



Land Demand/Capacity & Environmental Vulnerability Study

This analysis examines three broad elements: Residential/Non-Residential Land Demand, Land Capacity, and Environmental Vulnerability. This analysis is the foundation for projections of the amount and type of land that will be needed to accommodate residential and commercial uses between now and the planning horizon of 2030 for the KCIA Area Plan Study.

The demand analysis examines present and future patterns of growth for the KCIA Area Plan Study, informed by the consultant team's study of regional and local economic market forces that will likely influence future land demand. The capacity analysis is an estimate of the amount of future new dwelling units and non-residential uses that could be developed based on the amount of currently undeveloped property.

This analysis also includes an environmental vulnerability analysis to determine sensitive land within the study area that should be avoided by development. When combined with the above demand/capacity analysis, this holistic model can balance environmental and economic factors.

The end result of the demand/capacity and environmental vulnerability analysis is a rough estimate of the net acres of land that may be used for new development, and which will give direction to the identification of land needed for future development on the Future Land Use Map prepared for the KCIA Area Plan.

Assumptions

- The methodology outlined by the City of Lenexa 2020 Comprehensive Plan was adapted to the forecast data for the KCI study area and imported into the ArcGIS environment to develop a flexible and systematic model for forecasting economic land-use demand.
- The project team utilized 2000, 2010, 2020, and 2030 MARC employment forecasts by tract for the study area compiled by the Kansas City, Missouri Planning and Development Department specifically for the KCI study area. The base of this forecast data is the 2006 employment estimates by tract.
- The project team utilized 2000, 2010, 2020, and 2030 MARC population, household type, and household size forecasts by tract for the study area. The base data was compiled and cleaned by the Kansas City, Missouri Planning and Development Department specifically for the KCIA study area.
- Raster modeling in ArcGIS was used to perform the environmental vulnerability analysis. The factors from the Data Book determined as environmentally sensitive are: 100 year floodplain, proposed KCMO middle and outer stream buffer, wetlands, 100 foot wetland buffer, existing streams, slopes greater than 15%, and existing parks.
- The City of Kansas City, Missouri existing residential and non-residential land-use within the study area was aggregated to develop estimates of acreages of land-use.
- KCI Airport property was excluded from this study as it has undergone a separate capacity demand analysis as part of the Aviation Master Plan Study.
- Real estate market information is derived from CoStar, a national real estate research reporting group, for end-of-year 2006.

I. Land Demand Analysis

This analysis estimates net land demand in two general categories: 1) Determination of future retail, office, commercial and industrial uses that will be needed to accommodate future employment growth, and determination of land capacity to absorb future growth; and 2) Determination of future residential uses including single-family and multi-family units that will be needed to accommodate future growth, and determination of land capacity to absorb future growth. The results of the demand analysis are summarized in the following tables.

RESIDENTIAL LAND USE DEMAND **KCIA Area Plan 2000 to 2030**

	2000	2010	2020	2030	TOTAL
POPULATION FORECAST	10,459	13,207	15,795	18,134	
NEW HOUSEHOLDS		1,184	1,142	1,065	3,391
SINGLE-FAMILY					
New Households		699	674	628	2,001
Additional Dwelling Units		714	689	642	2,044
Total Acres Consumed		346.6	334.4	311.7	992.7
80% @ 2.8du/acre		203.9	196.7	183.4	583.9
20% @ 1du/acre		142.7	137.7	128.3	408.8
DUPLEXES					
New Households		83	80	75	237
Additional Dwelling Units		98	95	88	281
Total Acres Consumed		16.3	15.8	14.7	46.8
100% @ 6du/acre		16.3	15.8	14.7	46.8
MULTI_FAMILY					
New Households		403	388	362	1,153
Additional Dwelling Units		438	422	394	1,253
Total Acres Consumed		31.3	30.2	28.1	89.5
100% @ 14du/acre		31.3	30.2	28.1	89.5
TOTAL NEW DWELLING UNITS		1,249	1,205	1,123	3,578
TOTAL ACRES CONSUMED		394.2	380.3	354.5	1,129
TOTAL DEVELOPABLE ACRES					7,952
NET ECONOMIC LAND UTILIZATION					14%

