Billing Units-148,306/3,350 = 44.3 ERU

Total AISD = 624 ERUs

Total ERUs = 1,465 ERUs (without AISD), 2,089 ERUs (with AISD)

Revenue Estimates (\$/ERU/month X 12 month/year X total number ERUs )

	Without AISD	With AISD
\$4/ERU/Month =	\$70,300/year	\$100,300/year
\$5/ERU/Month =	\$87,900/year	\$125,300/year
\$6/ERU/Month =	\$105,500/year	\$150,400/year

Because of the large amount of impervious area associated with the AISD properties, the incorporation of the AISD properties into the drainage utility rate base would result in a 43% increase in annual revenue for the utility.

### **Enterprise Fund Budget Model**

An enterprise fund budget model was configured in Microsoft Excel for a five-year planning period. An example printout of the model follows this discussion. The model accounts for revenue, operating expenses, transfers in and out, annual excess/deficit, ending balance, annual carryover, and also calculates 30 and 45 working reserve, and debt coverage ratio. Green shading is used to identify the cells for model input variables, all other values are calculated by the spreadsheet.

#### Model Variables:

- Beginning Balance in year one
- Other utility revenue sources-Permits, Fees, Miscellaneous
- Operating Expenses-Personnel, Supplies, Contractual Services, Capital Outlay, Support Services
- Transfer in from General Fund
- Transfers Out –Bond debt service and pay-as-you-go CIP
- Number of Billing Units (ERUs) in each customer class in year one
- A toggle for AISD property In/Out of Utility Rate Base
- ERU annual growth rate (Not applied to AISD)
- Monthly Fee (billing rate) per ERU

All other values in the model are calculated.

- Interest Income is calculated as 3% of fund Beginning Balance for each fiscal year.
- Working Reserve requirement is calculated based on Total Operating Expenses for both 30 and 45 day periods to allow comparison to Ending Balance. Most municipalities have criteria for enterprise fund working reserve requirements.
- Revenue Bond Debt Coverage Ratio is calculated as Total Revenue less Total Operating Expenses divided by Revenue Bond Debt Service. Debt Coverage Ratio expresses the amount of revenue available for debt service after operating requirements are met.

### **Bond Debt Service Calculation**

The second spreadsheet tab is for calculation of bond annual debt service. Variables are bond issue amount, term and interest rate.

