Appendix A Methods for Forecasting Demand for Employment Land in Oklahoma City

A.1 INTRODUCTION

The City of Oklahoma City engaged the ECONorthwest team (ECO) to prepare an Employment Land Needs Assessment and Action Plan (ELNAAP). Task 3.2 of the Scope of Work required that ECO prepare the "Employment Land Needs Assessment (Demand)" component of that larger assessment. [1]

For the purposes of this project, employment land is defined as land that is zoned for or otherwise potentially suitable for independent industrial uses, industrial parks, warehousing, and some types of office / business parks.[2] Other types of employment uses (e.g., retail, office commercial) are not considered.

The focus of this study is on large businesses that require large parcels. Most of these businesses would be categorized in the literature of planning and economics as "industrial" uses. Thus, in this study the term "employment land" means primarily "industrial land". The professional literature also tends to separate evaluations of industrial land from evaluations of commercial land. Thus, much of the analysis in this section is of industrial land, with office and business parks subsequently considered as an addition to industrial land to get to "employment land for large users". Thus, throughout the appendices, the terms "employment land" and "industrial land" are often used interchangeably since the majority of the land being evaluated is land for industrial uses.

An essential part of a land needs assessment is a forecast of the demand for land: it is the expectation about the demand for land that defines the

[1] The contract's scope of work specifies that Task 3.2 address (1) economic trends and opportunities to identify local competitive advantages; (2) expected employment in target sectors building from sectors the City has already identified (e.g., bioscience and alternative energy); (3) the rough amount of land and sites by size needed over the planning period; and (4) site characteristics and infrastructure desired by various types of employers.

[2] This definition excludes most development for employment that is either (1) strictly office-based (finance, insurance, real estate, services, government, etc.) and (2) retail.

need.[3] This appendix describes the framework and methods ECO used to estimate the demand for industrial land. By *framework* we mean, broadly, a structure for thinking about an industrial land assessment. A framework defines terms and describes key relationships and data sources. It points the way toward specific *methods* used to conduct the evaluation. Thus, this appendix has two additional sections: one for framework, and one for methods.

A.2 FRAMEWORK FOR FORECASTING THE DEMAND FOR INDUSTRIAL LAND DEMAND

The easiest and most intuitive way to forecast any variable is as a function of time. If, for example, some variable of interest can be shown to have grown between 1.1% and 1.5% every year for the last 30 years, then one might have some confidence about forecasting growth of 1.3% per year for the next five years. In that case, one has no explanation of *why* the growth rate is 1.3% (what is *causing* that rate to occur).

Thus, in the context of industrial land, if one had good time series data on how much land converted every year to industrial uses from vacant land or from land in some other use, one could make a historical estimate of the average annual amount of such conversion and use that estimate as a basis for forecasting future absorption of industrial land.

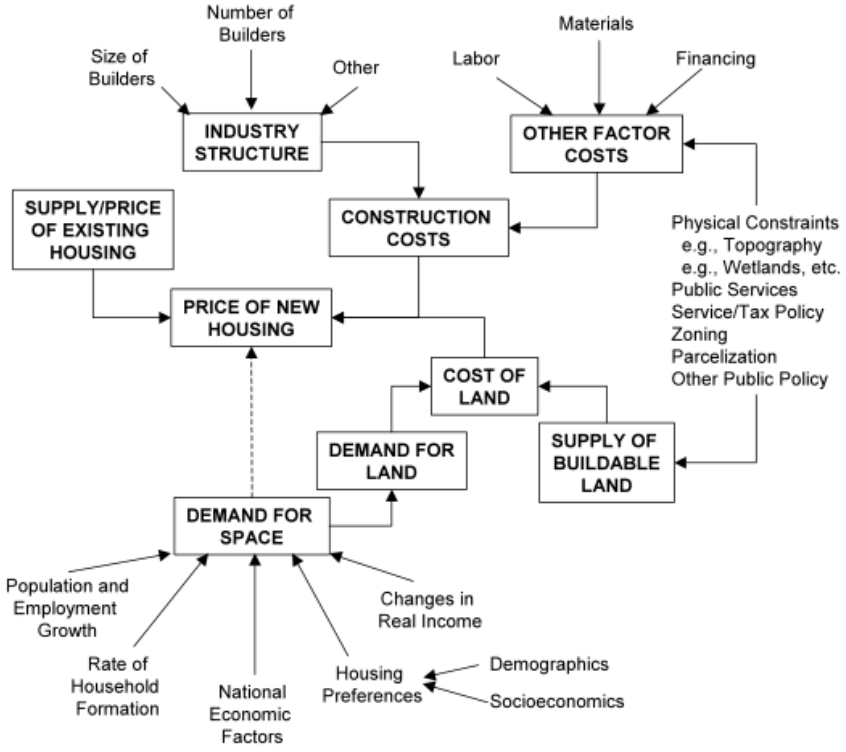
There are some problems with that method. The first is that a standardized, time-series data set for industrial land rarely exists. Industrial land is defined by industrial use; one must define industrial uses. One way to do that is by observing what is happening on the ground. This method of "I'll know it when I see it" might lead to an internally consistent and defensible definition, but it has the practical limitation that there is no solid database that (1) already has such a site-based classification completed, or (2) allows such a classification to be done by using existing data sources. Data from the local tax assessor might appear to fit the bill if it includes a code for "site use." But our experience is that such fields are not filled in for all parcels (or even a large majority), and for the parcels for which the fields are populated, the data are not very reliable.

[3] "Need" might be defined broadly to include some social desire to have more of some good or service. For a study of employment land is appropriate and typical to define it as "effective demand": the amount of land that will absorbed in the future given expectations (explicit or implied) about future need, prices, and the willingness to pay those prices.

In short, classifying sites based on observed uses would require developing a protocol for physically classifying site uses and visiting every site (or a sample) in the City to classify sites as industrial or not based on that protocol. Due to limitations in budget and schedule, we chose not to use that method.

Moreover, time might be a causal factor in predicting variables that relate to aging and lifecycle, but there are usually more, and more important, factors than time that are contributing to growth and change. Exhibit A-1 illustrates this point for a hypothetical housing market: many factors affect the price of housing.

Exhibit A-1: Factors that affect the price of housing



Source: ECONorthwest

The bottom of Exhibit A-1 shows some of the factors one might expect to influence the demand for built space. The demand for industrial land is driven primarily by the demand for buildings that accommodate industrial uses and activities. The demand for built space is driven by the same forces that drive industrial growth. Those forces are many, and they interact in complex ways. In previous studies, ECONorthwest has placed all those forces into categories of factors that affect the amount and type of industrial (or commercial) space built in a community (which we refer to as "the five P's"):

- **Production factors.** Even if none of the subsequent factors changed, demand for space will change if productivity and production processes change. Changes in technology have big effects here. The direction of change cannot be predicted in theory. It depends on the details. For example, a firm may increase productivity by substituting capital (machines) for labor. If those machines are internet servers that eliminate people, space demands could decrease even as demand for products grows. If those machines require a new building for robotic assembly, space demand will increase even as the number of employees decreases.
- **Purchasing power.** A stronger economy (one that creates disposable income for consumers) will increase the demand for industrial output (other things being equal). But in a global economy, local purchases may be a very small part of any industrial firm's revenues. Some firms may be more sensitive to foreign economic conditions than to U.S. economic conditions. In addition, businesses themselves have purchasing power. When they have more cash and economic conditions look more stable, they are more likely to invest in plant and equipment.
- **Preferences.** Like consumers, business owners have different preferences. They will place different values on different locational attributes, so different locations will look like better values to different firms. The literature reports many anecdotes of large business location and investment decisions made based on the preferences of one or a few chief executives.
- **Prices (and costs).** Investment occurs more readily when the factors of production are favorably priced relative to historical prices, expected future prices, and prices for similar goods and services in alternative locations. Investment is also influenced by the price for which a firm's products can be sold. Rising sales prices will encourage more production, which may lead to the need for more space.
- **Policy.** Governments affect the market for industrial space and land through policies and actions that encourage or discourage development of certain types of buildings in certain locations.

In summary, the location and construction choices of individual firms are influenced by many factors. Those factors interact in complex ways. Individual firms may value the factors in very different ways. Those preferences may be correlated with certain firm characteristics, but they are not dictated by them. The aggregate demand for industrial space and land in a given region is the result of the individual decisions of hundreds of firms. In short, forecasting demand based on underlying demand factors is a complex and uncertain exercise.

Few studies go to the effort of creating statistical models that use multiple variables in each of the five-P categories above to predict future demand for and absorption of industrial land. They are more likely to forecast land as a function of some other highly correlated variable for which time-series data exist, and perhaps even an official forecast. One needs a standard data sources for some variable that one can argue—based on empirical work or theory—is likely to be highly correlated with industrial uses. Such data sources are limited: candidates include employment, number of establishments, revenue generated, and sales.

Sales of goods and services are a decent measure for forecasting retail activity and retail land use, and the data are available from sales tax, but they do not work for industrial uses. The number of establishments gives no information about their size, amount of economic activity, and need for built space and land. Thus, the obvious candidate for forecasting demand in most local assessments of industrial land is employment.

For more than 10 years, most businesses in the U.S. have been required as part of their reporting of payroll taxes to (1) classify their primary business activity according to codes of the North American Industrial Classification System (NAICS), and (2) report their number of employees by location.[4] In concept, that means that standardized, time-series data for a majority of employment[5] are available The NAICS is a nested classification system. At the broadest level, all businesses are in one of about 20 two-digit classifications, which each contain 50 to 150 sub-classifications (e.g., to the three-digit and four-digit level). For example, "manufacturing" (codes 31-33) contains almost 800 sub-classifications, all the way to the six-digit level.[6]

A recent study of industrial land published by the American Planning Association[7] used NAICS codes to define "industrial use." The study identifies two ways NAICS codes can be used to define industrial use. The

[4] The compliation of these individual reports was formerly known as the ES)Employment Security) 202 data; it is know called the QCEW data (Quarterly Census of Employment and Wages)

[5] Not counted, because they are not covered by State unemployment insurance laws or the Unemployment Compensation for Federal Employees program are members of the armed forces, the self-employed, proprietors, domestic workers, unpaid family workers, and railroad workers covered by the railroad unemployment insurance system. In our expereince, about 15% of employees are typically not covered (more if underground employment is counted).

[6] For example: 31 = manufacturing; 311 = food manufacturing; 3111 = animal food manufacturing; 31111 = dog and cat food manufacturing.

[7] Howland, Marie. 2011. "Planning for Industry in a Post-Industrial World: Assessing Industrial Lands in a Suburban Economy." Journal of the American Planning Association. Winter, Vol 77, No 1. pp 39-53.

first definition (a *strict* definition) includes construction (code 23), manufacturing (31-33), wholesale trade (42), transportation and warehousing (48-49). The second definition (a *loose* definition) is more expansive, adding eight more three-digit categories.[8] The article selects the second list and refers to it as "production, distribution, and repair (PDR)." The industries included in both definitions are shown in Exhibit A-2.[9]

Exhibit A-2. NAICS codes presumed to be highly correlated with industrial land use

NAICS	Industry
Strict Definition	
23	Construction
31-33	Manufacturing
42	Wholesale trade
48-49	Transportation and warehousing
Loose Definition	
23	Construction
31-33	Manufacturing
42	Wholesale trade
48-49	Transportation and warehousing
221	Utilities
444	Building material and garden equipment and supplies dealers
511	Publishing industries (except Internet)
517	Telecommunications
518	Internet service providers, web search portals, and data processing services
562	Waste management and remediation services
811	Repair and maintenance
812	Personal and laundry services

Source: *Planning for Industry in a Post-Industrial World*, Marie Howland. See text for full citation.

With industrial employment defined, and assuming a correlation between industrial employment and industrial space, a basic forecasting method for a metropolitan area might be to (1) find (from a state agency or third-party vendor) a statewide forecast for employment by type, (2) calculate the percentage growth for industrial NAICS codes, (3) apply those percentages to existing metropolitan employment to get an estimate of growth in industrial employment for the metropolitan area, (4) acquire from other studies or independently calculate from local data an estimate of an average square footage of built space used by industrial employees, (5) acquire from other studies or independently calculate from local data an

[8] See Howland 2011, Table 1, page 41.

[9] Projecting future land need based on employment forecasts, and because independent employment forecasts rarely show 3-digit NAICS detail, we could not comprehensively adopt the PDR definition. Instead, we calculated multiple land need scenarios with increasingly loose definitions of industrial land. We ultimately provide a range of results, starting with the strictest possible definition of industrial land, the 2-digit NAICS codes identified in Howland's report.

estimate of an average floor-area ratio (FAR) for industrial uses, and (6) use the result of steps 3, 4, and 5 to forecast the amount of land that will be needed to accommodate expected industrial growth. For this study, to that base estimate some estimate of additional demand for large parcels for office and business parks should be added.

Such forecasts must be recognized as inherently uncertain. They are based on assumptions about many variables, and most of those assumptions are typically that the future will be like the past. They are useful as a ballpark approximation, but their usefulness for public policy may derive more from the explanation of their underlying assumptions about the dynamics of markets and policies than from the specific estimates of future demand and need. The forecasting methods we propose in the next section derive from those assumptions.

A.3 NATIONAL AND LOCAL CONTEXT

Land needs in Oklahoma City over the next twenty years will unfold in the context of long-run national and local trends. If one expects those trends to be similar in the future to their conditions in the past, then one can have more confidence in a forecast of land need that is simply an extrapolation of past rates of absorption. But if one expects economic trends, then one might want to forecast land absorption based on an independent forecast of some factor that can be tied to those economic changes and correlated to land absorption (e.g., employment). The most important of these factors are:

- **National and local recovery from the current recession.** Although the recession of the late-2000s is officially over, the recovery process has proven to be long and painful. The driver behind demand for industrial land is employment, and the national unemployment rate in March 2011 was 8.8%, the lowest it has been in two years, but still much higher than the mid-4% rates seen for much of 2006 and 2007.
- **Unemployment rate.** The unemployment rate in the Oklahoma City MSA has been about 1.5% lower on average than the national rate over the past decade. However, from May 2010 to April 2011, employment in the Oklahoma City MSA has rebounded more quickly than in the U.S., and the difference has grown to an average of over 3% lower. In April 2011, Oklahoma City's unemployment rate fell to just 4.5%, compared to 9% nationally. This large difference should result in

demand for employment land rebounding in Oklahoma City faster than in the nation.[10]

- **Oklahoma City's role in State's economy.** Oklahoma City is the largest, most diverse, and most economically active metropolitan area in the State. The Oklahoma City Metropolitan Statistical Area contains about a third of the State's population, about 35% of the State's labor force, and a higher proportion of residents with college degrees. These factors suggest that economic activity in the Oklahoma City area will grow at least as fast as in the rest of the State.
- **Possibility of short-run surge in demand for employment land.** Consultants who manage site selection for big businesses report that they are busier than they have ever been, suggesting pent-up demand for large employment sites. Analysts have observed a combination of factors that may portend this surge, including conservative business practices since the recession began, the softening of corporate credit markets, and a resumption of growth in domestic demand. For a further discussion see Section B.3.1 in Appendix B.

A.4 METHODS USED IN THIS STUDY

For this study, we forecast future demand for industrial land using an indirect method that presumes a good correlation between employment growth and the demand for and absorption of industrial land. We then describe possible adjustments to the forecast based on other factors, including an alternative forecast based on historical trends in the industrial real estate market.

A.4.1 METHODS BASED ON FORECASTS OF EMPLOYMENT

To forecast future industrial land demand for Oklahoma City as a function of forecasts of employment growth we use five steps:

1. Forecast employment growth, in the aggregate and by industry sector
2. Allocate forecasted employment growth by industry sector to building types
3. Assign employment densities to building types
4. Forecast future consumption of industrial land as a function of the results of steps "2" and "3"

[10] Bureau of Labor Statistics. http://www.bls.gov/data

5. Adjust for any additional demand for large sites from potential users of space in office or business parks.

Step 1: Forecast employment growth

The purpose of the employment forecast is to estimate land needed (to accommodate that employment growth). Forecasting general employment growth requires a range of historical growth rates on which to build the forecast.

In the context of economic trends and opportunities, we estimate total historical employment growth (1) in the aggregate, and (2) by major NAICS sectors for Oklahoma City. The key driver for our employment land demand projections is a composite employment forecast created using the State of Oklahoma's long-term industry employment projections[11] and the Greater Oklahoma City Chamber's 2011 Economic Forecast.[12] Using the Chamber's forecast, we calculate Oklahoma City's share of MSA and State employment in each industry sector.[13] Then, using the forecast of statewide employment, we create a forecast for the City based on that assumption that it will maintain the same share of MSA employment, and that the MSA will maintain the same share of statewide employment from 2008 to 2018.

The end result is a forecast of employment by sector in Oklahoma City at the 2-digit NAICS level (3-digit when available) for each year from 2008 to 2018. Growth rates from 2018 to 2030 are assumed to be those seen in the 2008 to 2018 period.

Step 2: Allocate industry sectors to building types

The key to converting estimates of employment by sector to estimates of land need is having evidence, even if approximate, of a relationship between (a) sectors and building types, and (b) building types and employment density. This step concerns the former.

To create a relationship between industry sectors and building types, we allocate forecasted employment, by sector, to specific industrial building

[11] www.ok.gov/oesc_web/documents/lmistwideindproj0818.pdf

[12] www.greateroklahomacity.com/clientuploads/pdf/2011_GreaterOKC_EconomicForecast.pdf

[13] A common problem when studying large geographies is apportioning economic activity properly across a region. In this study, the best data available were for the Oklahoma City MSA, a 7-county area much larger area than Oklahoma City's boundaries. According to the U.S. Census, in 2009 the City accounted for 46% of the population in the MSA but 63% of the employment. Although there are abutting cities that also capture significant fractions of MSA employment (Norman, Edmond, Midwest City, and Moore), the geography for the scope of this project is solely Oklahoma City.

types. There are two steps required to make this allocation: we must estimate and make assumptions about (1) the proportion of employment in each sector that will locate on industrial land, and (2) the type of industrial building space those employees will occupy. The rationale is as follows:

1. In many sectors, not all employment will locate in industrial space due to the difference between the subsectors within the sector. For example, some subsectors of the administrative, support, and waste management group usually locate on industrial land (waste collection and treatment) and others do not (office administrative services).
2. Different industries require different types of industrial space, and different types of industrial space support different employment densities.

We recreate these relationships for four different scenarios with increasingly loose definitions of "industrial" to create a range of projections. Descriptions of each of the scenarios follows, and is summarized in Exhibit A-3:

- **Level 1: narrower definition of industrial.** Allocates 100% of employment in sectors identified by the Howland report to industrial space: construction; manufacturing; wholesale trade; and transportation, warehousing, and utilities. Wholesale trade and transportation, warehousing, and utilities locate 100% of employees in warehousing space, construction locates 100% in light industrial space, and manufacturing locates in a mix of light industrial, heavy industrial, flex space, and light office space.[14]
- **Level 2: broader definition of industrial.** Allocates all Level 1 employment to space as previously described, plus portions of employment in the following sectors: natural resources and mining; professional, scientific and technical services; and admin, support, and waste management. Natural resources and mining would locate in heavy industrial space; professional, scientific, and technical services would located in flex space or light office / business park space; and admin, support, and waste management would locate in warehousing space.
- **Level 3: broadest definition of industrial.** Allocates all Level 1 and Level 2 employment to industrial space, plus a portion of employment in management of companies and enterprises and small additional

[14] Assuming that 100% of new construction employment is looking for new industrial space is questionable. A lot of construction employment uses very little space directly: construction workers report to a construction site, not a construction facility. Counting all construction workers as needing industrial space will overestimate land need, other things being equal.

portions of professional, scientific, and technical services and admin, support, and waste management. Employment in management of companies and enterprises would locate on flex space or light office / business park space.

- **All-employment comparison.** Allocates all employment in every sector to building space. This includes employment in typically non-industrial types, such as retail space, light office, and downtown buildings. This is an estimate of total employment land need, even if it is not all industrial.