Note: detailed explanation of model steps are set out in appendix 2

Table 2
NON-RESIDENTIAL PRIVATE SECTOR LAND USE DEMAND PROJECTIONS
KCIA Area Plan 2000 to 2030

SERVICE/OFFICE	2000	2010	2020	2030	TOTAL
Employment Projections	6,635	10,387	13,643	15,093	
Employment Increase		3,751	3,256	1,451	8,458
Rate of Employment Growth		57%	31%	11%	127%
Built Floor Area Generated (SF)		937,776	814,032	362,636	2,114,444
Land Area (SF)		4,077,287	3,539,269	1,576,678	9,193,235
Net Acres Consumed		93.6	81.3	36.2	211.0
RETAIL	2000	2010	2020	2030	TOTAL
Employment Projections	2,722	4,609	5,617	6,302	
Employment Increase		1,887	1,008	685	3,580
Rate of Employment Growth		69%	22%	12%	132%
Built Floor Area Generated (SF)		896,235	478,643	325,607	1,700,485
Land Area (SF)		4,481,173	2,081,057	1,415,685	7,977,914
Net Acres Consumed		102.9	47.8	32.5	183.1
MANUFACTURING	2000	2010	2020	2030	TOTAL
Employment Projections	1,736	2,550	4,167	5,517	
Employment Increase		814	1,617	1,350	3,781
Rate of Employment Growth		47%	63%	32%	218%
Built Floor Area Generated (SF)		1,220,403	2,425,812	2,025,508	5,671,723
Land Area (SF)		5,306,098	10,547,010	8,806,558	24,659,666
Net Acres Consumed		121.8	242.1	202.2	566.1
MISC. INDUSTRIAL	2000	2010	2020	2030	TOTAL
Employment Projections	5,339	5,566	5,629	5,656	
Employment Increase		227	64	27	317
Rate of Employment Growth		4%	1%	0%	6%
Built Floor Area Generated (SF)		181,455	50,922	21,516	253,893
Land Area (SF)		907,274	221,400	93,549	1,222,224
Net Acres Consumed		20.8	5.1	2.1	28.1
TOTAL	2000	2010	2020	2030	TOTAL
Employment Projections	16,433	23,111	29,056	32,569	
Employment Increase	-	6,678	5,945	3,513	16,136
Rate of Employment Growth		42%	26%	12%	99%
Built Floor Area Generated (SF)	-	3,235,868	3,769,409	2,735,268	9,740,546
Land Area (SF)	-	14,771,832	16,388,737	11,892,471	43,053,039
Net Acres Consumed	-	339.1	376.2	273.0	988.4
NET <u>NON-RESIDENTIAL</u> DEVELOPABLE ACRES					5,302
NET ECONOMIC LAND UTILIZATION					19%

Note: detailed explanation of model steps are set out in appendix 2

II. Land Capacity Analysis Including Environmental Vulnerability

The capacity of land is a measure of how much future development the undeveloped lands of the study area can accommodate. As shown above, the total developable land is 19, 059.7 acres, but not all of the acres are open to development due to environmental constraints and valuable natural resources. To calculate the capacity of land in the KCIA study area, acreages of sensitive land were identified and then subtracted from the total land acreages within the study area to determine the *net refined developable acres*. The methodology and results of the environmental vulnerability and land capacity analysis are presented below.

