## Analysis of Acreage Suitable and Available for Development at 704 Irwin Dr.

This analysis was conducted to identify the acreage on the subject 54-acre property that is both suitable and available for construction. It considers topography, soil characteristics, and other constraints (i.e. TVA ROW, stream buffers, and size-constrained areas). Included is an estimate of the acreage consumed by the applicant's Phase 1 development (Parker's Forest) as described in the conceptual drawing recently submitted to the Planning Commission. The remaining suitable and available acreage (i.e., post-Phase 1 acreage) includes land to be occupied by the isolated house and associated driveway identified but not specifically characterized in the conceptual plan (herein considered post-Phase 1 development). Based on this analysis, we identify several criteria that should be rigorously followed to help ensure that any construction is conducted in a manner that is both environmentally-sound and at least minimally consistent with the character of the neighborhood.

Included with this analysis are Figure 1 and Table 1. Figure 1 displays the distribution of soil types on the property along with other features that impact the suitability/availability of land for development. Topography, which is a key feature, is generally indicated by the soil types (see legend). Other features on Figure 1 include the 150 foot-wide TVA ROW that runs east-west across the property and the 100 foot-wide buffer zone along the tributary to Beaver Creek that runs south to north through the property. In neither case can dwellings be constructed although road crossings are allowed. Based on the location of these two features and the irregular shape of the property (Figure 1), additional acreage cannot be utilized because of inadequate space for even the smallest (condo-size) development (i.e., size-constrained areas). Given these considerations, Figure 1 identifies those portions of the property suitable for construction of dwellings. These areas include the applicant-proposed Phase 1 development area (Parker's Forest) and all post-Phase I suitable/available acreage, as defined above.

Table 1 provides relevant information on the soil types of the property, based on data taken from the NRCS *Knox Co. Soil Survey*. To obtain reasonably accurate estimates of the acreage of each soil type, the property boundaries were input to the NRCS *Web Soil Survey*. Relevant data for each soil type were taken from tables in the soil survey. Included are the ratings of each soil type for general and specific development activities. All such ratings are on a 0-1 scale, with increasing value denoting increasing unsuitability. Based on these and other considerations, the acreage of each soil type available for development is shown separately in Table 1 for all phases of development and any post-Phase 1 development, as defined above.

The majority of the land on the property is not suitable or available for development. Most is steeply (25-75%) sloped and rocky, with shallow depth to bedrock (Figure 1, Table 1). The soils in this topographic range (AmD, AmE, and AmF types), which occupy all acreage to the south of the TVA ROW, are uniformly rated 1 (poorly suited) for all types of development (Table 1). Soils of the AmC type, which occupy a substantial portion of the lower (5-12%) slopes (Figure 1), also have characteristics (shallow depth to bedrock) that raise serious development concerns (Table 1). Even the lesser-sloped, stream-side soils (HeB type) are poorly suited to development due to soil wetness and moderately slow permeability of the subsoil (Table 1). Regardless, we have classified the AmC and HeB acreage as "suitable" for development unless precluded by other considerations. Only the CtC type soils, which occupy 3.8 acres in the northwest corner of the property (Figure 1), are considered even moderately suitable for development (Table 1). We conclude that for all phases of development, **10.30 acres** are both suitable and available.

The applicant's proposed Phase 1 development (i.e., Parker's Forest) will utilize  $\sim$ 3.43 acres, most of it on CtC soils (Figure 1). The available post-Phase 1 acreage ( $\sim$ 6.87 acres) includes  $\sim$ 0.54 acres of HeB soils,  $\sim$ 0.68 acres of CtC soils, and  $\sim$ 5.65 acres of AmC soils (Figure 1, Table 1). As noted earlier, the AmC and HeB soils have serious concerns for development (Table 1). The conceptual plan does not provide sufficient information for precise estimation of the post-Phase 1 acreage impacted by the isolated house/driveway. However, we note that in addition to their footprints, their location on the property will eliminate additional post-Phase 1 land from development. Additional acreage will be consumed by any vegetative buffer along Irwin Dr. As a result, the acreage remaining after development of all structures and features shown in the conceptual plan will be considerably less than the  $\sim$ 6.87 acres remaining after development of Parker's Forest.

Consistent with the results of this analysis, the following development criteria are specified: (1) restriction of construction to the acreage identified herein, including no disturbance south of the TVA ROW and no development on AmE acreage north of the TVA ROW; (2) strict adherence to the 100-ft stream buffer exclusion; and (3) establishment of a 50-ft vegetated buffer along Irwin Dr.



Table 1. Land Suitability & Availability on the Rezoning Property at 704 Irwin Dr.							
Feature <sup>1</sup>		Soil Type					
		Heiskell silt loam (HeB)	Corryton-Townley complex (CtC)	Apison-Montevallo Complex (AmC)	Apison-Montevallo Complex (AmD)	Apison-Montevallo Complex (AmE)	Apison-Montevallo Complex (AmF)
Acres <sup>2</sup>		3.0	3.8	5.8	5.3	19.8	16.2
% of Property		5.6%	7.1%	10.8%	9.8%	36.7%	30.1%
Topographic Position		Along streams	Lower slopes	Lower slopes	Lower-mid slopes & hilltop	Mid slopes	Highest slopes
Slope		2-5%	5-12%	5-12%	12-25%	25-35% <b>rocky</b>	35-75% <b>rocky</b>
Depth to Bedrock		>60 iı	inches		20-40 inches		
Depth to Water Table		18 - 36 inches	>80 inches				
Soil Strength (Ability to Bear Traffic Load) <sup>3</sup>		0.00	1.00	0.50	1.00		
Overall NRCS Development Suitability Rating		Poorly suited	Moderately suited	Poorly suited	Poorly suited		
Site-Specific NRCS Development Suitability Ratings <sup>3</sup>	Residence w/ No Basement	0.00	0.50	0.04	1.00		
	Residence w/ Basement <sup>4</sup>	0.99	0.50	0.54	1.00		
	Local Roads & Streets	0.00	1.00	0.50	1.00		
Primary Site-Specific Development Limitations		Soil wetness & moderately slow permeability of subsoil	Moderately slow permeability, moderate shrink-swell of subsoil & low soil strength	Depth to bedrock & moderately low soil strength	Slope, depth to bedrock & low soil strength		
Acres Available for Development <sup>2,5</sup>	All Phases 10.3 acres	0.70	3.80	5.80	0	0	0
	Post-Phase 1 6.87 acres	0.54	0.68	5.65	0	0	0

<sup>1</sup> All soils data & related information taken from NRCS Soil Survey of Knox Co., TN (see Tables 11 and 12 as well as pp. 16-22, 43-44 and 72-73).

<sup>2</sup> Calculated by inputting property boundary to Web Soil Survey at *https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx.* 

<sup>3</sup> Ratings are from 0 to 1; The higher the rating, the more poorly suited the soil is for the development activity.

<sup>4</sup> Rating is generally indicative of any activity involving excavation.

<sup>5</sup> Taking into account TVA ROW, stream buffers and areas too small for dwelling development; see Figure 1.