Exhibit A-3. Summary of definitions for industrial land

Industrial Definition	Industry Sector	Percent of employment allocated to industrial land	Type of building space in which employment will locate
Level 1	Construction	100%	Light ind
	Manufacturing	100%	Light and heavy ind, flex, light office
	Wholesale trade	100%	Warehousing
	Transportation, warehousing, utilities	100%	Warehousing
Level 2	All Level 1 employment, plus...		
	Natural resources and mining	60%	Heavy ind
	Professional, scientific, technical services	20%	Flex
	Admin, support, waste management	15%	Warehousing
Level 3	All Level 1 and 2 employment, plus...		
	Management of companies	20%	Flex
	Professional, scientific, technical services	10%+ Lvl 2	Flex
	Admin, support, waste management	5% + Lvl 2	Warehousing
All employment comparison	All Level 1, 2, and 3 employment plus...		
	All remaining employment in all sectors	100%	Spread across all types

Source: ECONorthwest

Step 3: Assign employment density to building types

The type of built space employers need can be expressed as employment densities. For instance, employment-per-acre (EPA) is a measure of employment density based on the number of employees per acre of employment land that is developed for broad categories of employment uses (such as industrial or office). As part of this step, we identify the site characteristics and infrastructure desired by various types of employers. We also use information provided by the Chamber of Commerce to describe types of sites that have not been available for industries seeking sites in the past.

The result of this step is an estimate of the amount and type of land needed to accommodate forecasted employment growth. To convert employment growth into land need, ECO identified a variety of industrial land space types that will accommodate future employment. Each type of

space has a typical average employment density that estimates needed acreage. Exhibit A-4 shows these types and their corresponding densities.

Exhibit A-4. Industrial building space types and employment per acre

Space type	EPA
Light industrial	20
Heavy industrial	10
Warehousing	6
Flex	25
Retail	30
Light office	35
Downtown	100
Institutional	200

Source: ECONorthwest

Step 4: Forecast future consumption of industrial land

This step merges the employment forecast with the land type allocation for each scenario. For example, Step 1 estimated 95 new wholesale trade employees in 2011. Step 2 determined that all these employees would locate in warehousing space, which Step 3 determined holds 6 employees per acre, resulting in 16 acres of land needed for wholesale trade employees in 2011 in the Oklahoma City MSA. We repeat this process for each industry sector in each land need scenario.

Step 5: Make any adjustments to account for non-industrial employment demand for space in office and business parks

In Oklahoma City, the large majority of demand for and interest in large employment sites comes from businesses that would be classified in Table A-3, Level 3, as industrial. The development of large office parks is not common. Thus, we expect any adjustments here to be relatively small.

A.4.2 METHODS BASED ON HISTORICAL LAND ABSORPTION

After performing the forecast of land absorption based on employment growth, ECO crosschecked its conclusions against a direct forecast of land absorption based on historical rates of absorption. Section B.3.2 in Appendix B details this framework and explains how it can help validate the conclusions from the main analysis.

Appendix B Future Demand for Industrial Land in Oklahoma City

B.1 INTRODUCTION

The City of Oklahoma City engaged the ECONorthwest team (ECO) to prepare an Employment Land Needs Assessment and Action Plan (ELNAAP). Task 3.2 of the Scope of Work required that ECO prepare the "Employment Land Needs Assessment (Demand)" component of that larger assessment. Appendix A describes possible methods for doing that assessment. This appendix uses those methods to make a forecast of demand for industrial land in Oklahoma City.

Critical to an understanding of the analysis that follows is the distinction between average acres of annual absorption of industrial land and acres of development-ready land needed and available now and on and ongoing basis so that industrial growth is not constrained by a lack of suitable sites. The former is a smaller number than the latter because there must be some choice in the market for it to operate efficiently. There must be more land available in a market than what gets consumed, on average, each year. Moreover, the amount of absorption in a boom year may be two to three times the annual average absorption. Our forecast in Section B.2, and the discussion in Section B.3, is about average annual absorption. Section B.4 address estimates of short-run need for available industrial land.

This appendix has five additional sections:

- **Section B.2, Preliminary forecasts of average annual demand for employment land**: two different forecasting methods are used and compared
- **Section B.3, Further evaluation of the preliminary forecasts**: national and local factors that might suggest adjusting the preliminary forecasts shown in B.2.
- **Section B.4, Site needs** goes beyond average annual demand to look at the types of buildings and sites that various industries might require.
- **Section B.5, Summary assessment of the demand for industrial land**.
- **Data Supplement.** More detailed information that supports the previous sections.

B.2 PRELIMINARY FORECASTS OF AVERAGE ANNUAL DEMAND FOR EMPLOYMENT LAND

B.2.1 FORECAST BASED ON FORECASTED EMPLOYMENT GROWTH

Exhibit B-1 shows the employment forecast for Oklahoma City from 2008-2030. As explained in Section A.4.1, our forecast is based on a statewide forecast, by industry, through 2018 that we then extrapolated to 2030. The share of employment locating within Oklahoma City was determined by its historical share of MSA and statewide employment. The fastest-growing industry is projected to be professional, scientific, and technical services with 2.4% average annual growth. The industry projected to add the most total jobs over the period is education and health services with nearly 30,000.

Of the sectors composing the narrowest industrial definition (See Table A.3, Appendix A), construction is projected to see the fastest average annual growth at 1.9%. The other three (manufacturing, wholesale trade, and transportation and warehousing) are all expected to grow at 0.6% or less annually. Total employment is projected to grow at 1.0% annually.

Exhibit B-1. Employment Forecast, Oklahoma City, 2008-2030

					Change 2008-2030		
Industry Sector	**Base 2008**	**2010**	**2020**	**2030**	**Number**	**Percent**	**AAGR**
Natural Resources and Mining	17,429	17,606	18,515	19,471	2,042	12%	0.5%
Construction	17,545	18,234	22,113	26,815	9,271	53%	1.9%
Manufacturing	23,251	23,341	23,800	24,268	1,018	4%	0.2%
Trade, Transportation, and Utilities	63,546	64,362	68,603	73,123	9,577	15%	0.6%
Wholesale Trade	14,400	14,520	15,132	15,770	1,369	10%	0.4%
Retail Trade	38,973	39,538	42,488	45,659	6,686	17%	0.7%
Transportation and Warehousing	8,189	8,293	8,830	9,403	1,214	15%	0.6%
Information	8,146	8,046	7,563	7,108	-1,038	-13%	-0.6%
Financial Activities	20,954	21,130	22,030	22,968	2,014	10%	0.4%
Professional and Business Services	49,879	51,555	60,823	71,756	21,877	44%	1.7%
Professional, Scientific, and Technical Services	18,618	19,504	24,611	31,054	12,436	67%	2.4%
Management of Companies and Enterprises	3,842	3,898	4,189	4,502	660	17%	0.7%
Admin, Support, Waste Mgmt and Remediation	27,340	28,081	32,094	36,680	9,340	34%	1.3%
Education and Health Services	85,415	87,768	100,538	115,167	29,752	35%	1.4%
Educational Services	43,625	44,275	47,674	51,335	7,710	18%	0.7%
Health Care & Social Assistance	45,815	47,542	57,202	68,824	23,010	50%	1.9%
Leisure and Hospitality	36,927	37,773	42,297	47,363	10,435	28%	1.1%
Other Services (Except Government)	15,974	16,200	17,380	18,647	2,673	17%	0.7%
Government	36,950	37,723	41,839	46,404	9,453	26%	1.0%
Federal Government	15,488	15,527	15,726	15,927	440	3%	0.1%
State and Local Government	24,550	25,224	28,877	33,060	8,510	35%	1.4%
Total Employment	**376,016**	**383,738**	**425,500**	**473,090**	**97,074**	**26%**	**1.0%**

Sources: Oklahoma Long-Term Industry Employment Projections, 2008-2018
www.ok.gov/oesc_web/documents/lmistwideindproj0818.pdf,
Oklahoma City Chamber of Commerce 2011 Greater Oklahoma City Economic Forecast,
http://www.greateroklahomacity.com/clientuploads/pdf/2011_GreaterOKC_EconomicForecast.pdf
Calculated by ECONorthwest

Exhibit B-2 shows summary land demand results for all three definitions of industrial employers, the primary subset of employers looking for large

sites (see Table A-3: definitions of industrial get broader and include more business types as one moves from Level 1 to Level 3). Again, all scenarios use the employment forecast above; the difference is in the industries that are assumed to locate on industrial land. In the three industrial land scenarios (Levels 1-3) the average annual land need ranges from 43 to 70 acres per year—or from 904 to 1,470 acres between 2010 and 2030. In these three scenarios, total employment on industrial land would grow between 0.85% and 0.96% annually, or by between 11,868 to 18,293 jobs over the 2010-2030 period. Density of the new employment ranges from 15.5 to 16.5 jobs per acre of industrial land.

The last scenario looks at *all* employment (not just industrial employment) and does *not* assume that all (or even most) of that employment would go on industrial land. This comparison is intended as a rough estimate of the *total* amount of land needed for all employment in Oklahoma City. The estimated average annual absorption of vacant land is about 180 acres. The employment density on this land would be around 40 employees per acre due to a higher number of jobs in downtown or institutional uses.

Exhibit B-2. Summary industrial land demand results, 2010-2030

Industrial Definition	Avg. annual emp. growth on ind. land 2010-30	Emp. growth on industrial land 2010-30	Average density of emp. growth	Average annual land need (acres)	Total land need (acres) 2010-30
Level 1	0.85%	11,868	16.5/acre	43	904
Level 2	0.91%	16,540	15.5/acre	64	1,340
Level 3	0.96%	18,293	15.7/acre	70	1,470
All employment comparison	1.06%	90,568	40.2/acre	180	3,772

Source: ECONorthwest

B.2.2 FORECAST BASED ON HISTORICAL REAL-ESTATE TRENDS

Appendix A explains the difference between direct and indirect forecasting. We chose the indirect forecast as the best method (results shown above), but creating a simple framework for the direct method can help reaffirm our conclusions from the main analysis.

Forecasting future land demand solely as a function of historical land demand requires real estate market data. Grubb & Ellis gather real estate data from a variety of sources, and have reported industrial land[1] inventory, vacancy, absorption, and construction from 1999 to 2009, as

[1] Note that the definition of "industrial" here is narrower than the one from the indirect forecast. This inventory only counts buildings greater than 10,000 square feet.

shown in Exhibit B-3. During that 11-year period, the average net absorption per year was about 1.6 million square feet.[2]

Exhibit B-3. Industrial space inventory, vacancy, absorption, and construction in square feet, Oklahoma City, 1999-2009

Year	Inventory	Vacancy Rate	Net Absorption	Under Construction
1999	72,403,000	4%	1,260,000	410,000
2000	74,500,000	4%	1,013,000	1,270,000
2001	74,502,000	11%	-546,000	900,000
2002	75,253,000	16%	-1,622,000	1,520,000
2003	76,021,000	17%	2,317,000	859,000
2004	77,057,000	12%	2,945,000	1,450,000
2005	79,307,000	11%	2,100,000	2,250,000
2006	80,798,000	8%	1,632,000	991,000
2007	81,274,716	13%	366,021	1,882,000
2008	84,241,569	14%	1,545,886	212,000
2009	83,339,815	13%	578,849	1,267,000

Source: Caitlin Dempsey and Randy Lacey, Grubb & Ellis
Note: Inventory, absorption, and construction figures in square feet. Industrial land includes both speculative and built-to-suit industrial properties greater than 10,000 square feet.

The factors that would affect a forecast of industrial land based on historical trends are:

- **Slowing inventory growth.** Between 1999 and 2006, the inventory of industrial space grew by 1.6% annually. From 2006 to 2009, the inventory grew at a slower rate (1.0%) despite nearly two million square feet of construction in 2007 right before the beginning of the recession. Between 2008 and 2009, Oklahoma City lost over 900,000 square feet of industrial space.
- **Relatively high vacancy rates.** Vacancy rates jumped dramatically between 2000 and 2001 (from 4% to 11%) and have remained in the double-digits in every year except 2006. High vacancy rates create a buffer of available space and delay the need for existing inventory and new construction.
- **Slowing absorption and construction.** Absorption is the act of vacant employment space being filled by a new tenant. In the context of a large market, net absorption is the difference between the positive effect of vacant space being filled and the negative effect of occupied space becoming vacant. From 2003 to 2006, net absorption averaged positive 2.25 million square feet per year. From 2007 to

[2] Industrial space counted in the data includes both built-to-suit space and speculative space available for occupancy. Any buildings under 10,000 square feet are excluded, so inventory figures are understated. Confirmed with conversation with Randy Lacey, Grubb & Ellis.

2009, this number fell to 830,000 square feet per year. New construction slowed from 1.4 million square feet per year to 1.1 million square feet per year over the same time periods. Low absorption and construction are signs of the recession. The key and difficult judgment for forecasting is whether the recent reductions in absorption are cyclical (suggesting a return to higher level in the future) or secular (i.e., the beginning of a trend that will continue at lower than historical levels).

B.2.3 LINKING THE TWO FORECASTS

A method of validating our results is to look at comparable points from separate forecasts and see if they agree. This crosswalk is possible between our initial analysis and the direct forecast just described.

Section B.2.1 estimates future demand for industrial land using employment forecasts to allocate workers to industrial land types. The employment forecast we used had a baseline year of 2008, and using our allocation method we can estimate industrial land inventory in 2008. Comparing this number to actual observed inventory from the real estate data can help verify the accuracy of our allocation model.

The floor-to-area ratio of typical development on industrial land usually ranges from 0.20 to 0.40, meaning that 100 acres of industrial land holds between 20 and 40 acres of actual built industrial space (usually counted in square feet). Our Level-1 scenario estimates an industrial land inventory of 5,738 acres in Oklahoma City in 2008. As seen in Table B-3, Grubb & Ellis report there were 84.2 million square feet of industrial space in Oklahoma City in 2008 (not counting buildings of less than 10,000 square feet). For 84.2 million square feet to fit on 5,738 acres, the floor-to-area ratio would be 0.337 (slightly higher if the space in buildings smaller than 10,000 square feet were counted), which is within our suggested range. The Level-2 and Level-3 analyses both result in a floor-to-area ratio around 0.25, also within the range. That simple cross check supports the conclusion that our forecasts are in a reasonable range.

Looking at it a different way, if (1) an average of 1.1 million square feet of industrial space are absorbed each year (the average for 1999 to 2009), (2) if all of that square footage is new space built on vacant industrial land, and (3) if the average FAR is around 0.3, then Oklahoma City would absorb about 85 acres of industrial land per year. That is 15 acres per year higher than our Level-3 estimate.

Appendix A notes that the estimate of demand for "industrial" land may need to be adjusted to include additional land for non-industrial uses that

might want land in large business of office parks. This type of development has been uncommon in Oklahoma City, but it could increase in the future. The variability in the estimates here is large. Such business and office parks vary in size from 25 to several hundred acres. Full development may take over 20 years. The average annual demand in Oklahoma City over the next 20 years could be as low as a couple acres a year. Our best estimate is 5 to 10 acres per year for employment that is not already counted in the industrial estimates. That would take the total average annual absorption up to about 90 acres.

There are all kinds of reasons that one might make adjustments to the numbers that go into calculating the 90 acres, but for the purposes of this study, being off by a few tens of acres per year will not make much difference to the overall conclusions and policy recommendations.

In summary, we think our baseline forecasts, based on historical absorption rates, are reasonable.

B.3 FURTHER EVALUATION OF THE PRELIMINARY FORECASTS

Exhibit B-2 is the baseline forecast of annual average absorption of industrial land. This section provides information about factors that might cause that baseline forecast to move up or down. The data presented do not directly influence the forecast in a mathematical way. Rather, they are intended to contribute qualitatively to an understanding of future economic and land use conditions in Oklahoma City so that people can make judgments about whether the baseline forecasts should be adjusted up or down.

In the last decade it has become increasingly the case that (1) except in a handful of metropolitan areas, metropolitan economies move with the national economy, and (2) the national economy is more volatile than it has been at any time in the last 50 years. Land needs in the Oklahoma City area over the next twenty years will unfold in the context of long-run national economic trends.[3] If one expects those trends to be similar in the future to their conditions in the past, then one can have more confidence in a forecast of land need that is simply an extrapolation of past rates of absorption. But if one expects changes in economic trends, then one might want to forecast land absorption based on an independent forecast of some factor that can

[3] Much of this section is drawn from recent work done by ECONorthwest for the City of Eugene, Oregon.

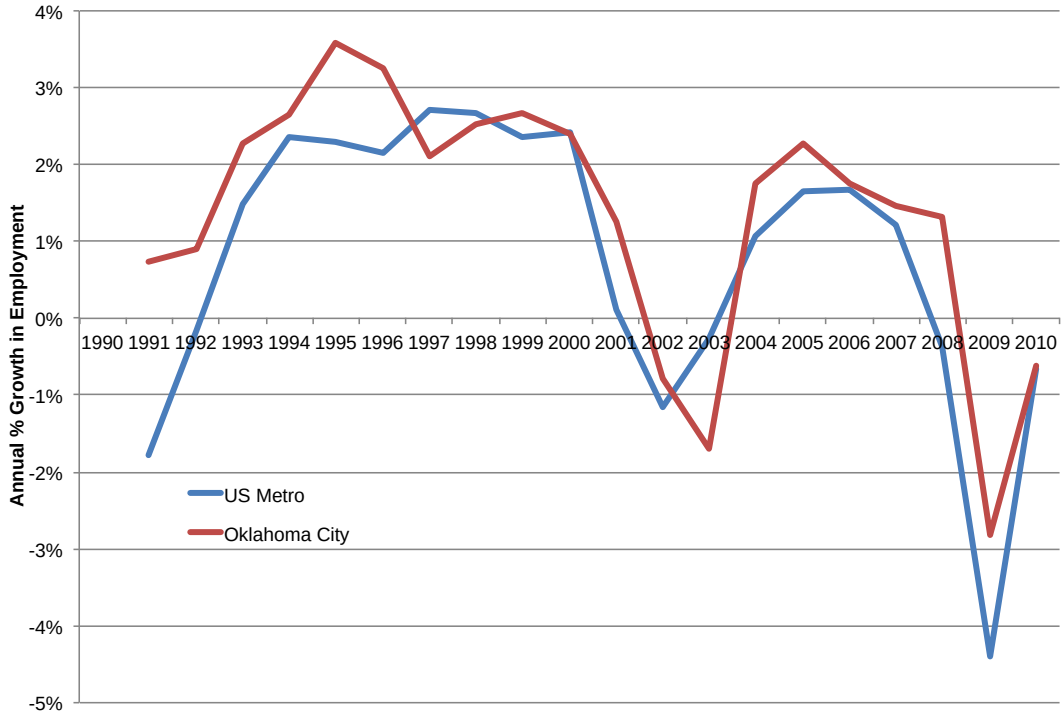
be tied to those economic changes and correlated to land absorption (e.g., employment).

A quick overview of economic factors suggests mixed signals for the national economy. Oklahoma City seems to be in a good position for economic growth. It is the capital and dominant metropolitan area in a state that has energy resources, has plenty of raw land, and relatively low cost of living. But its growth is not independent of national conditions:

- **National and local recovery from the current recession.** Although the recession of the late-2000s is officially over, the recovery process has proven to be long and painful. The driver behind demand for industrial land is employment, and the national unemployment rate in March 2011 was 8.8%, the lowest it has been in two years, but still much higher than the mid-4% rates seen for much of 2006 and 2007.
- **Unemployment rate.** The unemployment rate in the Oklahoma City MSA has been about 1.5% lower on average than the national rate over the past decade. In April 2011, Oklahoma City's unemployment rate fell to just 4.5%, compared to 9% nationally.[4]
- **Oklahoma City's role in State's economy.** Oklahoma City is the largest, most diverse, and most economically active metropolitan area in the State. The Oklahoma City Metropolitan Statistical Area contains about a third of the State's population, about 35% of the State's labor force, and a higher proportion of residents with college degrees. These factors suggest that economic activity in the Oklahoma City area will grow at least as fast as (and possibly faster than) in the rest of the State.
- **Expected long-run growth in population and employment.** All the state and local agency forecasts are for increases. These forecasts may, of course, prove wrong: it is increasingly common for long-run forecasts to get adjusted more substantially based on recent economic performance. But *if* the US economy grows in the long-run, *then* there is good historical evidence to suggest that Oklahoma City will participate in that growth. Exhibit B-4 shows the tight relationship between employment growth in all US metropolitan areas and growth in Oklahoma City.