Methodology

- The environmental constraint layers from the data book were combined in a map overlay method to determine environmentally vulnerable land (McHarg, Steiner, Steinitz, Dangermond). ArcGIS ModelBuilder was utilized to develop the environmental constraint raster overlay analysis.
- The factors from the Data Book determined as environmentally sensitive are: 100 year floodplain, proposed KCMO middle and outer stream buffer, wetlands, 100 foot wetland buffer, existing streams, slopes greater than 15%, and existing parks, developed parcels and impervious surface.
- The project believes the factors chosen for this analysis represent the real and significant challenges to future development that should be avoided to reduce project costs and protect natural resources.

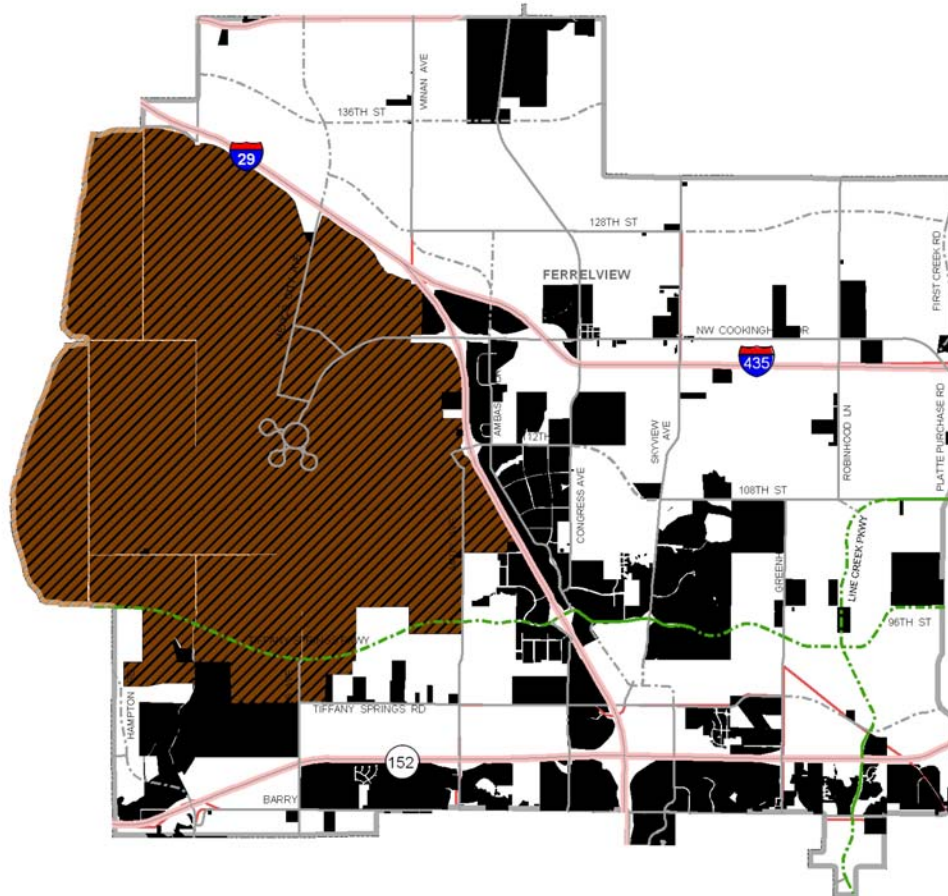
Results

- The KCIA study area has a significant amount of streams, floodplains, wetlands and steep slopes. Additionally, the upcoming KCMO stream buffer ordinance protects the existing vegetation within the study area. The project team recommends eliminating these sensitive lands from future development to minimize future development cost, protect valuable recreation area, protect water quality, and provide wildlife habitat.
- The land demand projections for economic and residential land use are significantly less than the land capacity. With the environmentally sensitive land removed from the total undeveloped land area, there is still 6.4 times greater land availability than projected 2030 land demand. The planning team recommends observing the proposed cap of 13,254 acres as the total available land area for development within the KCIA study area, as it will likely reduce future development costs, reduce environmental impacts and mitigation costs, provide amenity areas for residential and commercial developments, and will be in line with the current draft KCMO stream buffer ordinance.
- The KCIA area has limited land development potential in the southern tracts of the study area mostly due to existing development, but partly due to the environmental constraints of steep slopes, existing vegetation, and a broad floodplain in the Brush Creek basin. These tracts include: 303.05, 303.06, 302.08, 303.04, 302.07, 302.06, and 302.05.
- These results are summarized in Table 3 and Figures 1 and 2 below.