**City of Sunset Valley-Drainage Utility Fund**

	2011	2012	2013	2014	2015
<b>BEGINNING BALANCE</b>	<b>20,000</b>	<b>55,940</b>	<b>82,958</b>	<b>113,321</b>	<b>144,595</b>
<b>REVENUE</b>					
Drainage Fee					
Residential	16,020	16,020	17,622	17,622	19,224
Commercial/City	71,880	71,880	79,068	79,068	86,256
AISD	37,440	37,440	41,184	41,184	44,928
Interest Income (3% Beginning Balance)	600	1,678	2,489	3,400	4,338
Permits	-	-	-	-	-
Fees	-	-	-	-	-
Miscellaneous	-	-	-	-	-
<b>TOTAL REVENUE</b>	<b>125,940</b>	<b>127,018</b>	<b>140,363</b>	<b>141,274</b>	<b>154,746</b>
<b>TRANSFER IN FROM GENERAL FUND</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>TOTAL AVAILABLE FUNDS</b>	<b>125,940</b>	<b>127,018</b>	<b>140,363</b>	<b>141,274</b>	<b>154,746</b>
<b>OPERATING REQUIREMENTS</b>					
Personnel	-	-	-	-	-
Supplies	-	-	-	-	-
Contractual Services	20,000	20,000	20,000	20,000	20,000
Capital Outlay	-	-	-	-	-
Support Services	-	-	-	-	-
<b>TOTAL OPERATING EXPENSES</b>	<b>20,000</b>	<b>20,000</b>	<b>20,000</b>	<b>20,000</b>	<b>20,000</b>
<b>TRANSFERS OUT</b>					
Revenue Bond Debt Service	20,000	20,000	20,000	20,000	20,000
Enterprise CIP Fund(Pay-As-You-Go)	50,000	60,000	70,000	70,000	70,000
<b>TOTAL TRANSFERS OUT</b>	<b>70,000</b>	<b>80,000</b>	<b>90,000</b>	<b>90,000</b>	<b>90,000</b>
<b>TOTAL REQUIREMENTS</b>	<b>90,000</b>	<b>100,000</b>	<b>110,000</b>	<b>110,000</b>	<b>110,000</b>
<b>EXCESS (DEFICIENCY) OF TOTAL AVAILABLE FUNDS OVER REQUIREMENTS</b>	<b>35,940</b>	<b>27,018</b>	<b>30,363</b>	<b>31,274</b>	<b>44,746</b>
<b>ENDING BALANCE</b>	<b>55,940</b>	<b>82,958</b>	<b>113,321</b>	<b>144,595</b>	<b>189,340</b>
30 day working capital reserve (required)	1,667	1,667	1,667	1,667	1,667
45 day working capital reserve (preferred)	2,500	2,500	2,500	2,500	2,500
Revenue Bond Debt Coverage Ratio	5.30	5.35	6.02	6.06	6.74
<b>Monthly Fee</b>					
Residential	\$5.00	\$5.00	\$5.50	\$5.50	\$6.00
Commercial (per acre impervious cover)	\$65.01	\$65.01	\$71.52	\$71.52	\$78.02
<b>Billing Units</b>					
Single-Family Residential	267	267	267	267	267
Commercial/Industrial/MF/Civic/Religious	1,198	1,198	1,198	1,198	1,198
AISD	624	624	624	624	624
ERU Value (square feet impervious cover)	3,350				
			Billing Unit Growth Rate (%)	0.00	
			AISD ON=1, OFF=2	1	

**Appendix A**  
**City of Sunset Valley Drainage Utility Assessment**  
**Non-Residential Billing Unit Determination**

Because of the large difference in percentage of impervious coverage between the average single-family land parcel and the average commercial land parcel, an equivalent residential unit billing unit standard was developed for assignment of utility fees to non-residential properties that accounts for the difference in average development intensity between the two major customer classes. The impervious area percentage for the average single-family property parcel is 11% and for the average commercial property parcel is 55%. To account for this large difference in development intensity and associated stormwater run-off potential, the single-family land parcel impervious area average was reduced by the ratio of Rational Method runoff coefficients for average single-family land use conditions and for average commercial land use conditions to develop the Equivalent Residential Unit (ERU) billing standard for non-residential properties.

The Rational Method is a standard engineering method for estimating peak stormwater runoff rate from properties as follows:

$$\text{Peak Runoff Rate} = \text{Runoff Coefficient (C)} \times \text{Rainfall Intensity (i)} \times \text{Land Area}$$

Therefore, relative runoff potential is proportional to the runoff coefficient for a given rainfall intensity and land area. From the *City of Austin Drainage Criteria Manual*, the runoff coefficient for rooftops, driveways and parking areas is 0.84 average for the 2-100 year storm return period and for lawn areas in good condition with 2-7% slope is 0.37 average for the 2-100 year storm return period.

The weighted runoff coefficient is calculated based on percentage of impervious area and percentage vegetated area as follows:

$$\begin{aligned} \text{C Single-Family} &= 0.11 \times 0.84 + 0.89 \times 0.37 \\ &= 0.42 \end{aligned}$$

$$\begin{aligned} \text{C Commercial} &= 0.55 \times 0.84 + 0.45 \times 0.37 \\ &= 0.63 \end{aligned}$$

$$\text{Ratio} = 0.63 / 0.42 = 1.5$$

Average Single-Family Land Parcel Impervious Area= 5,035 square feet

$$\begin{aligned} \text{Non-Residential Billing Unit (ERU)} &= 5,035 \text{ square feet impervious area} / 1.5 \\ &= 3,350 \text{ square feet impervious area} \end{aligned}$$