[4] Bureau of Labor Statistics. http://www.bls.gov/data

Exhibit B-4: Annual employment growth rate, OKC vs. US metro average, 1990 - 2010



Source: Bureau of Labor Statistics

- **Federal budget problems.** As this report was being written, the Congressional Joint Select Committee on Deficit Reduction announced that it had failed in its charge to find and agree on cuts that would reduce the federal deficit by $1.2 trillion over 10 years. As a result, the law requires that the US Treasury withhold money ("sequestration") and that federal civilian and military spending begin reductions in 2013. In the state of Oklahoma and the Oklahoma City metropolitan area, the portion of employment that is federal is large relative to that for all metropolitan areas. In Oklahoma City, on the order of 7% of the total employment is federal (civilian plus military). Tinker AFB is surrounded by defense contractors, and, at least as things stand now, military spending is not protected from possible cuts.
- **Possibility of short-run surge in demand for employment land.** Consultants who manage site selection for large businesses report that they are busier than they have ever been, suggesting pent-up demand for large employment sites. According to one consultant "they (clients) are still not quite ready to 'pull the trigger,' but the economic forces compelling them to seek more competitive locations only intensified during the recession." Analysts have observed a combination of factors that suggest pent-up demand:

- Conservative business practices, in place since 2007, have left large corporations flush with cash. According to the Federal Reserve's quarterly flow of funds report, corporate liquid assets, as a share of total assets, currently average 6.12 percent, the highest rate since 1959. The companies with the highest reserves are, not surprisingly, the largest ones, including the big name computer companies, major manufacturers, and oil and gas companies. These well capitalized companies, now more than ever, will be the drivers of job creation.
- Corporate credit markets are softening up and big banks have money to lend to large, established customers.
- A lower dollar and resumption of growth in domestic demand for goods and services means that off-shore operation, at least for the time being, has reached or perhaps exceeded its potential: many higher-end customer service operations are looking for the right time to come home.

Uncertainty about the pace of the recovery and political turbulence around bottom-line issues such as healthcare, the environment and the deficit have kept companies cautious even with the recovery well under way. Many discretionary projects, including relocations and expansions, are set for implementation, but remain on hold awaiting the moment when the future appears somewhat more certain.

A competitive business cannot defer investment indefinitely: pent-up demand for technological improvements and expansion is mounting. Large companies in sectors including IT, customer service, and advanced manufacturing are primed to invest their significant reserves in large scale operations and, just as they did before the recession, they will be looking to site those facilities in communities that can promise an ongoing supply of highly skilled labor. A surge in expansions, relocations, and hiring by national companies seeking large facilities appears likely. One site selector predicts that it will begin as early as next year and last through 2015 before it normalizes.

Predicting the exact timing and regional locations of this surge is, of course, difficult. But communities should be positioning themselves to capitalize on this opportunity by focusing at least part, and perhaps a large part, of their recruitment efforts and their strategic infrastructure and workforce development investments on preparing for these large projects.

The factors described above are both positive and negative for economic growth in Oklahoma City. Section B.5 contains our assessment of the

overall effect and the implications for demand for industrial land in Oklahoma City.

B.4 SITE NEEDS

Exhibit B-3 above shows estimates of average annual absorption for industrial land in Oklahoma City. But, as noted at the beginning of this appendix, our estimate of *average acres* of annual absorption of industrial land is not an estimate of *acres of development-ready land needed and available now so that industrial growth is not constrained by a lack of suitable sites*. This section makes the latter estimate, and has three parts:

- Types of businesses the city hopes will be looking for sites.
- Prior constraints on development in Oklahoma City from limitations of buildable land
- Estimates of need for development-ready industrial land in Oklahoma City.

B.4.1 POTENTIAL GROWTH INDUSTRIES

A growth strategy identified in Oklahoma City's Comprehensive Economic Development Strategy is to retain and grow existing businesses and targeted clusters. Those targeted clusters are bioscience, renewable and alternative energy, aerospace, distribution, and manufacturing. This section contains ECO's comments on each of these industries in regard to their impact on industrial land need in Oklahoma City.

- **Bioscience.** Battelle and the Technology Partnership Practice prepared *Moving Forward Together: Greater Oklahoma City's Bioscience Future* in 2005. Identified in the report as a potential high-growth industry in this cluster are hospitals and labs. Large-scale employment growth in this area is likely to take place in dense, institutional development, maybe in office parks, but perhaps in denser employment areas with smaller parcel sizes than the ones that are the minimum thresholds for this evaluation of large employment sites. This industry cluster is unlikely to create sudden, unforeseen demand for industrial land.
- **Renewable and alternative energy.** Although economic development policies are focused on renewable and alternative energy, the current and larger comparative advantage for Oklahoma City is in extractive (fossil fuel) energy due to the presence of nearby resources and the existing infrastructure, capital, and professional support already in place due to the region's historical economy. The need for land is not

an issue in the city limits of Oklahoma City for either extraction of fossil fuel (extraction of oil now occurs throughout the City, and little land is needed for a well-head and pump) or for office space (the largest employers in this field (e.g., Devon) are using downtown office space, not industrial space). The professional technical and legal knowledge about energy, however, is at least partially transferrable and may help attract businesses manufacturing equipment for renewable and alternative energy, and they may need large industrial sites.

- **Aerospace.** The two largest employers in the aerospace industry in Oklahoma City are Tinker Air Force Base and the FAA's Mike Monroney Aeronautical Center. Growth around these two locations would require expansion of current facilities onto immediately adjacent land, and at fairly high densities, which would limit the implications for additional industrial land. The potential for high land demand comes from new industries that either support these two federal institutions, or are attracted to Oklahoma City for its growing aerospace cluster and other advantages (e.g., workforce, quality of life). Some, perhaps a majority, of the private-sector demand in this sector will be for office space in stand-alone offices and office parks near the these locations, but if the City is to attract an industrial operation (as it attracted Boeing's) it will need some large sites.
- **Distribution.** Distribution is a not a particularly specialized industry sector; every large city needs some level of distribution services to function. Distribution employment tends to locate on large industrial parcels with low density and low floor-area ratios. Our demand model assumed employment in transportation, warehousing, and utilities would locate on land averaging just six employees per acre. If Oklahoma City's economic development policies attract an unexpectedly large number of distribution jobs, industrial land demand would increase beyond our baseline forecast.
- **Manufacturing.** The industrial land demand implications for rapid growth in employment in manufacturing are smaller than those for distribution. In our demand model, the average manufacturing employee creates just one-fourth the land demand a distribution employee would. Nonetheless, manufacturing growth is projected. The City's recruitment history suggests that some of that growth will come from larger manufacturers looking for larger sites, and the City will need to have a few large, development-ready sites to attract them.

B.4.2 MISSED OPPORTUNITIES

The Greater Oklahoma City Chamber of Commerce keeps a record of unsuccessful business recruitments. Between November 2005 and August 2009, there were 20 such recruitments, including three that would have brought over 2,000 jobs each.

The most cited reason for the failed recruitment was a lack of adequate selection of sites that met the requirements of the company. These requirements included supply for large water or electricity demands, and proximity to rail service or highways. Another issue that arose several times was that businesses wanted the City to provide the site at reduced or no cost.

B.4.3 ESTIMATES OF NEED FOR DEVELOPMENT-READY INDUSTRIAL LAND IN OKLAHOMA CITY

Oklahoma City is likely to have growth in a full range of industrial sectors. Different industries have demand for different types of buildings and land with varying characteristics, and businesses within the same sub-sector will want different types of buildings.

For example, a warehousing firm may need a relatively large building on flat land that is located near a major highway or interstate interchange. A bioscience firm may need to locate in or near a hospital, with laboratory and office spaces. While the bioscience firm needs ready access to transportation, it does not need to locate near to a major highway or interstate interchange. Exhibit B-5 summarizes the lot sizes typically needed for larger firms in selected industries.

Exhibit B-5. Typical lot size requirements for larger firms in selected industries

Industry	Site Size (acres)
Manufacturing	
Fabricated metals	10 to 20
Food processing	10 to 50
Electronics	10 to 100
Industrial machinery	10 to 20
Alternative Energy	
Solar	60 to 100+
Biomass	25 to 60
Biomedical	
Manufacturing pharmeceuticals	40 to 60
Research or laboratories	10 to 30
Device design	1 to 10
Warehousing	25 to 120

Source: ECONorthwest.

Note that Exhibit B-5 gives a *broad range* of what might be typical for *larger* firms. Most firms, even in industrial sectors, are not large. Small sites will suit most of them. Many will lease space rather than own it. The issue about larger parcels can, however, affect them indirectly: many might like smaller, leased spaced in industrial and offices parks, and the developers of such employment parks need larger parcels.

The conclusions we draw from these considerations are:

- Trying to match targeted industrial sectors to specific site types and sizes may make sense for some targeted industries. The State of Oklahoma's site profiles identify specific site needs for specific industry types; site selectors know demands by industry. For a few industrial sectors that a city or region has targeted and are specialized (e.g., in Oklahoma City, biosciences and aerospace), it makes sense to ensure that ample sites in the right location are available.
- But the City is open for business to all industrial sectors. It does not make sense for it to try to identify which sites are best for each. For the large majority of industrial sectors, it makes more sense to have a range of readily-buildable sites of different sizes in different locations. A variety of sites in the inventory makes a place more competitive.
- The experience of the Chamber of Commerce with successful and unsuccessful recruitment suggests that there is ongoing demand for large sites in the industrial land inventory; the estimates in Exhibit B-5 suggest that 100+ acres is the size that some firms might look for. For example: a major warehousing / distribution center or alternative energy or electronics manufacturing might be looking for on the order of one million square feet of built space and 100 acres. Companies also need corporate campuses for expansion. It is common for firms to purchase 75-100+ acre sites for development that occurs in phases over many years. Between 2006 and 2009 the Oklahoma City Chamber of Commerce documented 20 engagements with large business that did not result in a location because of some variation of "lack of adequate sites." One business wanted 1,500 to 2,500 acres; two wanted 300 to 500 acres; eight wanted 80 to 150 acres; eight wanted 30 – 50 acres; and one wanted 20 acres. Dell Computers came to Oklahoma City in 2004 on a site of 75 acres and has built two of its planned three buildings. Its peak employment was 2,300. Boeing occupied about 500,000 square feet on 30 acres (relatively dense) and is now expanding.

- In general, any big sites are a long way from services. The City has only a few privately-held, serviced sites of 50 acres or more.

Making an estimate of the amount of development-ready land needed requires another judgment: about how much choice there needs to be in the land market. Though there is no debate that there needs to be more land on the market than the amount that gets used for development each year, there is no consensus in the professional literature of land-use planning and urban economics about how much more. From the perspective of industrial recruitment alone, more land and choice is better. But that land needs services: there are constraints on budgets of agencies that provide those services, and having an excessively large inventory of serviced land sitting idle for years is inefficient.

It is common for land-use plans to look out 20 years and to make estimates so that there is adequate land to accommodate 20-years of expected growth. But that is a *long-run* supply issue; the question here is about ongoing *short-run* supply. One urban economist speculates that, on average, a well functioning market should, at any given time, have an amount of land equal to about three times average annual absorption.[5]

But even if that assessment were correct on average for all industrial land, does it also have to be true for every sub-category of industrial land? Does a region need development-ready sites of different types (for different types of users) in different sizes in different locations? If so, then it needs hundreds of acres of development-ready industrial land. And would a city half the size and another twice the size of Oklahoma City all have the same land need if they were all trying to attract the same types of industries?

If it is relatively easy (from a policy and cost perspective) to provide development-ready (or almost-ready) sites, then having more sites is good for all the things the City wants to achieve with industrial development. At some point, however, the cost of infrastructure extension and idle capacity feed back on the City's fiscal position, and may eventually affect its ability to provide other desirable facilities and services. So the question about "the right amount" of development-ready land is a relevant one. A concern in Oklahoma City that led, in part, to this study was that the City had adequate vacant land but that it lacked sufficient infrastructure funding and policies to ensure that developable land can be delivered to the market when the opportunities come.

[5] Personal communication, Dr. Gerrit Knaap, National Center for Smart Growth Research and Education, University of Maryland.

The next section describes the conclusions we draw from all those considerations.

B.5 SUMMARY ASSESSMENT OF DEMAND FOR INDUSTRIAL LAND

This appendix takes a long-run perspective on economic conditions; it does not attempt to predict the impacts of short-run national business cycles on employment or economic activity. Some of the implications of these trends on our forecast of Oklahoma City's industrial land needs are:

- **Oklahoma's and Oklahoma City's population and employment are expected to grow for the foreseeable future.** The City's growth rates are expected to exceed the State's.
- **But forecasting economic conditions has become an increasingly imprecise endeavor.** Markets are much more volatile. Local economies depend on the national economy, which in turn is influenced by national economic policy and global economic conditions.
- **The signals for economic growth in Oklahoma City, as in all the US, are mixed.** In the US, consensus forecasts about the speed of the recovery from the most recent recession have been continually adjusted downward. Federal budget and consumer debt problems exacerbate structural economic problems. Nonetheless, all mainstream forecasting bodies expect the US economy to grow, just more slowly. And the economic downturn is not affecting all sectors and all locations equally. We noted above evidence of pent-up demand nationally. In Oklahoma City, housing, employment, and banking conditions all seem better than US average. The construction of the Devon Tower has helped keep construction employment high, but it will soon add almost two million square feet to office inventory, which will have implications for new construction as the occupancy of the new and old space gets sorted out.
- **Industrial employment has been growing slowly, and even declining in some cases, but State forecasts are for moderate growth.** Aggregate employment in construction, manufacturing, wholesale trade, and transportation and warehousing is projected to decline by 0.5% annually in Oklahoma between 2009 and 2012. The State projects those industries will grow by 0.7% annually between 2008 and 2018. The State also projects that manufacturing

employment will grow slowly in the long run. This projection is at odds with the recent trends in the US, where manufacturing has been shedding jobs at a high rate.

- **The demand for industrial land will not simply go away.** Despite structural shifts in the economy and changing business practices, if and as population and employment grow, the need for industrial sites to serve expanding and growing companies will remain. Certain functions like distribution and utilities are required to accommodate growth, and are largely unaffected by the economic trends that cause job loss in industries like manufacturing.

Given these considerations and others described previously in this appendix, ECONorthwest believes the long-run forecasts of agencies for long-run growth of population and employment are justifiable. In fact, it would probably be poor planning to assume otherwise and then be unprepared to deal with growth.

What is evident, however, is that long-run forecasting, which has always been uncertain, may be even more uncertain now. There are relatively low rates of utilization of industrial capacity across the country, the federal budget problems may lead to less spending, ongoing trends in globalization reduce demand for some types of US manufacturing, and demands for and success in delivering more productivity may mean less demand for industrial employment and certain types of industrial space. All these factors may slow down the rate at which new development occurs in Oklahoma City, but they are unlikely to erase the long-run demand for new industrial space and land.

Given those points, ECONorthwest further believes that the forecasts of average annual absorption for industrial land (shown in Exhibit B-2 above) are reasonable for the purposes of this project. In broad terms, the expectation is for an annual average of 70 to 90 acres of vacant employment land to be developed with buildings for industrial / business park users each year.

But for decisions about City policies for employment land, average annual absorption is a useful benchmark but not the key issue. *The key issue is whether policy is efficiently assisting with the provision of an adequate supply of development-ready land for new industrial development, in suitable sizes and locations.* The practical question this demand analysis should answer is: *How much development-ready land, in what site sizes and what locations, would be adequate to provide for local start-ups and expansions, and for larger-scale new development?* Here is a summary of our assessment and recommendations:

- **Not all new development occurs on "vacant" land**. By definition, all businesses now in operation are operating in buildings that are on "developed" parcels. Some of those buildings have vacant space, some businesses have opportunities for getting more employment into existing space, technological changes can increase productivity and allow business output to grow at a much faster rate than employment, and some businesses bought an amount of land adequate to handle future expansion. The implications are that (1) not all the forecasted new employment will need new space, and (2) not all the new space it does need will go on land that the Industrial Land Supply Analysis in this study (Appendices C and D) identifies as vacant. A further implication is that this effect would cause the estimates of average annual absorption of industrial land in Exhibit B.2 to be overstated.
- **A lot of the new development that does occur will occur on smaller parcels that appear to be in adequate supply around the City.**
- **Thus,** ***the key issue for industrial land policy in Oklahoma City is having an adequate supply of larger sites for larger businesses (expansions and recruitment) and industrial and office parks.*** How much land is "adequate"? Here are some considerations:
  - **Warehousing and distribution**. Oklahoma City is not a first-tier location nationally: its percentage of employment in both the "wholesale trade" and "transportation and warehousing" sectors is below the national average. But it is a regional center and a crossroads for three interstate highways. Having two or three large sites (100 acres) that *could* be used for warehousing and distribution (as well as other industrial uses) is reasonable.
  - **Manufacturing**. The well-documented decline of manufacturing employment in the US is expected to continue. But manufacturing will still account for around 7% of the total employment in the US (that percentage is closer to 6% in the Oklahoma City region), and businesses will start and grow even as their overall share of employment may decline. If the City wants to be able to accommodate such industries, it should have at least a couple large sites (on the order of 100 acres) in appropriate areas.
  - **High-tech**. On the City's list of targeted sectors are some that could want large sites: e.g., alternative energy, aerospace, electronics, pharmaceuticals. At least two large sites of approximately 100 acres should be available for high-tech industries.

- **Industrial, research, and office parks**. Some of the sectors that the City wants to retain or recruit may not need very large sites, but they might want five to ten acres in a convenient, secure, up-scale environment. Business parks can offer such an environment. But such parks require large sites that can be prepared by a master developer: 50 to 100 acres would be a relatively small development; large industrial or technology parks can be several hundred to 1,000 acres.
- **These land needs are not strictly additive**. For example, a 100-acre site that is suitable for a single user in a targeted technology sector is probably also suitable for a research or office park; depending on access, it might also be suitable for warehousing and distribution.

How might these ideas be applied in the context of Oklahoma City?

- Large, vacant sites are not going to be available close to downtown. With the exception of the area east of the downtown and north of I-40 (where there may be some opportunity close-in for traditional industrial uses), any industrial development within four miles of the downtown will occur as infill (e.g., west along I-40; north along I-235) or as redevelopment (e.g., just south of the downtown).
- Our supply analysis (Appendices C and D) shows that large tracts of land are only available at the edges of the City. Several of those areas would be suitable for various types of industrial development:
  - While it might make sense to have a large site available to the east around Tinker AFB, our supply analysis shows land in this area and inside the city limits is mainly carved up: we found few, if any, large sites. Moreover, land east of Tinker is farther from existing public infrastructure and facilities.
  - South and southwest of the City there is land with suitable locational and site characteristics. Land around the airport would be a prime candidate.
  - North and west of the downtown, north of the Kilpatrick Turnpike also makes sense.
  - Going farther to the west on I-40 or along the north-south leg of the Kilpatrick Turnpike gives access to a lot of land, but infrastructure cost could be an issue (see Appendix D).

Thus, it seems like the City would be in good shape for retaining and recruiting new industrial businesses if it had (1) at least two, and preferably three sites, (2) for each of at least two broad user types (warehousing /

traditional manufacturing, and high tech / research / office park; the distinction here is between sites that have heavier industrial use and truck/rail traffic, and those that have more office–type use and looking for a more upscale environment), and (3) in each of three size classes (25, 50, and 100+ acres). Ideally, some of those would be in different parts of the City.

Collectively, that means to be competitive, the City needs around 1,000 acres of land that is development ready (ground could be broken in six months to a year) in sites of 25 acres or greater with the greatest focus on sites 100 acres or greater. This could be perceived as a lot of land to have ready to go, especially if the City has to acquire some properties or provide backbone infrastructure to land that now lacks it. The City would still be reasonably well placed with about 500 acres. Anything less than 500 acres is too tight for a city with the size and aspirations of Oklahoma City.

Appendix B Data Supplement

National economy

- **National economic recovery from the current recession.** Despite the unusual depth of the recent recession, the national economy began growing again in 2010. The U.S. Gross Domestic Product (GDP) decreased by 2.6% in 2009 but grew by 2.5% in 2010. The Congressional Budget Office forecasted nominal GDP to grow by 3.1% in 2011, 2.8% in 2012, and 3.4% annually from 2013 to 2016. [6]

  According to the CBO the unemployment rate peaked in 2010. The rate is projected to decline steadily between 2011 and 2016 and then stabilize at a little over 5% until 2021. In comparison, the average unemployment rate from 1999 to 2008 was 5.0%.The CBO projects that inflation will continue to average about 1% annually, changing little in 2011 and 2012, and averaging no more than 2% per year between 2013 and 2016.

  There are good reasons to be skeptical of any economic forecast. Only a month before the collapse of housing markets and financial institutions in the fall of 2008, all of the most common sources of economic forecasts were predicting continued economic growth. The tendency to predict the long-run based on recent short-run experience is pervasive.