Table 3
**NET DEVELOPABLE LAND
KCIA Area Plan 2000 to 2030**

NET DEVELOPABLE ACRES	19,059.7
- ENVIRONMENTALLY VUNERABLE ACRES	- 5,805.7
NET REFINED DEVELOPABLE ACRES (LESS ENVIRONMENTALLY VULNERABLE AREA)	13,254

KCIA Study Total Development Capacity



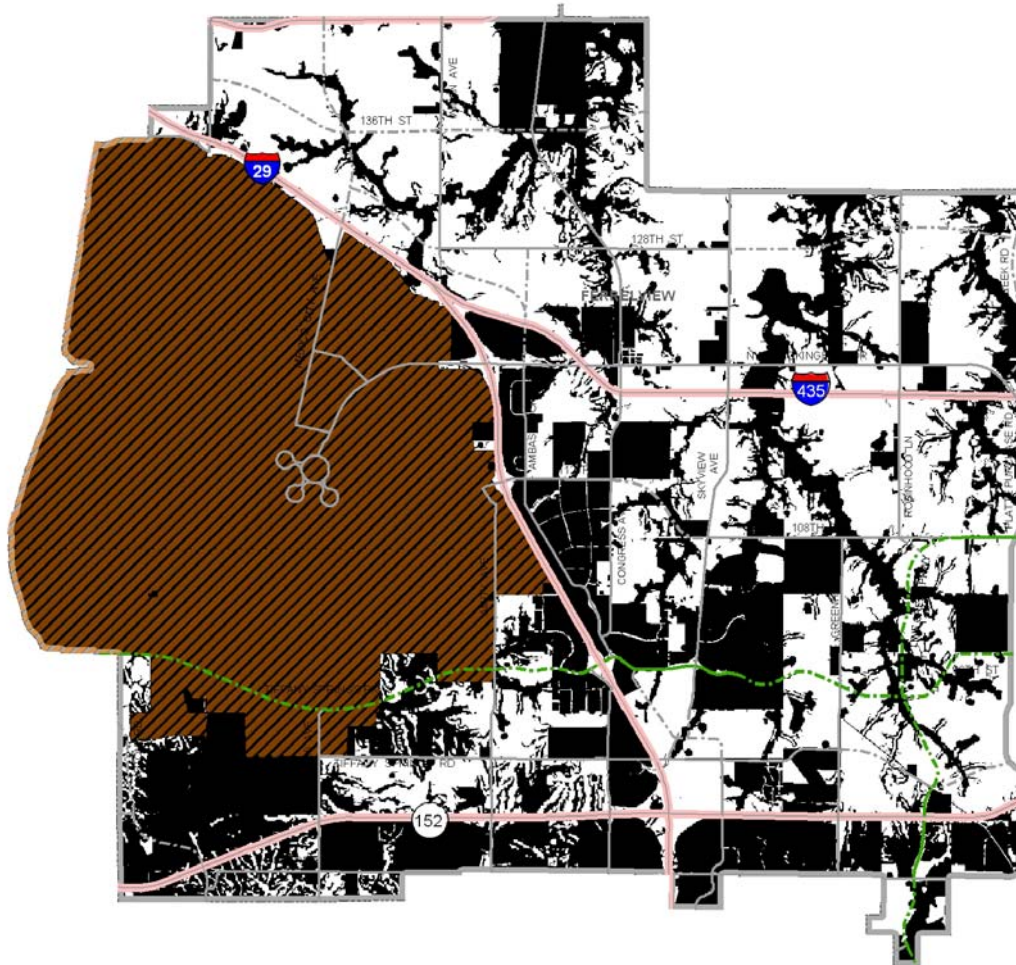
Legend

-  KCIA Study Area StPin
-  Developed Land
-  Available for Development
-  KCI Boundary