  A fundamental question for long-run forecasting is whether the long-run, generally upward trends for the national economy (real Gross Domestic Product, in 2005 constant dollars, grew at an average annual rate of a little over 3% from 1947 to 2010)[7] is going to continue, or whether it will decline (the direction most analysts think is more likely) in response to many global and national economic and environmental changes. Pundits and technicians are lined up on both sides of the argument. In situations like that, a middle-of-the-road forecast is typical: cyclical ups and downs, but long-run growth, though perhaps at a slower pace.

- **The aging of the baby boom generation, accompanied by increases in life expectancy.** The number of people age 65 and older will more

[6] Congressional Budget Office. The Budget and Economic Outlook: Fiscal Years 2011 to 2021, January 2011. Page 27. http://www.cbo.gov/ftpdocs/120xx/doc12039/01-26_FY2011Outlook.pdf

[7] http://www.data360.org/dataset.aspx?Data_Set_Id=354 US Department of Commerce, BEA. During that long period the real GDP *quarterly* growth rate was positive in almost 85% of all quarters. The rolling average *annual* growth rate was 2% or greater for allmost 75% of all quarters, and was negative in about 12% of all quarters.

than double nationwide between 2010 and 2050, while the number of people under age 65 will grow only 20 percent. The economic effects of this demographic change include a slowing of the growth of the labor force, an increase in the demand for healthcare services, an increase in the percent of the federal budget dedicated to Social Security and Medicare,[8] and (in most states) similar pressures on pensions, healthcare, and on state and local government budgets.[9]

- **Long-term need for replacement workers.** Over the long-term, the need for workers to replace retiring baby boomers will outpace job growth. According to the Bureau of Labor Statistics, net replacement needs will be 34.3 million job openings over the 2008-2018 period, more than twice the growth in employment of 15.3 million jobs. Management occupations and teaching will have the greatest need for replacement workers because these occupations have older-than-average workforces.[10]
- **Increases in labor productivity.** Productivity, as measured by output per hour, generally increased between 1947 and 2008. The largest recent increases in productivity occurred between 2000 and 2005, with average annual increases of approximately 3%. Between 2005 and 2008, average annual increases averaged about 1.7%.[11] The largest increases in productivity between 1995 and 2005 were led by industries that produced, sold, or intensively used information technology products. The sectors that experienced the largest productivity increases over the 2000 to 2005 period were: Information, Manufacturing, Retail Trade, and Wholesale Trade. Productivity in mining decreased over the five-year period. [12]
- **Continued trend towards domestic outsourcing.** Businesses continue to outsource work to less expensive markets. Outsourcing generally falls into two categories: (1) moving jobs from relatively

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[8] The Board of Trustees, Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds, 2009, *The 2009 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds*, May 12, 2009.

[9] A recent analysis (Time Magazine, 7 March 2011, page 42) showed Oklahoma in the top 25% of states in terms of per capita pension and long-term liabilities.

[10] T. Alan Lacey and Benjamin Wright, "Occupational Employment Projections to 2018," *Monthly Labor Review*, November 2009, pp. 82-123.

[11] Michael Chernousov, Susan E. Fleck, and John Glaser, "Productivity trends in business cycles: a visual essay," *Monthly Labor Review*, June 2009, pp. 50-63.

[12] Corey Holman, Bobbie Joyeaux, and Christopher Kask, "Labor Productivity trends since 2000, by sector and industry," Bureau of Labor Statistics *Monthly Labor Review*, February 2008.

expensive areas to less expensive areas within the U.S. (e.g., Boeing's move from California to Oklahoma City), and (2) moving jobs outside of the U.S. to countries with lower labor costs. About three-quarters of layoffs in the U.S. between 1995 and 2004 were the result of domestic relocation, involving movement of work within the same company. The industries with the largest amounts of domestic outsourcing were manufacturing, retail trade, and information.[13] Jobs that are outsourced or moved off-shore generally involve operation of technology or use of telecommunications. The service occupations most susceptible to being moved off-shore over the 2006 to 2016 period are computer programmers, pharmacy technicians, parts salespersons, telephone operators, billing and posting clerks and machine operators, computer operators, data entry keyers, and word processors and typists.[14]

- **Continued growth in global trade and the globalization of business activity.** With increased global trade, both exports and imports rise. Faced with increasing domestic and international competition, firms will seek to reduce costs through implementing quality- and productivity-enhancing technologies, such as robotics or factor automation. In addition, some production processes will be outsourced offshore.[15]
- **Continued shift of employment from manufacturing and resource-intensive industries to the service-oriented sectors of the economy.** Increased worker productivity and the international outsourcing of routine tasks led to declines in employment in the major goods-producing industries. Projections from the Bureau of Labor Statistics indicate that U.S. employment growth will continue to be strongest in healthcare and social assistance, professional and business services, and other service industries. Construction employment will grow with the economy but manufacturing employment will decline.[16]

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[13] Sharon P. Brown and Lewis B. Siegel, "Mass Layoff Data Indicate Outsourcing and Offshoring Work," *Monthly Labor Review*, August 2005, pp. 3-10.

[14] Roger J. Moncarz, Michael G. Wolf, and Benjamin Wright, "Service-providing occupations, offshoring, and the labor market," *Monthly Labor Review*, December 2008, pp. 71-86.

[15] Eric B. Figueroa and Rose A. Woods, 2007, "Industry Output and Employment Projections to 2016," *Monthly Labor Review*, November 2007, pp. 53-85.

[16] Eric B. Figueroa and Rose A. Woods, 2007, "Industry Output and Employment Projections to 2016," *Monthly Labor Review*, November 2007, pp. 53-85.; Arlene Dohm and Lyn Shniper, "Occupational Employment Projections to 2016," *Monthly Labor Review*, November 2007, pp. 86-125.

- **The importance of high-quality natural resources.** The relationship between natural resources and local economies has changed as the economy has shifted away from resource extraction. Increases in the population and in households' incomes, plus changes in tastes and preferences, have dramatically increased demands for outdoor recreation, scenic vistas, clean water, and other resource-related amenities. Such amenities contribute to a region's quality of life and play an important role in attracting both households and firms.[17]
- **Continued westward and southward migration of the U.S. population.** Although there are some exceptions at the state level, a 2008 study by the Pew Research Center documents the continuing long-run pattern of interstate population movement from the Northeast and Midwest to the South and West.[18]
- **The growing importance of education as a determinant of wages and household income.** According to the Bureau of Labor Statistics, a majority of the fastest growing occupations will require an academic degree, and on average they will yield higher incomes than occupations that do not require an academic degree. The fastest growing of occupations requiring an academic degree will be: computer software application engineers, elementary school teachers, and accountants and auditors. Occupations that do not require an academic degree (e.g., retail sales person, food preparation workers, and home care aides) will grow, accounting for about half of all jobs by 2018. These occupations typically have lower pay than occupations requiring an academic degree. [19]

  The national median earnings in 2008 was about $34,700. Workers without a high school diploma earned $14,500 less than the median income and workers with only a high school diploma earned $7,300 less than median income. Workers with some college earned slightly less than median and workers with a bachelor's degree earned $12,300 more than median.

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[17] For a more thorough discussion of relevant research, *see,* for example, Power, T.M. and R.N. Barrett. 2001. *Post-Cowboy Economics: Pay and Prosperity in the New American West*. Island Press, and Kim, K.-K., D.W. Marcouiller, and S.C. Deller. 2005. "Natural Amenities and Rural Development: Understanding Spatial and Distributional Attributes." *Growth and Change* 36 (2): 273-297.

[18] PewResearchCenter, "American Mobility: Who Moves? Who Stays Put? Where's Home?," December 2008. http://pewsocialtrends.org/pubs/721/movers-and-stayers

[19] T. Alan Lacey and Benjamin Wright, "Occupational Employment Projections to 2018," *Monthly Labor Review*, November 2009, pp. 82-123.

- **Continued increase in demand for energy.** Energy prices are forecast to resume relatively high levels, such as those seen in the 2006 to 2008 period, possibly increasing further over the planning period. There is, however, some uncertainty about energy prices, with the possibility of lower energy prices if major-oil-producing countries expand production beyond the forecast. Higher energy prices are possible if major-oil-producing countries maintain tight control over production or if civil unrest interrupts production (the current situation). Output from the most energy-intensive industries is expected to decline, but growth in the population and in the economy is expected to increase the total amount of energy demanded. Energy sources are expected to diversify and the energy efficiency of automobiles, appliances, and production processes are projected to increase. Despite increases in energy efficiency and decreases in demand for energy by some industries, demand for energy is expected to increase over the 2009 to 2030 period because of increases in population and economic activity.[20]

- **Impact of rising energy prices on commuting patterns.** Energy prices may continue to be high (relative to historic energy prices) or continue rising over the planning period.[21] The increases in energy prices may impact willingness to commute long distances. There is some indication that increases in fuel prices have resulted in decreased suburban housing price (i.e., housing demand), especially in large urban areas (e.g., Los Angeles or Chicago) and suburbs far from the center city. If this pattern continues, the area in Oklahoma most likely to be most impacted is Oklahoma City, which has the largest area of urban and suburban development in the state.[22]

- **Possible effect of rising transportation and fuel prices on globalization.** Increases in fuel prices are related to globalization: When transportation is less expensive, companies move production to areas with lower labor costs.

  Increases in either transportation or labor costs may impact globalization. When the wage gap between two areas is larger than the additional costs of transporting goods, companies are likely to shift operations to an area with lower labor costs. Conversely, when

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[20] Energy Information Administration, 2009, *Annual Energy Outlook 2009 with Projections to 2030*, U.S. Department of Energy, DOE/EIA-0383(2009), March 2009.

[21] Ibid.

[22] Cortright, Joe. "Driven to the Brink: How the Gas Price Spike Popped the Housing Bubble and devalued the Suburbs," May 2008.

transportation costs increase, companies may have incentive to relocate to be closer to suppliers or consumers.

This effect occurs incrementally over time and it is difficult to measure the impact in the short-term. If fuel prices and transportation costs decrease over the planning period, businesses may not make the decision to relocate (based on transportation costs) because the benefits of being closer to suppliers and markets may not exceed the costs of relocation.

In summary:

- The national economy is recovering from the current recession, though not as quickly as previous forecasts had indicated.
- The baby boom generation is nearing retirement, which will result in slower labor force growth, an increase in demand for health care, and a long-term need for replacement workers.
- Outsourcing remains an effective cost-cutting measure for American businesses, though increasing fuel costs lowers the incentive for businesses to locate transportation-intensive functions overseas.

All the previous bullets are about long-run, national economic trends. Short-term national trends will also affect economic growth in the region. At times these trends may run counter to the long-term trends described above. A recent example is the downturn in economic activity in 2008 and 2009 following declines in the housing market and the mortgage banking crisis. The result of the economic downturn has been a decrease in employment related to the housing market, such as construction and real estate. Employment in these industries will recover as the housing market recovers and will continue to play a significant role in the national, state, and local economy over the long run. Moreover, there is evidence to suggest some pent-up demand for investment in plant and capital; that business have been postponing investment through the recession of the last two years as they wait for signs of a more stable economy.

Local factors

Population

Exhibit B-6 shows a historical population and a population forecast for Oklahoma, the Oklahoma City MSA[23] and Oklahoma City for the 1990-2030 period. This forecast assumes the annual population growth rate from 2010

[23] The 2010 Census defines the Oklahoma City MSA as 7-County area encompassing Canadian, Cleveland, Grady, Lincoln, Logan, McClain, and Oklahoma Counties. We use this definition for each year in Exhibit B-6.

to 2030 is equal to the rate from 1990 to 2010[24]. Between 2010 and 2030, the City is projected to grow at 1.34% annually, compared to 0.88% in the State and 1.28% in the MSA.

Exhibit B-6, Population counts and forecasts, Oklahoma, Oklahoma City MSA, and Oklahoma City, 1990-2030

Year	Oklahoma	Oklahoma City MSA	Oklahoma City
1990	3,145,576	971,042	444,719
2000	3,450,654	1,095,421	506,132
2010	3,751,351	1,252,987	579,999
2015	3,920,212	1,335,438	619,816
2020	4,096,675	1,423,314	662,366
2025	4,281,080	1,516,973	707,837
2030	4,473,786	1,616,796	756,430
Change 2010-2030			
Number	722,435	363,809	176,431
Percent	19%	29%	30%
AAGR	0.88%	1.28%	1.34%

Source: U.S. Census

Exhibit B-7 shows age in Oklahoma, the Oklahoma City MSA[25], and Oklahoma City in 2009. The City has a higher proportion of adults between the ages of 25 and 34 (16%) than the State (14%) or MSA (15%). Aside from the small difference in young adults, the age compositions of the three geographies are very similar.

Exhibit B-8 shows highest educational attainment for the above-25 population of Oklahoma, the Oklahoma City MSA, and Oklahoma City in 2009. The population of the City and MSA were more likely to have a bachelor's degree or higher (27%) than the State's population (23%). Similarly, 46% of the State's population had no education beyond high school compared to 42% in the City and 41% in the MSA.

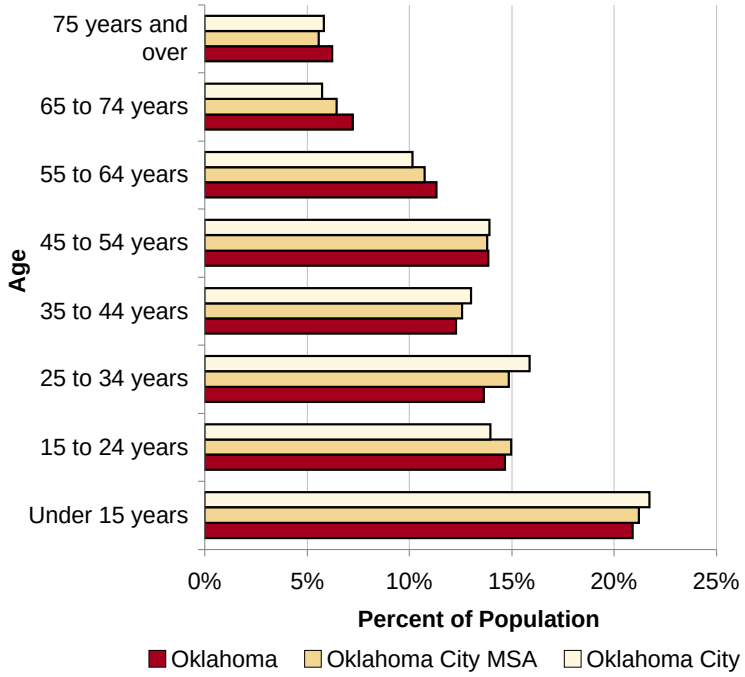
Exhibit B-9 shows household income for Oklahoma, the Oklahoma City MSA, and Oklahoma City in 2009. As is true with age composition, household income distribution is similar in the three geographies. Twenty-six percent of Oklahoma City households earned $75,000 or above, compared to 24% in the State and 27% in the MSA. The MSA had a lower

[24] This is not a preferred method of population forecasting, though it is necessary in this case because the most recent forecast performed by the Oklahoma Department of Commerce dramatically underestimated population counts from the 2010 Census.

[25] The definition of the Oklahoma City MSA changed between 2000 and 2009. The 2009 MSA includes Canadian, Cleveland, Grady, Lincoln, Logan, McClain, and Oklahoma Counties.

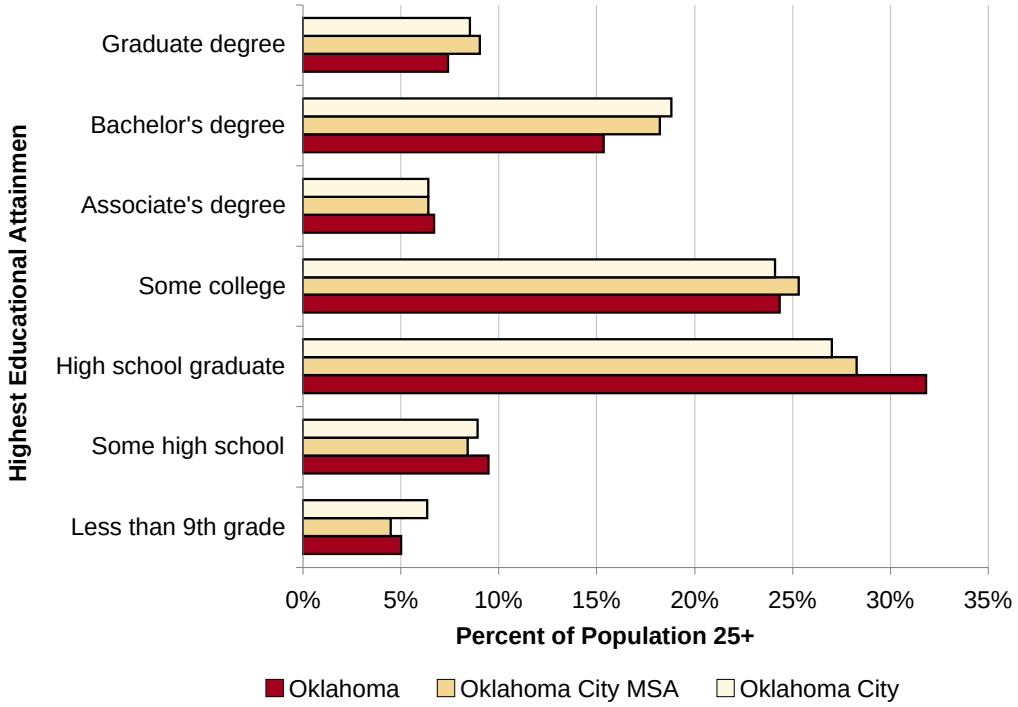
percentage of households earning under $35,000 (39%) than the State or City (both 42%).

Exhibit B-7. Age, Oklahoma, Oklahoma City MSA, and Oklahoma City, 2009



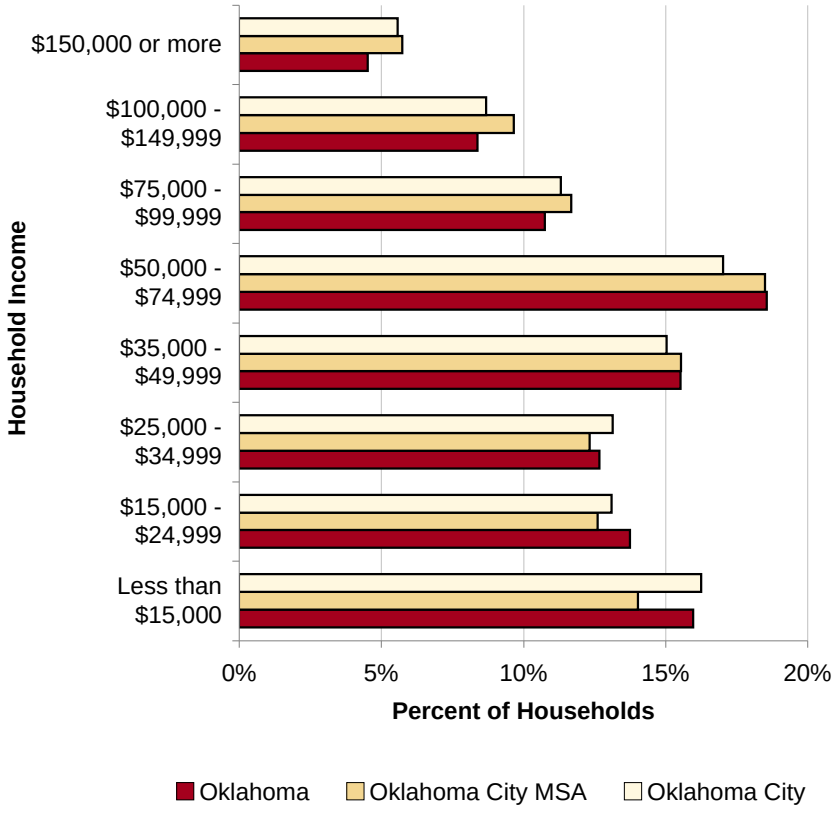
Source: American Community Survey 2009, Demographic Data Profile

Exhibit B-8. Highest educational attainment, Oklahoma, Oklahoma City MSA, and Oklahoma City, 2009



Source: American Community Survey 2009, Social Data Profile

Exhibit B-9. Household income, Oklahoma, Oklahoma City MSA, and Oklahoma, 2009



Source: American Community Survey 2009, Economic Data Profile

Exhibit B-10 shows labor force participation for the over-16 population in Oklahoma, the Oklahoma City MSA, and Oklahoma City in 2009. Over 67% of the City's eligible population participated in the labor force in 2009, compared to 63% in the State and 66% in the MSA. All three areas employed around 93% of their labor force.

Exhibit B-10. Labor force participation, Oklahoma, Oklahoma City MSA, and Oklahoma, 2009

Labor status	Oklahoma	Oklahoma City MSA	Oklahoma City
In labor force	63%	66%	67%
Employed	*92%*	*92%*	*92%*
Unemployed	*7%*	*6%*	*7%*
Armed forces	*1%*	*1%*	*1%*
Not in labor force	37%	34%	33%
Population 16+	**2,865,562**	**950,592**	**432,518**

Source: American Community Survey 2009, Economic Data Profile

Employment

This section describes employment trends at two levels: (1) the aggregate level (i.e. total employment) and (2) the sector level (including those sectors considered "industrial").

Exhibit B-11 shows employment by sector in Oklahoma for 2001 and 2009 and Oklahoma State University's forecast for 2012. Total employment grew by 44,750 (0.4% annually) between 2001 and 2009 and is projected to grow by 47,970 (1.0% annually) between 2009 and 2012. Industries with high job growth between 2001 and 2009 include state and local government (41,460 jobs, or 1.9% annually), health care and social assistance (30,260 jobs or 2.3% annually), and natural resources and mining (14,360 or 5.1%). Manufacturing lost 40,230 jobs over the same period, shedding over 5% of its workforce annually.

Between 2009 and 2012, the industries with the largest estimated growth are admin, support, and waste management (17,980 jobs or 6.2% annually), health care and social assistance (12,730 or 2.3%), and construction (6,490 or 3.0%). Oklahoma State University estimates that manufacturing will continue its short-run decline between 2009 and 2012, losing another 9,520 jobs or 2.5% annually.

Exhibit B-11. Employment by sector, Oklahoma, 2001, 2009, and forecasted 2012

				Change 2001-2009			Change 2009-2012		
Industry Sector	2001	2009	2012	Number	Percent	AAGR	Number	Percent	AAGR
Natural Resources and Mining	**29,090**	**43,450**	**43,830**	**14,360**	**49%**	**5.1%**	**380**	**1%**	**0.3%**
Construction	**66,080**	**68,810**	**75,300**	**2,730**	**4%**	**0.5%**	**6,490**	**9%**	**3.0%**
Manufacturing	**169,830**	**129,600**	**120,080**	**-40,230**	**-24%**	**-3.3%**	**-9,520**	**-7%**	**-2.5%**
Wholesale Trade	**56,750**	**56,550**	**58,170**	**-200**	**0%**	**0.0%**	**1,620**	**3%**	**0.9%**
Retail Trade	175,050	169,290	173,770	-5,760	-3%	-0.4%	4,480	3%	0.9%
Transportation, Warehousing, and Utilities	**57,810**	**54,960**	**54,590**	**-2,850**	**-5%**	**-0.6%**	**-370**	**-1%**	**-0.2%**
Information	37,080	27,450	27,530	-9,630	-26%	-3.7%	80	0%	0.1%
Finance and Insurance	58,980	58,820	62,710	-160	0%	0.0%	3,890	7%	2.2%
Real Estate, Rental, and Leasing	23,550	22,400	22,750	-1,150	-5%	-0.6%	350	2%	0.5%
Professionsl, Scientific, and Technical Services	**54,850**	**62,130**	**67,940**	**7,280**	**13%**	**1.6%**	**5,810**	**9%**	**3.0%**
Management of Companies and Enterprises	**12,960**	**13,240**	**12,660**	**280**	**2%**	**0.3%**	**-580**	**-4%**	**-1.5%**
Admin, Support, and Waste Management	**98,420**	**90,250**	**108,230**	**-8,170**	**-8%**	**-1.1%**	**17,980**	**20%**	**6.2%**
Educational Services	15,650	19,870	22,530	4,220	27%	3.0%	2,660	13%	4.3%
Health Care and Social Assistance	151,460	181,720	194,450	30,260	20%	2.3%	12,730	7%	2.3%
Arts, Entertainment, Recreation, and Accommodations	127,250	140,170	147,230	12,920	10%	1.2%	7,060	5%	1.7%
Other Services	62,650	62,020	60,640	-630	-1%	-0.1%	-1,380	-2%	-0.7%
Federal Government	46,250	46,390	45,780	140	0%	0.0%	-610	-1%	-0.4%
State and Local Government	250,120	291,580	288,360	41,460	17%	1.9%	-3,220	-1%	-0.4%
Total	**1,493,830**	**1,538,580**	**1,586,550**	**44,750**	**3%**	**0.4%**	**47,970**	**3%**	**1.0%**

Source: 2011 Greater Oklahoma City Metropolitan Area Economic Forecast
Note: Sectors highlighted in grey are assumed to locate on industrial land in the Level 3 definition from the analysis

Exhibit B-12 shows employment by sector in the Oklahoma City MSA for 2001 and 2009 and Oklahoma State University's forecast for 2012. Total employment grew by 17,390 (0.4% annually) between 2001 and 2009 and is projected to grow by 23,430 (1.4% annually) between 2009 and 2012. Industries with high job growth between 2001 and 2009 include health care and social assistance (12,520 jobs or 2.6% annually), state and local government (10,321 or 1.5%), and natural resources and mining (5,910 or

7.6%). Manufacturing lost 16,060 jobs over the same period, shedding almost 5% of its workforce annually.

Between 2009 and 2012, the industries with the largest estimated growth are admin, support, and waste management (7,920 jobs or 6.7% annually), health care and social assistance (5,150 or 2.5%), and professional, scientific, and technical services (4,180 or 4.9%). Oklahoma State University estimates that manufacturing will continue its decline between 2009 and 2012, losing another 3,560 jobs or 3.8% annually.

Exhibit B-12. Employment by sector, Oklahoma City MSA, 2001, 2009, and forecasted 2012

				Change 2001-2009			Change 2009-2012		
Industry Sector	**2001**	**2009**	**2012**	**Number**	**Percent**	**AAGR**	**Number**	**Percent**	**AAGR**
Natural Resources and Mining	**7,470**	**13,380**	**13,940**	**5,910**	**79%**	**7.6%**	**560**	**4%**	**1.4%**
Construction	**23,280**	**25,820**	**27,480**	**2,540**	**11%**	**1.3%**	**1,660**	**6%**	**2.1%**
Manufacturing	**48,570**	**32,510**	**28,950**	**-16,060**	**-33%**	**-4.9%**	**-3,560**	**-11%**	**-3.8%**
Wholesale Trade	**21,720**	**21,870**	**22,230**	**150**	**1%**	**0.1%**	**360**	**2%**	**0.5%**
Retail Trade	61,650	59,880	62,720	-1,770	-3%	-0.4%	2,840	5%	1.6%
Transportation, Warehousing, and Utilities	**17,340**	**15,500**	**15,580**	**-1,840**	**-11%**	**-1.4%**	**80**	**1%**	**0.2%**
Information	14,450	12,170	12,380	-2,280	-16%	-2.1%	210	2%	0.6%
Finance and Insurance	23,560	22,910	23,800	-650	-3%	-0.3%	890	4%	1.3%
Real Estate, Rental, and Leasing	10,800	10,070	10,240	-730	-7%	-0.9%	170	2%	0.6%
Professionsl, Scientific, and Technical Services	**23,210**	**27,200**	**31,380**	**3,990**	**17%**	**2.0%**	**4,180**	**15%**	**4.9%**
Management of Companies and Enterprises	**5,260**	**5,800**	**5,680**	**540**	**10%**	**1.2%**	**-120**	**-2%**	**-0.7%**
Admin, Support, and Waste Management	**40,060**	**36,730**	**44,650**	**-3,330**	**-8%**	**-1.1%**	**7,920**	**22%**	**6.7%**
Educational Services	5,000	8,720	9,550	3,720	74%	7.2%	830	10%	3.1%
Health Care and Social Assistance	55,820	68,340	73,490	12,520	22%	2.6%	5,150	8%	2.5%
Arts, Entertainment, Recreation, and Accommodations	10,670	11,420	11,100	750	7%	0.9%	-320	-3%	-0.9%
Food Services and Drinking Places	40,210	45,740	48,940	5,530	14%	1.6%	3,200	7%	2.3%
Other Services	24,230	23,470	23,700	-760	-3%	-0.4%	230	1%	0.3%
Federal Government	27,080	25,970	24,570	-1,110	-4%	-0.5%	-1,400	-5%	-1.8%
State and Local Government	82,050	92,360	92,870	10,310	13%	1.5%	510	1%	0.2%
Total	**542,430**	**559,820**	**583,250**	**17,390**	**3%**	**0.4%**	**23,430**	**4%**	**1.4%**

Source: 2011 Greater Oklahoma City Metropolitan Area Economic Forecast
Note: Sectors highlighted in grey are assumed to locate on industrial land in the Level 3 definition from the analysis

Exhibit B-13 shows the average annual rates of growth in Oklahoma and the Oklahoma City MSA for each industry sector over the 2001-2009 and 2009-2012 periods. Total employment grew at the same average annual rate (0.4%) in the State as in the MSA between 2001 and 2009. The projected average annual growth rate in the MSA from 2009 to 2012 is expected to be 1.4%, compared to 1.0% in the State. The State is projected to see faster growth (or slower decline) in three of the four industries considered primarily industrial (shaded grey in the table).

Exhibit B-13. Average annual employment growth by industry sector, Oklahoma and Oklahoma City MSA, 2001-2009 and 2009-2012

Industry Sector	Change 2001-2009		Change 2009-2012	
	State	MSA	State	MSA
Natural Resources and Mining	**5.1%**	**7.6%**	**0.3%**	**1.4%**
Construction	**0.5%**	**1.3%**	**3.0%**	**2.1%**
Manufacturing	**-3.3%**	**-4.9%**	**-2.5%**	**-3.8%**
Wholesale Trade	**0.0%**	**0.1%**	**0.9%**	**0.5%**
Retail Trade	-0.4%	-0.4%	0.9%	1.6%
Transportation, Warehousing, and Utilities	**-0.6%**	**-1.4%**	**-0.2%**	**0.2%**
Information	-3.7%	-2.1%	0.1%	0.6%
Finance and Insurance	0.0%	-0.3%	2.2%	1.3%
Real Estate, Rental, and Leasing	-0.6%	-0.9%	0.5%	0.6%
Professionsl, Scientific, and Technical Services	**1.6%**	**2.0%**	**3.0%**	**4.9%**
Management of Companies and Enterprises	**0.3%**	**1.2%**	**-1.5%**	**-0.7%**
Admin, Support, and Waste Management	**-1.1%**	**-1.1%**	**6.2%**	**6.7%**
Educational Services	3.0%	7.2%	4.3%	3.1%
Health Care and Social Assistance	2.3%	2.6%	2.3%	2.5%
Arts, Entertainment, Recreation, and Accommodations	1.2%	1.5%	1.7%	1.7%
Other Services	-0.1%	-0.4%	-0.7%	0.3%
Federal Government	0.0%	-0.5%	-0.4%	-1.8%
State and Local Government	1.9%	1.5%	-0.4%	0.2%
Total	**0.4%**	**0.4%**	**1.0%**	**1.4%**

Source: 2011 Greater Oklahoma City Metropolitan Area Economic Forecast
Note: Sectors highlighted in grey are assumed to locate on industrial land in the Level 3 definition from the analysis

In summary, of assessment of these local factors is:

- The population of Oklahoma, the Oklahoma City MSA, and Oklahoma City are all expected to increase by between 0.9% and 1.3% percent annually to 2030. Oklahoma City is projected to grow at a slightly faster rate than the MSA or the State over the period.
- The State, MSA, and City have very similar age compositions.
- A higher percentage of the population in the MSA and City have a bachelor's or graduate degree than in the State, which has a higher percentage of the population with no college education.
- Household income distribution is fairly similar in the three geographies, though the City and MSA have a slightly higher percentage of households earning over $100,000 than the State.
- The labor force participation rate is higher in Oklahoma City than in the MSA or the State.
- Total employment in the State and the MSA grew at the same rate, 0.4% annually on average, between 2001 and 2009. Statewide employment is projected to grow by 1.0% annually from 2009-2012, and MSA employment is projected to grow by 1.4% annually.
- From 2009 to 2012, growth in industrial sectors is generally projected to be faster statewide than in the MSA.

Appendix C Preliminary Analysis of Land Supply

The analysis of industrial land supply in Oklahoma City has two phases: a preliminary analysis using readily available data and a detailed study of a subset of sites. This appendix concerns the former. The preliminary analysis that follows is a basis for the detailed analysis (summarized in Appendix D), and is superseded by the results of the detailed analysis. This preliminary analysis is included as Appendix C so that the methods are fully documented.

In March 2011, ECO prepared a preliminary assessment of Oklahoma City's supply of employment land. The goal of the preliminary analysis (referred to as the Level-1 analysis) was to identify the subareas most likely to accommodate development for employment uses, now and in the future. To identify the areas, ECO took the following steps:

1. Assemble a comprehensive data file of all parcels in the region.
2. Screen out parcels that have "fatal flaws" and were unsuitable for large-scale industrial development.
3. Identify twelve criteria upon which to evaluate each remaining parcel
4. Assign a score (0 to 10) for each criteria to each parcel
5. Weight the criteria according to relative importance to create a comprehensive weighted score for each parcel
6. Define scenarios with different meaningful weighting parameters and map the scores

The final products were parcel-specific maps that highlighted sub-regions and subareas that scored well on characteristics associated with "suitable" land for industrial development. These maps can be seen in Section C.3, Results.[1]

The March, 2011, technical memorandum on the Level-1 analysis begins on the next page. It has been reformatted and edited slightly to conform to the format of the final report and appendices.

[1] The remainder of this appendix and its attachments are the entirety of a memorandum submitted to the City of Oklahoma City in March 2011 entitled, "Oklahoma City ELNAAP: Summary of L-1 Analysis."

C.1 BACKGROUND AND PURPOSE

The City of Oklahoma City engaged the ECONorthwest team (ECO) to conduct an employment land needs assessment and action plan (ELNAAP). "Employment land" is defined for the purposes of this evaluation as primarily industrial land, including industrial parks, warehousing, and some office parks.[2] Task 3.1 of the Scope of Work requires that ECO prepare an assessment of the city's supply of employment land. The land supply analysis has two steps: (1) Level-1 (L-1) uses readily available data to make a preliminary identification of subareas of the City most likely to have large sites that are ready to accommodate industrial development; (2) Level-2 (L-2) will do more detailed analysis of a subset of sites in the subareas identified in the L-1 analysis.

This memorandum summarizes the methods for and results of the L-1 analysis and is ECO's product[3] for Task 3.1. The conclusions will be summarized in the main ELNAAP report and this memorandum will be attached to the main report as an appendix.

C.2 METHODS FOR THE LEVEL-1 ANALYSIS

C.2.1 OVERVIEW

The goal of the L-1 analysis is to identify subareas of the City most likely to have large sites that are likely to be suitable to accommodate development for employment (primarily industrial) uses, now and in the future.

In summary, the L-1 analysis has six steps:

- **Step 1: Create an enhanced data file**. The evaluation began with an original GIS (Geographic Information System) parcel file called *TriCountyParcels*. The study team created an enhanced data file by

[2] Thus excluding most development for employment that that is strictly office-based (finance, insurance, real estate, services, government, etc.) and retail.

[3] ECO is the author of this memorandum and responsible for all the analysis of the parcel data leading to the conclusions this memorandum contains. The City (Geoff Butler) provided the base data and commented on methods and assumptions. The Benham Companies (led by Carrie Langraf) cleaned and manipulated the base data to provide a revised parcel file for ECO's analysis. Group Mackenzie did prior GIS analysis of City data to help develop the methods for the L-1 analysis. Other members of the consulting team (Iron Wolf and Lautman Economic Architecture) commented on the methods and results of the L-1 analysis.

incorporating other information using additional GIS shape files (like zoning or slope) and other data sources.[4]

- **Step 2: Reduce file size by screening out parcels with attributes that make them unlikely candidates for larger-scale industrial development.** In this step we reduced the size of the original parcel file by screening out parcels with "fatal flaws": location or site attributes deemed by the project team to be sufficiently detrimental to development that the parcel should not be considered a promising candidate for large-site industrial development. Examples of such attributes: location outside the city limits, size smaller than one acre, location in a floodway, and (the biggest category) residentially zoned parcels smaller than 5 acres. Note, however, that some of these parcels may (probably will) end up in a subarea selected for L-2 analysis because they will be embedded in a grouping of parcels judged highly suitable for future industrial development.
- **Step 3: Select criteria for site evaluation.** For this step, we selected 12 characteristics to use as evaluation criteria. We selected these 12 characteristics not only because they influence a parcel's suitability and readiness for development, but also because data were available to allow us to measure the characteristics. We split them into two categories: (1) market characteristics, and (2) land characteristics.
- **Step 4: Assign raw scores.** Step 2 did screening to eliminate parcels; Step 4 does scoring of parcels that were not eliminated in Step 2. We assigned a score (zero to 10) to each value within each site evaluation criterion. We used (a) a matrix that allocated scores based on the measured values within each criterion, and (b) input from the consulting team, the City Planning Department and the Chamber of Commerce, to make judgments about which values warranted the highest score (10). We then made a judgment about what value, unique for each criterion, would be the dividing line between a score of 10 and a score of 9. We then made a judgment about what value warranted the lowest score (zero) and determined what value distinguished a zero from a one. With those two points as anchors, we used an analysis of the distribution of values within each criterion (by decile) for all parcels to help assign scores for the rest of the values. [Attachment C.1 to this memorandum shows for each

[4] The attached *L-1 Data Matrix* includes detailed descriptions of the parcel characteristics (also called attributes) in the original parcel file and the additional GIS shape files appended to the original file. The *Data Matrix* also includes an explanation of the analysis used each attribute in the Level-1 analysis and lists the name assigned to the newly created column in the enhanced parcel file.

criterion the distribution of values by decile.] The resulting matrix gives a score (which we call a "raw score") to each parcel of 0 to 10 for each of the 12 criteria, based on the measured values for each criterion. [The process is explained in more detail later in this memorandum.]

- **Step 5: Assign weighted and averaged scores.** First, we assigned a relative weight, as a percentage, to each criterion. Section 2.3.2 describes the process. Second, for each criterion for each parcel we multiplied raw scores by the respective criterion weight to get 12 "weighted scores for each parcel." Third, we added all the separate weighted scores to get a single average weighted score for each record. Each parcel received a weighted score between zero and ten.
- **Step 6: Define scenarios and map scores for every parcel.** We developed four *scenarios*: each was defined by a different combination of raw scores and weights. The City then created maps for each scenario: the maps showed the "average weighted score" for each parcel as a color, with denser coloring used for higher scores (what we also refer to a "heat maps": the "hot" areas are the ones with higher average weighted scores). Results are illustrated in Section 3. This task is equivalent to sensitivity testing: we were interested in how different the scores would be (as illustrated by the maps) for different assumptions.
- **Optional step**: **Use alternative point scenarios to test sensitivity.** We developed seven alternative scoring schemes to test the sensitivity of certain characteristics.
- **Step 7: Use map scores to establish boundaries for subareas**. We compared the maps, discussed the results with the project team, and selected a preferred scenario for selecting subareas for the L-2 analysis. The final result was that we selected 16 subareas with a combined total of about 45,000 acres and 5,500 parcels for L-2 analysis.

C.2.2 SCREENING

We use the term "screening" in this memorandum to refer to what we described as Step 2, above: a first pass to reduce the size of the database by eliminating parcels with attributes likely to make them unsuitable for large-scale industrial development relative to other parcels with different attributes. The purpose of using screening thresholds first is to narrow the total number of parcels to a subset deemed most likely to be suitable and most readily available for development (and thus, suitable for more detailed analysis in either Level 1 or Level 2). For example, not all parcels in the database are located in the Oklahoma City limits. If a parcel is not

located within the City, it is not relevant to this study. The selection criterion is "Political Jurisdiction" and the threshold for elimination from further analysis is "outside the City limits."[5] The value is expressed in a field in the enhanced parcel database as yes/no and therefore the threshold for elimination is "no."