Figure 1: Spatial Distribution of Net Development Capacity

KCIA Study Total Development Capacity Less Environmentally Vulnerable Area



Legend

-  KCIA Study Area StPin
-  Developed Land
-  Available for Development
-  KCI Boundary

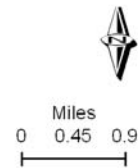


Figure 2: Spatial Distribution of Refined Developable Acres (Net Developable Acres Less Environmentally Vulnerable Area)

III. Land Capacity vs. Land Demand

Once the net refined developable acres have been identified, a comparison of the demand versus the net refined developable acres will yield the land capacity within the study area. The comparison of demand for land with land capacity within the study area will help identify the best locations for future land use types and will also illustrate when areas lack certain land use types and where there is a surplus.

Allocation of Developable Acres

In order to compare capacity with demand, it is necessary to determine the amount of land allocable by land use. The ultimate answer will be part of the completed planning process. For the purpose of this analysis it is assumed that 60% of the available undeveloped land will be used for residential purposes and 40% for non-residential uses. This allocation was derived from looking at the experiences of other communities and is presented in tables 4, 5, and 6 below.

Table 4
LAND USE DEMAND AND LAND CAPACITY
KCIA Area Plan 2000 to 2030

	2000	2010	2020	2030	TOTAL
TOTAL ACRES CONSUMED FOR RESIDENTIAL USES		394.2	380.3	354.5	1,129.0
TOTAL ACRES CONSUMED FOR NONRESIDENTIAL		339.1	376.2	273.0	988.4
TOTAL ACRES CONSUMED FOR DEVELOPMENT		733.3	756.5	627.5	2,117.4
TOTAL REFINED DEVELOPABLE ACRES					13,254
NET ECONOMIC LAND UTILIZATION (Total acres consumed as % of Total refined)					16%

Table 5
RESIDENTIAL LAND USE DEMAND AND LAND CAPACITY
KCIA Area Plan 2000 to 2030
(60% of Land allocable to Residential Uses)

	2000	2010	2020	2030	TOTAL
TOTAL ACRES CONSUMED		394.2	380.3	354.5	1,129
TOTAL REFINED DEVELOPABLE ACRES FOR <u>RESIDENTIAL</u> DEMAND					7,952
NET ECONOMIC LAND UTILIZATION					14%

Table 6
NON-RESIDENTIAL LAND USE DEMAND AND LAND CAPACITY
KCIA Area Plan 2000 to 2030
(40% of Land allocable to Non-Residential Uses)

	2000	2010	2020	2030	TOTAL
SERVICE/OFFICE		93.6	81.3	36.2	211.0
RETAIL		102.9	47.8	32.5	183.1
MANUFACTURING		121.8	242.1	202.2	566.1
MISC. INDUSTRIAL		20.8	5.1	2.1	28.1
TOTAL ACRES CONSUMED		339.1	376.2	273.0	988.4
TOTAL REFINED DEVELOPABLE ACRES FOR <u>NON-RESIDENTIAL</u>					5,302
NET ECONOMIC LAND UTILIZATION					19%

Note: detailed explanation of model steps outlaid in appendix 2

IV. Conclusions

The results of this analysis serve as the basis for both general land use decisions and policy direction for the KCIA Area Plan Study. Summary conclusions are:

Residential

The study area has far more residential capacity than projected demand by the year 2030. In fact, the area has seven times more capacity than demand. A general industry guide line is that a city should have, at a minimum, two times the projected demand for each dwelling unit type. If the multiplier is greater than two, there is potential for the inefficient development pattern known as "sprawl".