Parcels with the following characteristics were eliminated from the database (summarized in Table 1):

- **Parcels outside the City limits.** This study focuses on lands within the City of Oklahoma City. Therefore, parcels outside the City limits are not considered relevant for this study.
- **Parcels already developed (with two exceptions).** The focus of the ENLAAP is on finding readily developable land for large employers. Land that is already developed is, in most cases, not readily developable. Thus, we can reduce our search for promising subareas by not looking at the large percentage of parcels that already have substantial improvements (i.e., that are developed). It is unlikely that such uses will be converted into industrial uses within the 20-year planning period. We note two exceptions. First, we do not eliminate any developed parcel whose use is "industrial:" we want to see where those parcels are because (1) it is more likely that industrial uses will be redevelopable to industrial uses compared to non-industrial parcels, and (2) we may want to use "proximity to industrial development" as a factor in ranking vacant, developable parcels for inclusion in the Level-2 analysis. Second, we do not eliminate *all* developed residential parcels: we leave in the database any developed residential parcel that is five acres or greater in size. That also us to consider that very large residential lots in certain areas might be able to be carved up for or converted to industrial use.
- **Parcels smaller than one acre.** The intermediate purpose for the L-1 analysis is to identify 5 to 10 subareas that are strong candidates for future employment/industrial development and for more detailed (Level 2) analysis. Thus, eliminating parcels smaller than one acre does not really eliminate them if they later end up inside the boundaries of one such subarea. It does, however, substantially reduce the size of the L-1 database and the computational and interpretation requirements.

[5] Note that the criterion need not be binary (yes/no; in/out): we could have created a secondary threshold like (hypothetically) "within ¼ mile of City limits" or "in an identified annexation area." In fact, we did have multiple thresholds for many of the criteria.

- **Parcels located within a floodway.** We considered this a severe development restriction. (Note that *floodway* is more restrictive than *floodplain*: we did not eliminate parcels in a floodplain, but location in a floodplain did influence the overall assessment of suitability).
- **Parcels located outside City-designated sewer-sheds.** Such parcels are unlikely have sewer service within the 20-year planning timeframe, and we assumed sewer service was essential for large industrial developments.

Exhibit 1. Screening thresholds for eliminating parcels from further analysis

Parcel characteristic	Threshold for elimination	Threshold value (column value)
OKC City limits	Outside city limits	In OKC? = No
Current land use	Developed with residential uses and < 5 acres	CLUCAT = residential
	Developed with schools and universities	CLUCAT = education
	Classified as existing right-of-way	CLUCAT = row
Parcel size	Less than one acre	CalcAcres = less than one acre
Floodway	100% of parcel in a floodway	Ac_Flwy = 100% of parcel

C.2.3 SCORING

Parcels that survived *screening* progressed to *scoring*. Screening thresholds, which eliminate parcels from further analysis, are not appropriate for every attribute in the enhanced parcel file. For example, a parcel's distance from a water main is expressed in feet. A parcel that is 10,000 feet from a water main does not necessarily warrant elimination from the analysis, but it will almost certainly make that parcel more expensive to develop than a parcel that is already served by water (other things being equal), and thus make it less attractive or suitable for development in the short- or long-term.[6] Therefore, we developed a scoring system to consider the relative importance of parcel attributes (also called *characteristics* or *factors* and, when used to rank parcels, *criteria*) such as distance from water main and distance from highway ramps.

This section describes three types of scores. Every parcel gets 12 *raw scores* (one for each characteristic) based on the value it has for each characteristic. For example, if a parcel has a value of 101 acres for the characteristics called

[6] We know the direction of the effects (i.e., more or less suitable), but we do not, at least at this point in the analysis, know the relative magnitudes (e.g., how less suitable is a parcel if it is 10,000 feet instead of 100 feet from a water main?). We will deal with magnitudes for the subset of parcels that get carried into the Level-2 analysis.

"size," it gets a raw score of 10 for that characteristic. After all the raw scores have been calculated (12 raw scores for each of over 62,000 parcels), they are converted to *weighted scores* by multiplying the raw score of each characteristic by the respective weight of the characteristic. Finally, the weighted scores are summed and normalized to create an *average weighted score*: a single score for each parcel that is used for mapping.

C.2.3.1 Raw Scores

Identifiers

Parcel identification number (Parcels NB)

Description / Rationale: Unique number for every parcel to be used for tracking and mapping data by parcel

Scoring Method: Not applicable: identifiers are not scored. They are simply necessary information for keeping track of parcel data and for subsequent mapping.

Market and physical characteristics

1 Parcel size (CalcAcres)

Description / Rationale: The bigger the parcel, the more suitable and flexible it is, and the easier it is to develop. For this project, parcel size is a key criterion for determining suitability. The database gives parcel size in acres.

Scoring Method: Ten points awarded for 100 acres or more. Score decreases by one point at each of the following cutoffs: 100, 50, 25, 10, 7, 5, 4, 3, 2.5, and 2.

2 Amount / type of development; vacant land (CLUCat); redevelopment potential

Description / Rationale: Vacant, buildable land is key for development. This criterion gets at vacancy; other criteria get at buildability (e.g., slope, floodplain, infrastructure). But the CLUCat variable gets only at vacant / not vacant. If not vacant, it provides a code for the use. But the *type* use (e.g., housing, warehousing) is less important than the *intensity / value* of the use. Thus, we created a composite criterion: one that also looks at assessment data and creates a ratio of Improvement Value to Land Value as a proxy for "ease with which the developed land might be converted to new industrial uses."

Scoring Method: Vacant parcels receive 10 points. Parcels considered "Ag/Vacant" receive 9 points. Parcels with industrial or utility uses received 5 points. Parcels with employment uses or relatively rural designations received 2 points. Parcels with any other type of use receive zero points.

3 Floodplain (Ac_100Fp, Ac_500_Fp)

Description / Rationale: Land in the *floodway* has already been eliminated in the screening analysis. The floodway is the central part of a floodplain: an area deemed by the Federal Emergency Management Agency to be critical to the release of flood waters, and where flood waters run fastest and deepest. The *floodplain* is a broader area defined by the maximum expected reach of flood waters during a big flood (100-year flood) and really big flood (500-year flood). Buildings are in less risk as they move from the floodway to the 100-year floodplain, and so on.

Scoring Method: If a parcel has zero acreage in any floodplain, it gets 10 points. If a parcel is entirely within the 500-year floodplain, it receives 7 points. If a parcel is entirely within the 100-year floodplain, it receives zero points. If the parcel is divided between categories, it receives weighted values of each category's base score in proportion with the percentage of the parcel within that category. For

example, a parcel half outside the floodplain (50% times 10 points) and half within the 500-year floodplain (50% times 7 points) would receive 8.5 points.

4 Wetlands (WETLAND_TY)

Description / Rationale: Wetlands in Oklahoma City are mapped by the US Fish and Wildlife Service and regulated by the US Army Corps of Engineers, which is responsible for approving or denying development projects that impact wetlands (per Section 404 of the Clean Water Act). Permits under Section 404 are called "Individual Permits" because they are reviewed on a case-by-case basis. Generally, if a parcel contains 0.5 acre or more of a designated wetland, an Individual Permit review is required. Though an Individual Permit will almost certainly increase the time and cost of development**,** result of the review (i.e., approval, denial, some level of mitigation), depends on the amount, type, and value of the wetlands present on the parcel. Given the complexity of wetland regulation and lack of universal regulation, it is difficult to determine how a particular wetland will be regulated. Thus, unless the parcel is wholly contained in a pond or lake, the adverse impacts of development may be mitigated.

Scoring Method: A parcel with under 10% of its acreage in wetlands receives a 10. A parcel with between 10% and 25% of its acreage in wetlands receives a 6. A parcel with between 25% and 50% of its acreage in wetlands receives a 4. A parcel with 50% or more of its acreage in wetlands receives a 0. If a parcel has more than 0.5 acres of wetlands (necessitating an Individual Permit review) it loses three points, unless the parcel was already receiving zero.

5 Slope (slpusdem92.img –vector polygon)

Description / Rationale: The definition of slope can be confusing because 45 degrees is a 100% slope. Slope (as a percent, not as an angle) is defined as vertical rise as percent of horizontal run. Thus, if land rise over a distance of 100 feet, its average slope is 10%. Moreover, that average could be reflected on the land as a continuous even rise of 1 foot every 10 feet, or as completely flat for 99 feet with a 10-foot cliff at the last foot. Due to their large building footprints and circulation requirements, large industrial/employment uses want flat sites—an average slope of 10% is, as a rule of thumb, considered the upper bound for large industrial development. Though Oklahoma City is flat relative to many cities, there are areas with slopes over 7%. To arrive at an average slope, it was necessary to convert a raster image file to a polygon layer. Since, the raster file was originally set at 50-foot cells, the conversion process returned over 3 million records. As an alternative process, it was necessary to aggregate surrounding cells and increased the size of the cell to 200' x 200' (this essentially decreased the resolution). The original raster was expressed in decimal places, but ArcGIS does not allow conversion of a float raster to a vector. Thus it was necessary to convert the values to integers. ArcGIS truncated the numbers (for example a 2.8 becomes a 2). To resolve this, it was necessary to add 0.5 to every value. For example, a value of 2.8, would become a 3.2 and then would get truncated to 3, which means it would round accurately. In some cases, there were multiple values per parcel (i.e. if the parcel was larger than 200 x 200'). Therefore, it was necessary to find an average of the multiple slope values in order to get one value for each parcel.

Scoring Method: If parcel contains slopes less than 1%, it gets 10 points. Score decreases by one point for each 1% increase in slope, down to zero points awarded for a 10% slope or higher.

6 Brownfield (multiple attributes)

Description / Rationale: The term *brownfield* for this analysis is defined by the data available about actual or potential contamination on the site. Other things equal, users of industrial space would prefer that their site is free from contaminants. The parcel database information that we use for the Level-1 analysis for (1) the presence of a leaking underground storage tank, (2) listing of the site on the US EPA Comprehensive Environmental Response, Compensation, and Liability

Information System (*CERCLIS*), (3) designation by the City as a site with a "miscellaneous" condition that suggests an environmental problem, and (4) any other concerns such as a former auto salvage, former service station, former oil wells, oil wells, or former landfills.

Scoring Method: All of the indicators are binary (yes / no: it exists or it does not). If a site gets "no" for all four indicators, it gets 10 points. One yes gets 4 points. If a parcel is considered a brownfield by two or more indicators, it receives zero points.

7 Access to employment; agglomeration economies

Description / Rationale: For many well-documented reasons, businesses find advantages by locating near other businesses. The result is the creation of employment centers. We wanted some measure of business concentration that we could attribute to each parcel. ECONorthwest specified such a measure, and the City built it. Using geo-located employment data and GIS techniques, the City was able to calculate, for small grids cells covering the city, how many employees were within one mile of that cell. That information was attributed to parcels based on the grid cell that coincided with each parcel's calculated centroid. By dividing total employment by the area in acres of a circle with a radius of one mile, we calculate "average employees per acre within one mile of the parcel" (i.e., average employment density). Parcels with higher density are more desirable and get more points.

Scoring Method: We examined the decile distribution of parcels to determine scores. The top 10% of parcels on this factor (i.e., those with the highest number of nearby employees) received a 10. The next-highest 10% received a 9, and so on. Parcels with over 13,621 employees within a 1-mile radius were in the top 10% and received 10 points. Score decreases by a point at each of the following cutoffs for number of employees: 13,621, 6,638, 4,863, 3,489, 1,943, 631, 147, and 9. A parcel with 9 employees within a 1-mile radius received three points. Over 20% of all parcels showed zero employees within 1 mile and got zero points.

We calculated the variable as employees within a 1-mile radius of a parcel centroid, but may make more sense to report it as employees per acre. The equivalent of 13,621 employees in a 1-mile radius is an average density of 6.8 employees per acre. The average employment per acre cutoffs equating with the employee count cutoffs shown above are: 6.8, 3.3, 2.4, 1.7, 1.0, 0.3, 0.1, and 0.004. Those who work with employment density will note that these numbers are much lower than typical estimates of employees per acre on industrial land (6 -15). Those are typically employees per net acre; the numbers we are reporting are double gross acres: they include not only land on a parcel that is used for access, setbacks, and so on, but all land in the 1-mile area, including land in street rights of way, housing, hospitals, parks—everything, As a comparable number, OKC as a whole has about 620 square miles and 560,000 employees, for an average of 1.4 employees per acre.

Land characteristics that can be changed by public policy or investment

8 and 9 Zoning (Straight_zoning; Overlay_zoning)

Description / Rationale: Zoning is a local designation that regulates the type and design of uses that can be developed on a parcel. Oklahoma City has separate zoning designations for agricultural, residential, commercial, industrial, office and special uses. Zoning is a regulatory characteristic that can be changed through public policy. The level of effort and political risk involved with changing the zoning of a particular parcel depends on a variety of factors, though it is our understanding that the process in Oklahoma City is relatively straightforward and

predictable, and that non-industrial zoning is not the major constraint to industrial development that it is in many other cities.

Scoring Method: Even though zone changes in Oklahoma City are relatively easy, it has to be the case that if a developer wants to build industrial buildings, being in a zone that allows that use now is better than being in a zone the requires some administrative procedure that takes at least some time and has at least some risk of denial. Thus, parcels zoned for industrial use receive 10 points. We considered giving parcels zoned for commercial use in heavy commercial areas (central business district, near highways, etc.) partial points. In the end, the decision was to given all other zoning categories (with an exception described in the next paragraph) zero points. Though that seems like a big spread, its importance is diminished by the low "weight" we place on this criterion because zone changes are relatively easy to get and do not constitute a significant barrier to industrial development (per City staff).

The City has a PUD designation (Planned Unit Development). When a PUD is established, it is assigned a corresponding zone that is considered appropriate for the particular PUD (i.e. it allows the type of development envisioned in the PUD). PUDs are typically made up of multiple parcels, either under single ownership or controlled by a single entity (through a development agreement, option or other method), which suggests that a parcel that is vacant and designated as "PUD" may be a useful proxy for site size. Therefore, parcels with PUD designation received 5 points.

Overlay zoning is treated as a separate scoring category. The City has around 10 types of overlay zones. The presumption for this level of analysis is that any overlay zone, whatever its value to the public, is a cost to a developer in that in limits use or requires additional administrative procedures or costs. Thus, any parcel that has any overlay receives 0 points. All non-overlay parcels receive 10 points.

10 Transportation access: distance to ramps (Dis_ramp).

Description / Rationale: Large employers and industrial users typically prefer locations with good transportation access: sites close to arterials and highway ramps. Good access facilitates movement of products and employees. For this analysis, we calculated each parcel's distance from a highway ramp. We considered more complicated methods that would consider distance from major and minor arterials (the data are available) but concluded that the extra effort would have little effect on the subareas for the L-1 analysis and would not be worth he additional cost.

Scoring Method: We examined the decile distribution of parcels to determine the scoring framework. The closest 10% of parcels to freeway ramps received a 10. The next 10% received a 9, and so on. Parcels within 0.17 miles were in the top 10% and received a 10. Score decreases by a point at each of the following cutoffs: 0.17, 0.32, 0.47, 0.64, 0.85, 1.08, 1.38, 2.07, and 4.50. Parcels over 4.5 miles from a highway ramp received 1 point.

11 and 12 Water/sewer service: distance to large lines (wwu_WATER_wGravityMain/ wwu_SEWER_SGravityMain)

Description / Rationale: Water and sewer facilities are commonly critical to industrial functions. New water lines for heavy users can cost up to $2.5 million per mile to extend to a site.[7] For this reason, the L-1 analysis calculates each parcel's

[7] Oklahoma City Employment Lands Presentation

distance from an existing water and sewer main (pressurized or gravity greater) than 11 inches in diameter.[8]

Scoring Method:

Water: We examined the decile distribution of parcels to determine the scoring framework. The closest 10% of parcels to water mains received a 10. The next 10% received a 9, and so on. Parcels within 109 feet were in the top 10% and received 10 points. Score decreases by a point at each of the following cutoffs: 109, 180, 280, 424, 610, 907, 1,408, 3,764,and 20,180. Parcels more than 20,180 feet from a pressurized or gravity water main received 1 point.

Sewer: We examined the decile distribution of parcels to determine the scoring framework. The closest 10% of parcels to sewer mains received a 10. The next 10% received a 9, and so on. Parcels within 148 feet were in the top 10% and received 10 points. Score decreases by a point at each of the following cutoffs: 148, 323, 538, 803, 1,142, 1,651, 2,621, 8,393, and 24,031. Parcels more than 24,031 feet from a pressurized or gravity sewer main received 1 point.

C.2.3.2 Weighted scores

Once "raw" scores are calculated for each of the 12 criteria, they are multiplied by the respective weight for each criterion to calculate "weighted" score.

Weighted scoring requires prior weighting of characteristics / criteria. We assigned a relative weight, as a percentage, to each criterion. For example, the consultant team, after extensive discussion, decided the criterion considered the most important of the 12 evaluated was parcel size, which received 20% of the total weight (its "default" or base case weight). Other criteria were given a weight based their importance relative to the most important criterion. Then, for each criterion for each parcel we multiplied raw scores by the respective criterion weight to get 12 weighted scores for each parcel.

C.2.3.3 Average weighted scores

The sum of a parcel's 12 weighted scores equals its single "average weighted score" for a specific weighting / scoring scenario. The final scenario score for each parcel is the value to be used for mapping purposes. Higher average weighted scores appear "hot" (greater color density on the map) and lower average weighted scores appear "cold."

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[8] After all the data manipulation, scoring, and mapping had been completed, we raised to the City that an 11" main for sewer seemed small. City staff suggested something like a 24"-main was probably more appropriate for large-scale development. The effect will be that the analysis reported in this memorandum will show a less point spread among parcels for proximity to sewer lines than would an analysis with a 24" main. We concluded that the effect would be unlikely to change our boundaries for subareas. Moreover, since proximity to sewer mains is a proxy measure for cost of new sewer service, and that cost will be estimated directly in Level 2, there is no need to redo this analysis.

C.2.4 SCENARIOS

Scenarios are purposeful combinations of a scoring procedure with a weighting procedure. Each combination creates a unique set of raw, weighted, and average weighted scores.

In the *base-case scenario* (aka, the default scenario) we allocated 75% of the total weight to market and physical characteristics: parcel size (20% of weight), current land use (15%), acreage in floodplains (5%), acreage in wetlands (5%), slope (10%), brownfield status (10%), and access to employment centers (10%). Policy and investment characteristics had less weight because they can be changed more easily through government actions and were deemed lower impediments to development (for the base case). Policy and investment characteristics were straight zoning designation (4%), overlay zoning (1%), distance from highway ramp (5%), distance from a water main (7.5%), and distance from a sewer interceptor (7.5%).

Alternate scenarios modeled include two versions where policy and investment characteristics were given no weight. The rationale for these scenarios is that policy and investment characteristics may be short-run impediments to industrial development, but they can more easily changed in the long run (compared to a physical characteristic like slope). Weighting these policy and investment variable keeps increases scores for parcels that might have these impediments. Thus, these scenarios could be interpreted as a more liberal screening that gives bigger parcels more weight and is more of a long-run view of land supply. In one scenario, the weight was redistributed among market and physical characteristics equal to each characteristic's proportion of the group's weight in the base case. In the other, the weight was redistributed solely to parcel size and current land use.

For the purposes of comparison, we added a final scenario that distributes weight evenly among all 12 characteristics (8.3% each). Equal criterion weight is often what happens by default in a ranking process. We are not recommending it: we wanted to see how much different it might make.

Exhibit 2 shows ECO's four weighting scenarios.

Exhibit 2. Weighting scenarios

	Market and Physical Characteristics							Policy or Investment Characteristics				
Weighting Scenario	Parcel Size (Acres)	Land Use	Flood-plain	Wet-lands	Slope	Brown-fields	Access to employment centers	Straight Zoning	Overlay Zoning	Highway Ramp (miles)	Water Pump (miles)	Sewer Pump (miles)
Base Case	20.0%	15.0%	5.0%	5.0%	10.0%	10.0%	10.0%	4.0%	1.0%	5.0%	7.5%	7.5%
No P/I, proportional redistribute	26.7%	20.0%	6.7%	6.7%	13.3%	13.3%	13.3%	0.0%	0.0%	0.0%	0.0%	0.0%
No P/I, Size/LU redistribute	35.0%	25.0%	5.0%	5.0%	10.0%	10.0%	10.0%	0.0%	0.0%	0.0%	0.0%	0.0%
All equal	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%

Source: ECONorthwest

In addition to weighting scenarios, ECO created alternative scoring scenarios to test the sensitivity of certain characteristics. These include scenarios penalizing parcels for any land use other than vacancy, increasing allowance for parcels under two acres, reducing the acceptability of long distances from infrastructure, and reducing the scoring consequences to small increases in slope. If the results of an alternative scenario for a certain characteristic results in significant changes to the map, we would learn that the characteristic in question is sensitive to changes in the scoring scenario and warrants further discussion of the scores and weights of that particular criterion.

C.3 RESULTS

Attachment C.1 summarizes how raw, unscored data were distributed for the six characteristics we evaluated quantitatively. We used that distribution to make some judgments about how to set scores.

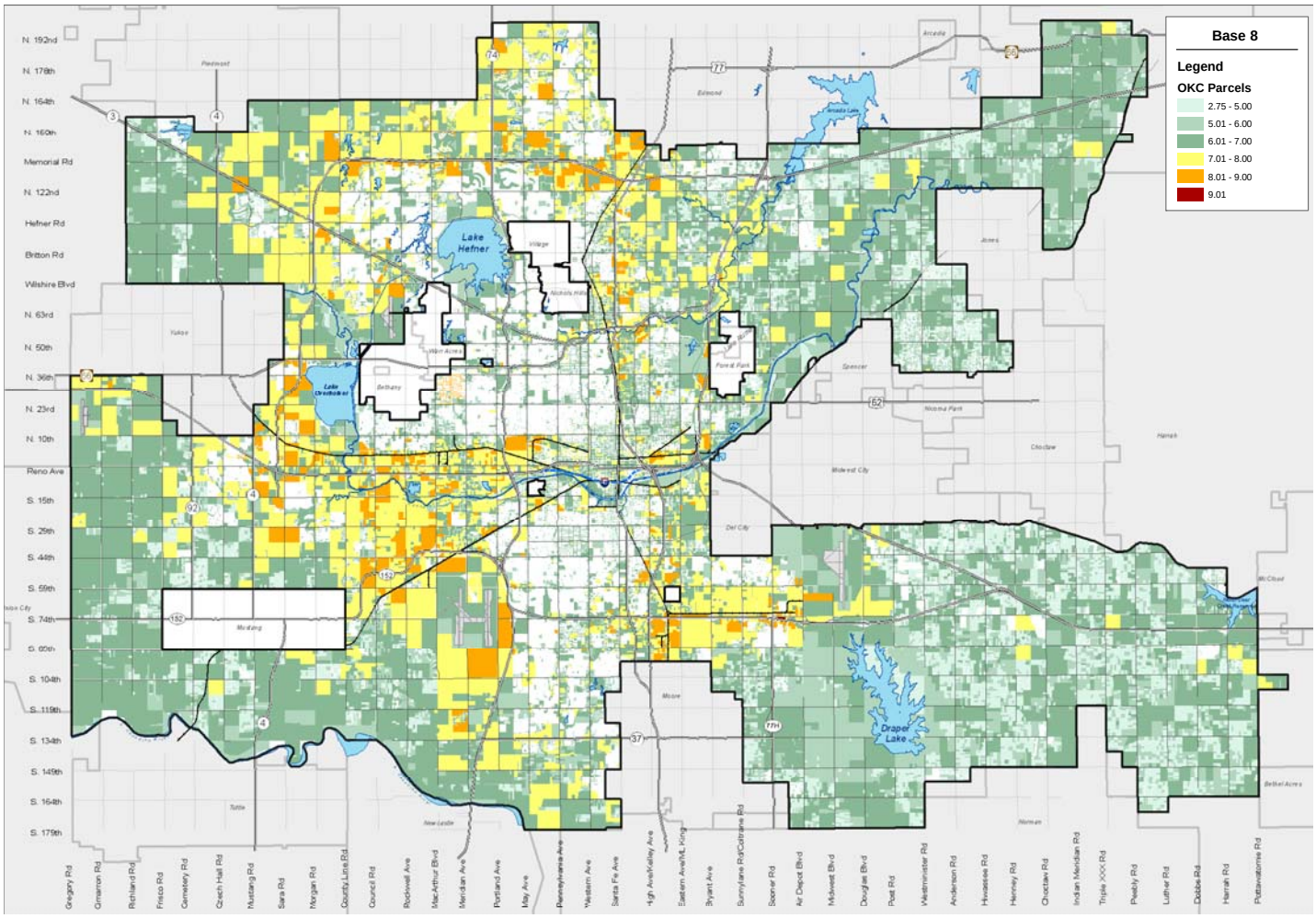
Attachment C.2 shows how we set the scores and weights in the final, selected scenario. Prior to settling on those scores and weights, we explored many other variations (as described in Section 2.4, Scenarios, above).

The scoring and weighting process was all numerical. Ultimately, however, the scoring led to an average weighted score for each parcel that was mapped as a color intensity, and *it is the qualitative visual analysis of the maps that the project team used to evaluate alternative boundaries for the subareas* that would go forward to the L-2 analysis.

The project team discussed the maps for the various scenarios, and compared those maps against early maps drawn by the team based on its assessment of areas likely to be superior for larger-scale industrial development. Ultimately the team chose the scores and weights shown in Attachment C.2 as the ones to be the basis for the definition of sub-regions and subareas, and for any further evaluation in the Level-2 analysis (referred to here as the Revised Base Case Scenario). That scenario increased the points to proximate infrastructure over the allocation in the original base case, and used the weights from the original base case. Map 1

shows the average weighted scores for that scenario for all parcels that survived the initial screening. White areas indicate parcels that were screened out (per Section 2.2., Screening, above).

Map 1 Revised Base Case Scenario, average weighted scores by parcel.

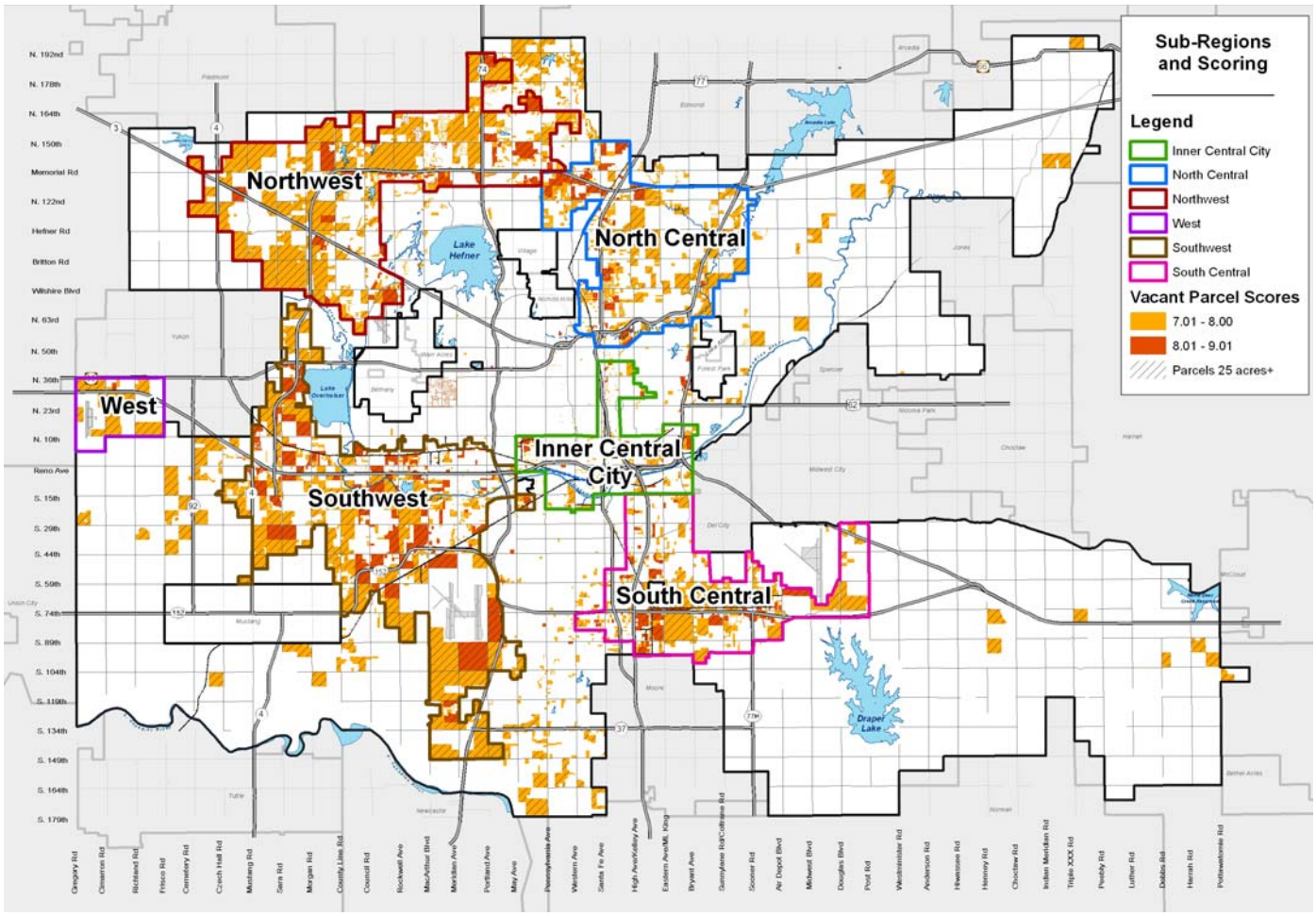


Based on scores and weights in the Revised Base Case Scenario.

The team then used the mapping of the high scoring parcels in the Revised Base Case to draw two sets of boundaries: for sub-*regions* and for sub-*areas*.

Map 2 shows the **six sub-regions**. Counterclockwise from the center they are: Central City; North Central; Northwest; West; Southwest; and South Central. Map 2 also shows (1) all parcels with an averaged weighted score of 7 or greater (orange to red) in the Revised Base Case Scenario, and (2) parcels greater than 25 acres in size (hatch marks).

Map 2 Sub-regions

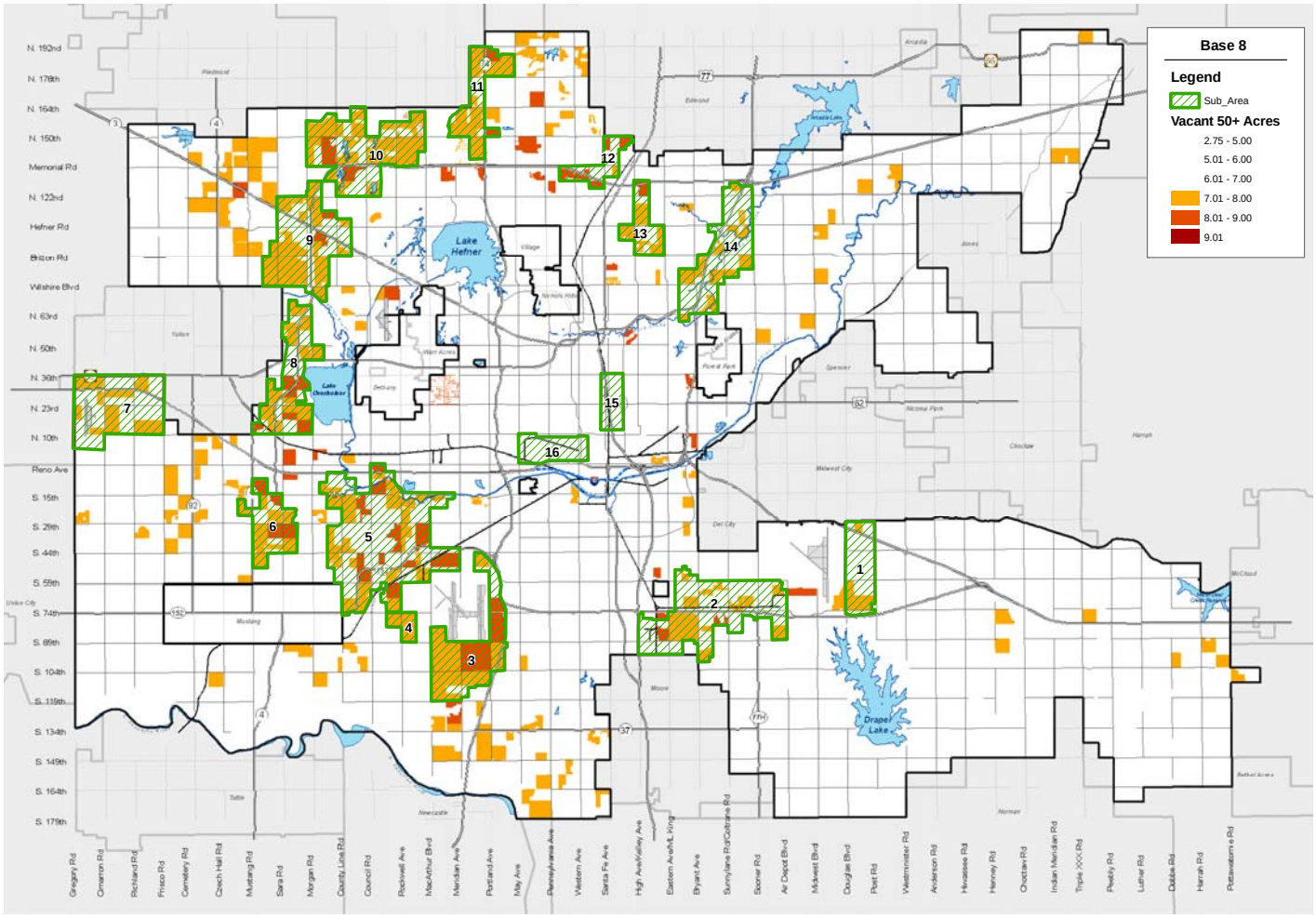


Based on scores and weights in the Revised Base Case Scenario.

Map 3 shows 16 **subareas**. Each sub-region is further divided into one to five subareas. Map 3 shows only parcels (1) greater than 50 acres, and (2) having an average weighted score of 7 or greater the Revised Base Case Scenario. Some summary statistics:

- The 16 subareas contain a combined total of about 45,000 acres and 5,500 parcels for L-2 analysis (average parcel size equals 8 acres).
- The subarea with the largest land area (#5) has about 8,200 acres (almost 13 square miles).
- The subarea with the greatest number of parcels (#16) has about 1,600 parcels, but they have an average size of only 0.5 acres.
- The smallest subarea (#4) has about 460 acres and 4 parcels.
- Half of the subareas had average parcel sizes of 19 acres or greater.

Map 3 Subareas



Based on scores and weights in the Revised Base Case Scenario.

Map 3 and the underlying data, scores, and weights from which it is derived are the starting point for the Level-2 analysis that Group Mackenzie will manage.

Attachment C.1 Distribution of raw data by evaluation characteristic

Several of the characteristics can be evaluated quantitatively. We used *deciles* to illustrate the distribution of the results. Here are some examples of how to read the table (using the first characteristic, *acres*):

- 10% of all parcels had less than 0.14 acres (about 6,000 square feet).
- 60% of all parcels had less than 1.03 acres.
- 10% of all parcels were between 1.03 acres and 2.39 acres (i.e., in the 7th decile—the one between 60% and 70%).

Decile	Acres	Miles to nearest ramp	Feet to water main	Feet to sewer main	Average slope	Employees within 1 mile
0% (lowest value)	0.00	0.0	0	0	0.0%	0
10%	0.14	0.2	109	148	0.5%	0
20%	0.16	0.3	180	323	1.0%	9
30%	0.20	0.5	280	538	1.5%	147
40%	0.31	0.6	424	803	2.0%	631
50%	0.54	0.9	610	1,142	2.3%	1,943
60%	1.03	1.1	907	1,651	3.0%	3,489
70%	2.39	1.4	1,408	2,621	3.5%	4,863
80%	4.88	2.1	3,764	8,393	4.1%	6,638
90%	7.43	4.5	20,180	24,031	5.5%	13,621
100% (highest value)	733.09	12.7	70,024	79,163	16.0%	48,328

Attachment C.2 Definition of the Revised Base-Case Scenario

The scenario is defined by its assumptions about scores and weights, as follows:

	Market and Physical Characteristics							Policy or Investment Characteristics				
Points	**Parcel Size (Acres)**	**Land Use**	**Floodplain**	**Wetlands***	**Slope**	**Brown-fields**	**Employees within one mile**	**Straight Zoning**	**Overlay Zoning**	**Distance from Highway Ramp (miles)**	**Distance from Water Main (feet)**	**Distance from Sewer Main (feet)**
0	< 2	Incom-patible uses	All 100-year floodplain	Any size > 50%	> 10%	Yes to two or more criteria	0	All others	Any overlay	1.5 or over		
1	2 - 2.5		Varying degrees of acreage in floodplains	> 0.5 AC 25% - 50%	9% - 10%							
2	2.5 - 3	Other employ-ment			8% - 9%					1 - 1.5		
3	3 - 4			> 0.5 AC 10% - 25%	7% - 8%		9				1,500 or more	1,500 or more
4	4 - 5			< 0.5 AC 25% - 50%	6% - 7%	Yes to one, no to four	147			0.75 - 1		
5	5 - 7	Industrial, utility			5% - 6%		631	Planned unit development				
6	7 - 10			< 0.5 AC 10% - 25%	4% - 5%		1,943			0.5 - 0.75	500 - 1,500	500 - 1,500
7	10 - 25		All 500-year floodplain	> 0.5 AC < 10%	3% - 4%		3,489					
8	25 - 50		Varying degrees of acreage in floodplains		2% - 3%		4,863			0.25 - 0.5		
9	50 - 100	Ag/Vacant			1% - 2%		6,638					
10	> 100	Vacant	Not in floodplain	< 0.5 AC < 10%	< 1%	No to all five	13,621	Industrial	No overlays	< 0.25	< 500	< 500

	Revised Base Case Scenario Weighting											
	Parcel Size	**Land Use**	**Floodplain**	**Wetlands**	**Slope**	**Brown-fields**	**Employees within one mile**	**Straight Zoning**	**Overlay Zoning**	**Distance from Highway Ramp**	**Distance from Water Pump**	**Distance from Sewer Pump**
Weight	20%	15%	4%	1%	5%	8%	8%	10%	5%	5%	10%	10%

*Wetlands scoring based on two categories: parcel size and percent of parcel in wetlands

Appendix D Final Analysis of Land Supply

The analysis of industrial land supply in Oklahoma City had two phases: a preliminary analysis using readily available data (Appendix C) and a detailed study of a subset of sites (this appendix). Group Mackenzie, a subcontractor to ECONorthwest completed this analysis; what follows is its report.

GROUP MACKENZIE

TABLE OF CONTENTS

I. Report Summary 1

II. Level-1 and Level-2 Supply Analysis: Methodology and Inventory Results..... 2

A. Level-1 Analysis..... 2

B. Level-1 Results..... 3

C. Level-2 Analysis..... 7

III. Level-2 infrastructure analysis and findings 15

A. Infrastructure Analysis.....15

B. Infrastructure Findings 18

IV. Conclusions 25

Technical Appendix D: Expanded Analysis of Land Supply

To
ECONorthwest

For
Oklahoma City Buildable Lands Analysis

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I. REPORT SUMMARY

The land supply analysis identifies those areas in Oklahoma City where potential exists to create an inventory of industrial sites to meet market demand. The analysis was completed in two parts: the Level-1 (L-1) analysis (Appendix C) effectively analyzed all of the parcels in Oklahoma City and, through a combination of quantitative and qualitative measures, reduced the inventory to 45,000 acres and 5,500 parcels in 16 subareas distributed throughout the City. The L-2 analysis further reduced the land in the subareas to identify study areas where large industrial sites could be located to meet the job creation needs of the City.

The Level-2 (L-2) analysis resulted in 14 study areas totaling 6,800 gross acres and 6,300 net developable acres. Study areas range in size between a low of 161 acres and a high of 923 acres. There are a total of 162 parcels in the study areas.

In order to determine potential infrastructure demand and capacity, the consultant team along with the Greater Oklahoma City Chamber of Commerce and the City assigned industrial use profiles to model build-out scenarios for each study area. Using the utility demand profiles developed for each study area, the local utility service providers each completed a capacity analysis of the impact on the utility infrastructure from the projected industrial development. Part of the capacity analysis for each utility included developing construction cost estimates to extend or upgrade utilities to the boundary of the study areas.

The results of the infrastructure cost analysis indicate that the costs of providing utility service to new industrial developments will vary widely across the city. The primary infrastructure costs are associated with the transportation, electrical power, and water systems. While the results presented in this report are based on the specific industrial land use profiles assigned to the study areas, the results suggest that some regions of the city may be better suited to serve industry types with high utility demands.