The following summarizes the relationship between the projected residential demand and residential capacity.

- The estimated number of new residents within the study area by the Year 2030 is estimated to be approximately 7,675.
- The study area has the capacity to accommodate approximately 59,000 new residents.
- There is expected to be approximately 3,390 new households by 2030.
- There is expected to be approximately 3,578 new dwelling units constructed by the Year 2030
- There is enough undeveloped land to accommodate almost 41,000 new dwelling units (if 100% is used or 24,200 if using 60% of developable area)
- The capacity for new residential development is more than seven times the demand.

Non-Residential

The estimated capacity for non-residential uses far exceeds the demand for the various non-residential sectors by almost five times.

- Retail Capacity:
 - Future land use for retail development is distributed throughout the city and metropolitan area with larger retail areas located at activity centers near major roadways and smaller retail centers located in or near residential neighborhoods.
 - Over 1.2 million square feet of new retail space has been added to the metro area in the last year.
 - The North Kansas City Market comprises an overall inventory of shopping center square feet totaling 5.3 million square feet. Over 1.0 million square feet of new retail space has been added to the retail base over the past three years.
 - Looking into the future, developers have an additional 3.0 million square feet of retail projects planned in the North Kansas City Market.
 - Opportunities in this submarket for future retail development will be generally limited to neighborhood centers in the next five years based on present supply and demand due to market coverage by lifestyle and power center development completed in the recent past or in the final stages.
 - Retail uses are estimated to comprise 19% of the non-residential uses.
 - If the city used a multiplier of two, similar to the residential multiplier, the study area would need approximately 366 acres of land planned for retail use. Some of this development may actually take the form of redevelopment of land that has already been developed.

- Service/Office Capacity:
 - Future land use for office development is distributed throughout the city and metropolitan area at most activity centers near major roadways and city centers.
 - The entire market for Kansas City is 89 million square feet of office space with less than 8 million square feet located north of the Missouri River, or about 9% of the market.
 - On top of the low percentage of the total market, this submarket is also the second weakest performing submarket. The area has a vacancy rate of over 18.3%, while the rest of the metropolitan area is averaging a 14.1% rate at the end of 2006.
 - Service/office uses are estimated to comprise 21% of the non-residential uses.
 - If the city used a multiplier of two, similar to the residential multiplier, the study area would need approximately 425 acres of land planned for Service/office use. Some of this development may actually take the form of redevelopment of land that has already been developed.

- Manufacturing and Misc. Industrial Capacity:
 - Future land use for manufacturing and miscellaneous industrial development is distributed throughout the city and metropolitan area at most activity centers near major roadways and city centers.
 - The Kansas City metro industrial base totals more than 235 million sq. feet, with overall vacancy rates of 7.7% with 18 million sq. ft. vacant. Under construction buildings at end of year 2006 were reported at more than 1.7 million sq. ft. for a total of 30 buildings. Rental rates have remained relatively flat.

- The North of the River submarket includes 745 industrial properties with a total rentable area of over 42 million sq. feet. The vacancy rate for this market holds around 8.5%, which is equal to about 3.6 million sq. feet.
- The Airport/North Platte market encompasses the area generally surrounding the Kansas City International Airport. Within this secondary market are a total of 68 industrial buildings with a total rentable area of 4.25 million sq. feet. The vacancy rate for this area is 12.4%. This figure remains slightly above Kansas City's overall industrial vacancy rate of 7.7%.
- Total land absorption based on aggressive growth patterns would equate to 40 to 60 acres per year on average.
- The remaining manufacturing and miscellaneous industrial uses are estimated to comprise 60% of the non-residential uses.
- If the city used a multiplier of two, similar to the residential multiplier, the study area would ultimately need 1,188 acres of land planned for industrial use. Some of this development may actually take the form of redevelopment of land that has already been developed.