The land supply analysis points to areas in the City where industrial sites can be identified. Infrastructure availability and costs, market and locational considerations, and parcelization are all factors that influenced the ability to create this site level inventory. It is clear from this study that the City has a beginning inventory of approximately 6,000 acres from which to create a large lot, developable-ready inventory of sites. This inventory of land is by no means development ready and will require a combination of infrastructure investments, aggregation strategies and planning policies to prepare and maintain them for industrial development and jobs.

II. LEVEL-1 AND LEVEL-2 SUPPLY ANALYSIS: METHODOLOGY AND INVENTORY RESULTS

The land supply analysis for the Employment Land Needs Assessment and Action Plan (ELNAAP) had two steps: (1) Level-1 (L-1) used readily available data to make preliminary identification of subareas of the City most likely to have large parcels to accommodate industrial development. (2) Level-2 (L-2) used a more detailed parcel analysis in the sub-areas identified in the L-1 analysis to identify concentrations of parcels for industrial development. The consultant team began with an inventory of the entire City and through a series of analysis screens and discussions, reduced a large inventory of parcels down to subarea targets where there are concentrations of parcels that provide the best opportunities for large industrial sites. This document summarizes the methods and results of the L-1 and L-2 analyses.

A. LEVEL-1 ANALYSIS

The goal of the L-1 analysis was to identify subareas of the City containing large sites that are likely to be suitable to accommodate development for employment (primarily industrial) uses, now and in the future. More detailed description of the L-1 analysis can be found in Appendix C. In summary, the L-1 analysis had six steps:

Step 1: Create an enhanced data file. The evaluation began with an original GIS (Geographic Information System) parcel file called *TriCountyParcels*. The study team created an enhanced data file by incorporating other information using additional GIS shape files (like zoning or slope) and other data sources.

Step 2: Reduce file size by screening out parcels with attributes that make them unlikely candidates for larger-scale industrial development. In this step, the project team[1] reduced the size of the original parcel file by screening out parcels with "fatal flaws": location or site attributes deemed by the project team to be sufficiently detrimental to development that the parcel should not be considered a promising candidate for large-site industrial development.

Step 3: Select criteria for site evaluation. Selected criteria influenced a parcel's suitability and readiness for development, and data were available to allow for measurement of market and land site characteristics.

Step 4: Assign raw scores. A zero to 10 score was assigned to each value within each site evaluation criterion.

Step 5: Assign weighted and averaged scores. First, a relative weight was assigned, as a percentage, to each criterion. Second, for each criterion for each parcel, raw scores were multiplied by the respective criterion weight to get 12 weighted scores for each parcel. Third, all the separate weighted scores were added to get a single average weighted score for each parcel. Each parcel received a weighted score between zero and 10.

[1] The project team includes EcoNorthwest, Group Mackenzie, IronWolf Community Resources, Lautman Economic Architecture, Benham/SAIC, The City of Oklahoma City, and the Greater Oklahoma City Chamber of Commerce. The consultant team includes EcoNorthwest, Group Mackenzie, IronWolf, and Lautman.

Step 6: Define scenarios and map scores for each parcel. The project team developed several scenarios for parcel scoring, defined by a different combination of raw scores and weights. The City created maps for each scenario that showed the "average weighted score" for each parcel as a color, with denser coloring used for higher scores. This allowed the project team to analyze the parcels based on the geographic distribution and relationship/proximity of highly scored parcels.

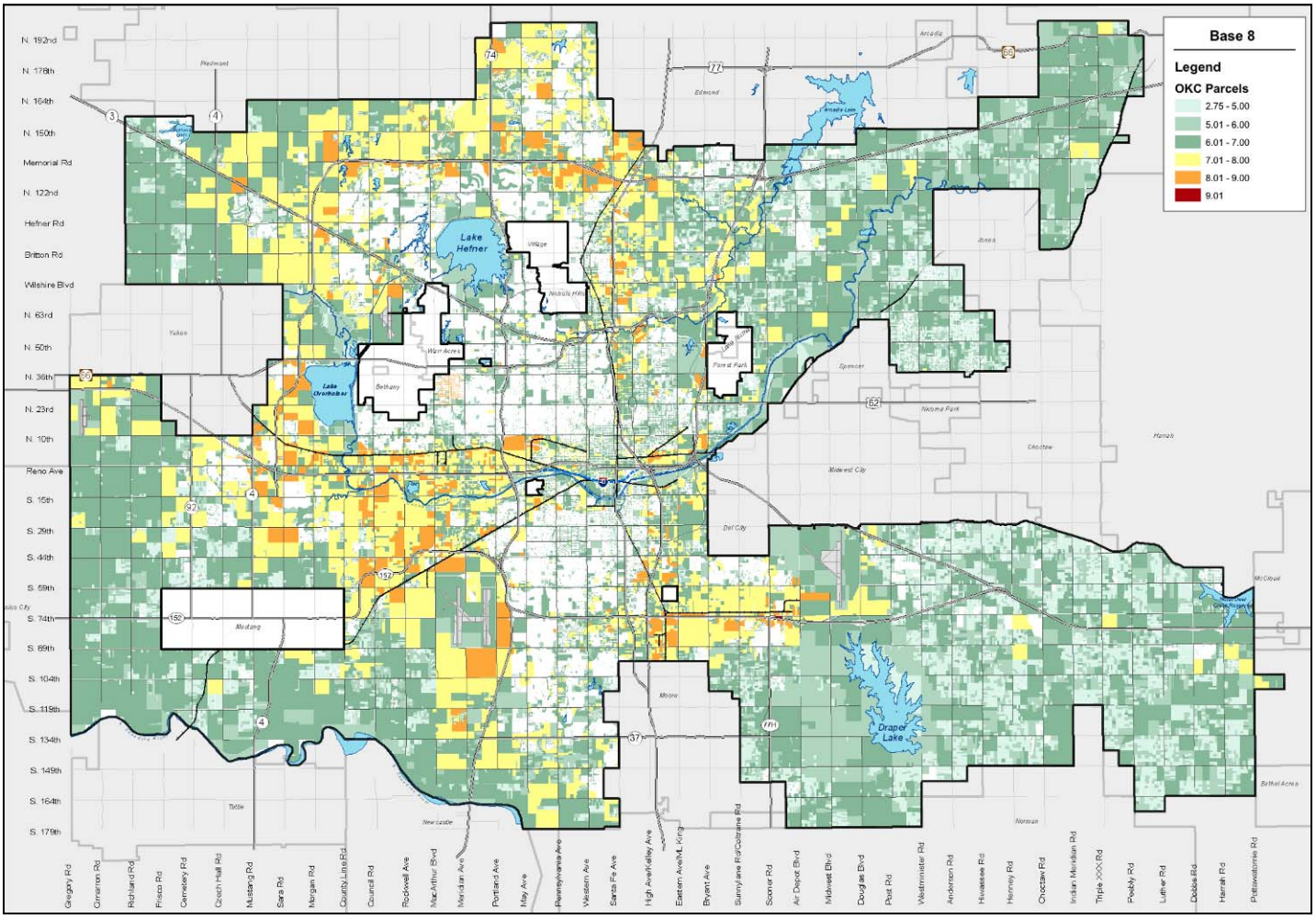
Step 7: Use map scores to establish boundaries for subareas. A preferred scenario for selecting sub-areas for the L-2 analysis was chosen. A total of 16 subareas were selected, with a combined total of about 45,000 acres and 5,500 parcels, for the L-2 analysis.

B. LEVEL-1 RESULTS

The L-1 analysis analyzed all of the parcels in Oklahoma City and through a combination of quantitative and qualitative measures reduced the inventory down to 45,000 acres and 5,500 parcels in 16 subareas. These subareas were distributed around the City and provided the most opportune areas for industrial development. The L-2 analysis then further reduced those areas to concentrations of parcels to identify the best opportunities for large employment sites to meet the job creation needs of the City.

Map 1 shows the average weighted scores for the Preferred Scenario for all parcels that survived the initial screening in the L-1 analysis.

Map 1: Preferred Scenario, Average Weighted Scores by Parcel

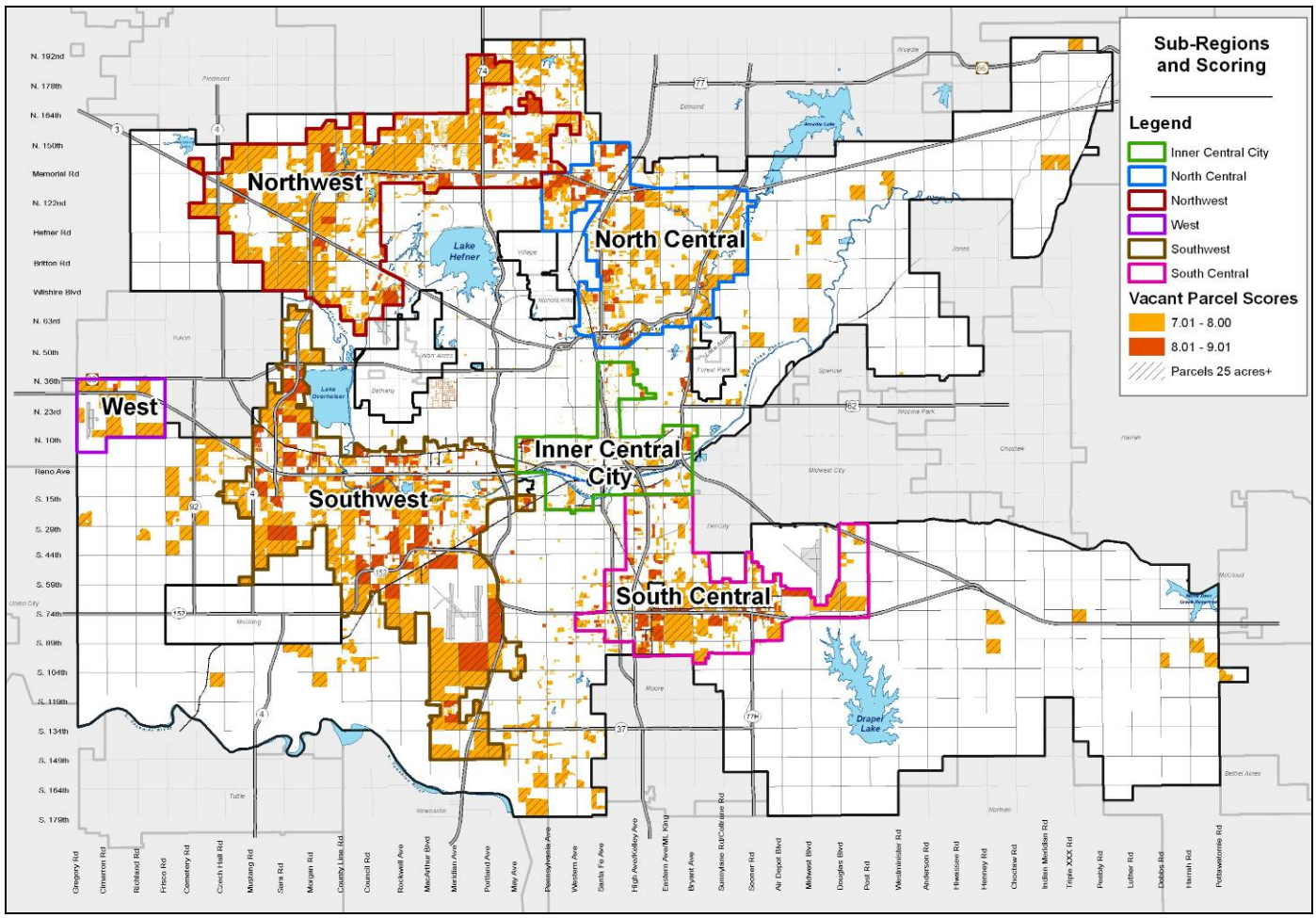


Based on scores and weights in the Revised Base Case Scenario.

The team then used the mapping of the high scoring parcels in the Preferred Scenario to draw two sets of boundaries: for sub-*regions* and for sub*areas*.

Map 2 shows the six sub-regions. Counterclockwise from the center they are: Inner Central City; North Central; Northwest; West; Southwest; and South Central. Map 2 also shows (1) all parcels with an averaged weighted score of 7 or greater (orange to red) in the Preferred Scenario, and (2) parcels greater than 25 acres in size (hatch marks). This criterion was imperative in selecting large agglomerations of highly scored parcels larger than 25 acres for determining the subareas.

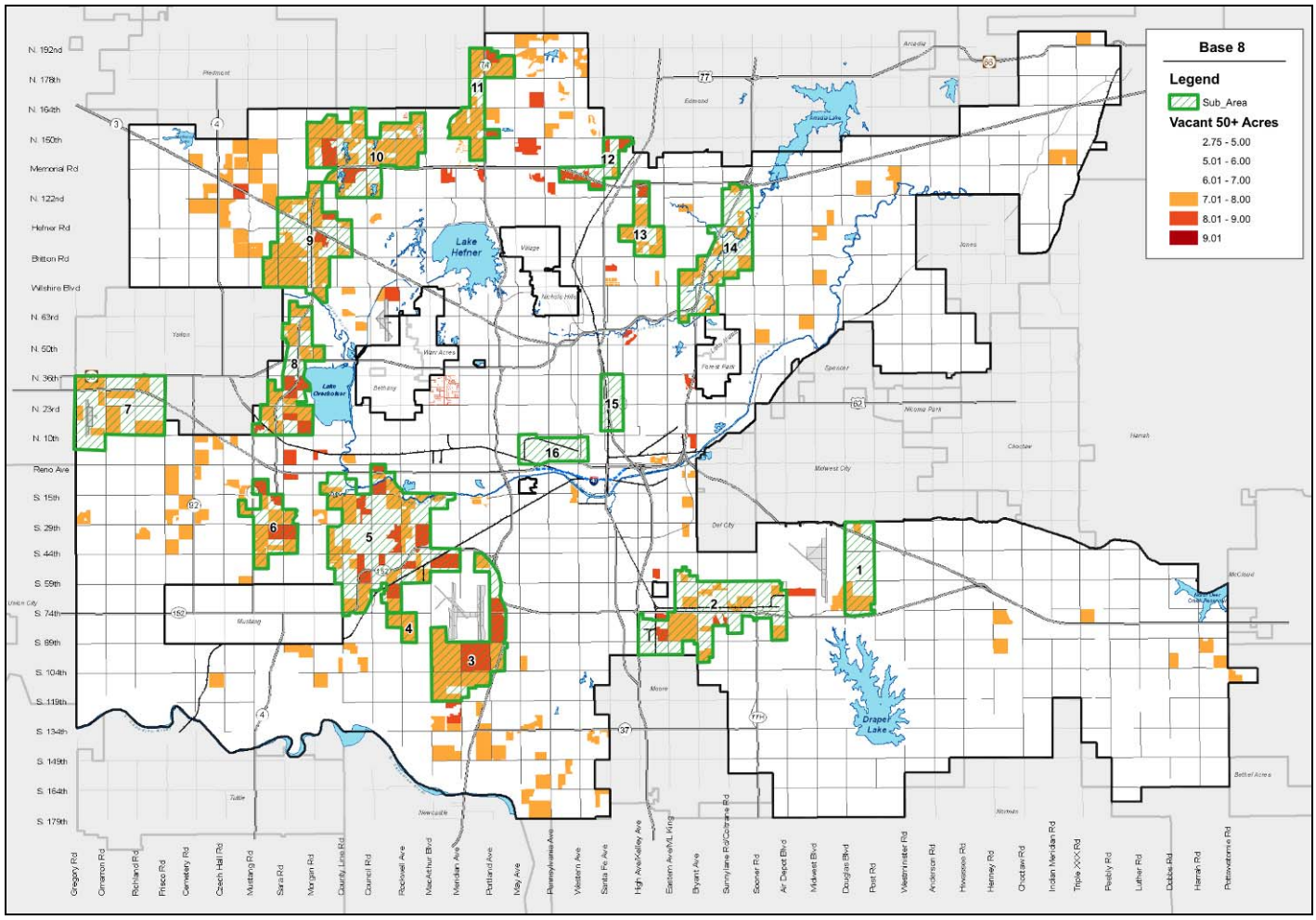
Map 2: Sub-regions



Based on scores and weights in the Preferred Scenario. Map created by Oklahoma City Planning Staff.

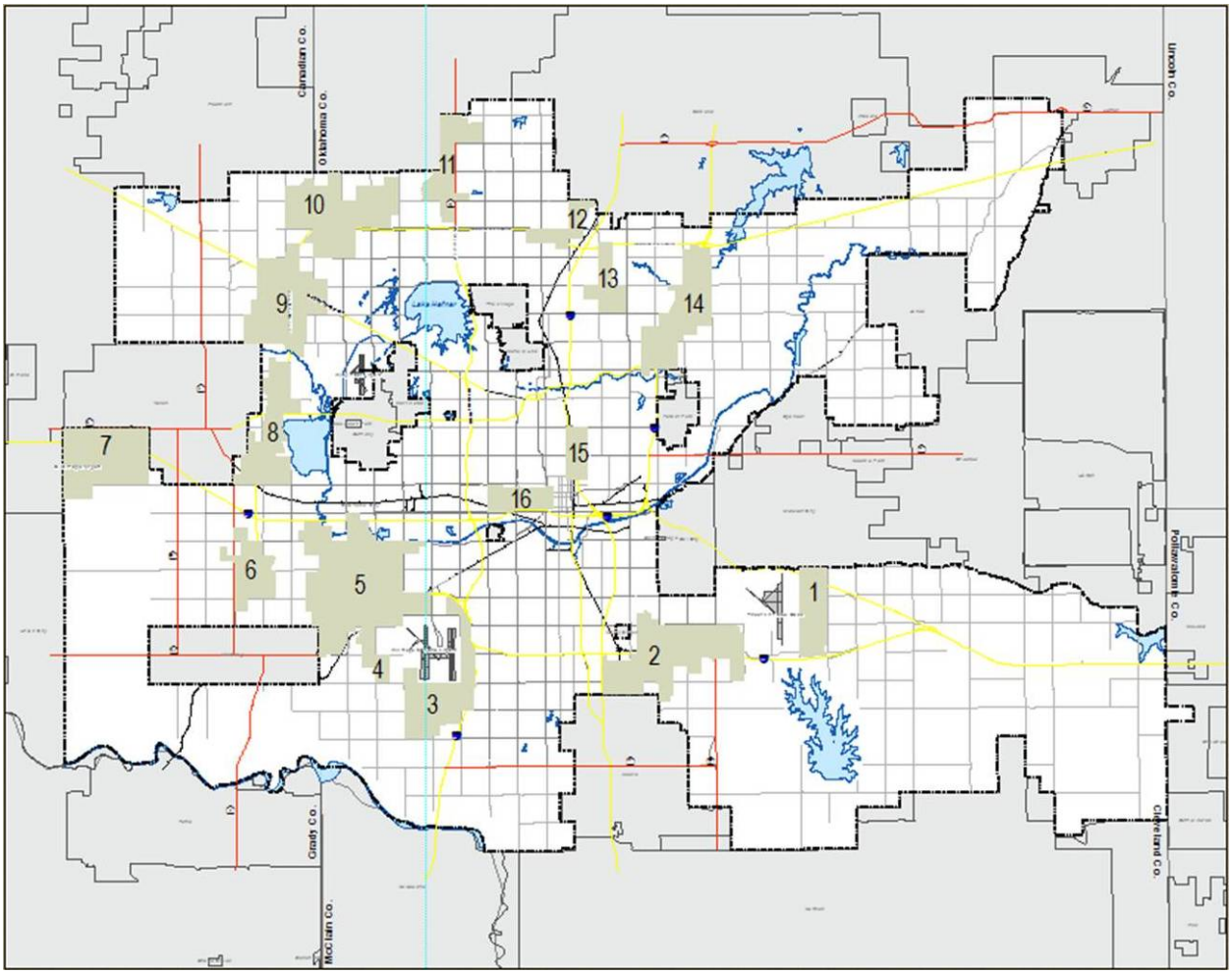
Map 3 shows 16 **subareas**. Each sub-region (map 2) may have multiple subareas. Map 3 only shows parcels that are: 1) greater than 50 acres; and 2) have an average weighted score of 7 or greater. The subareas shown in Map 3 are the starting point for the Level-2 analysis.

Map 3: Subareas



Based on scores and weights in the Preferred Scenario. Map created by Oklahoma City Planning Staff.

Map 4: 16 Subareas

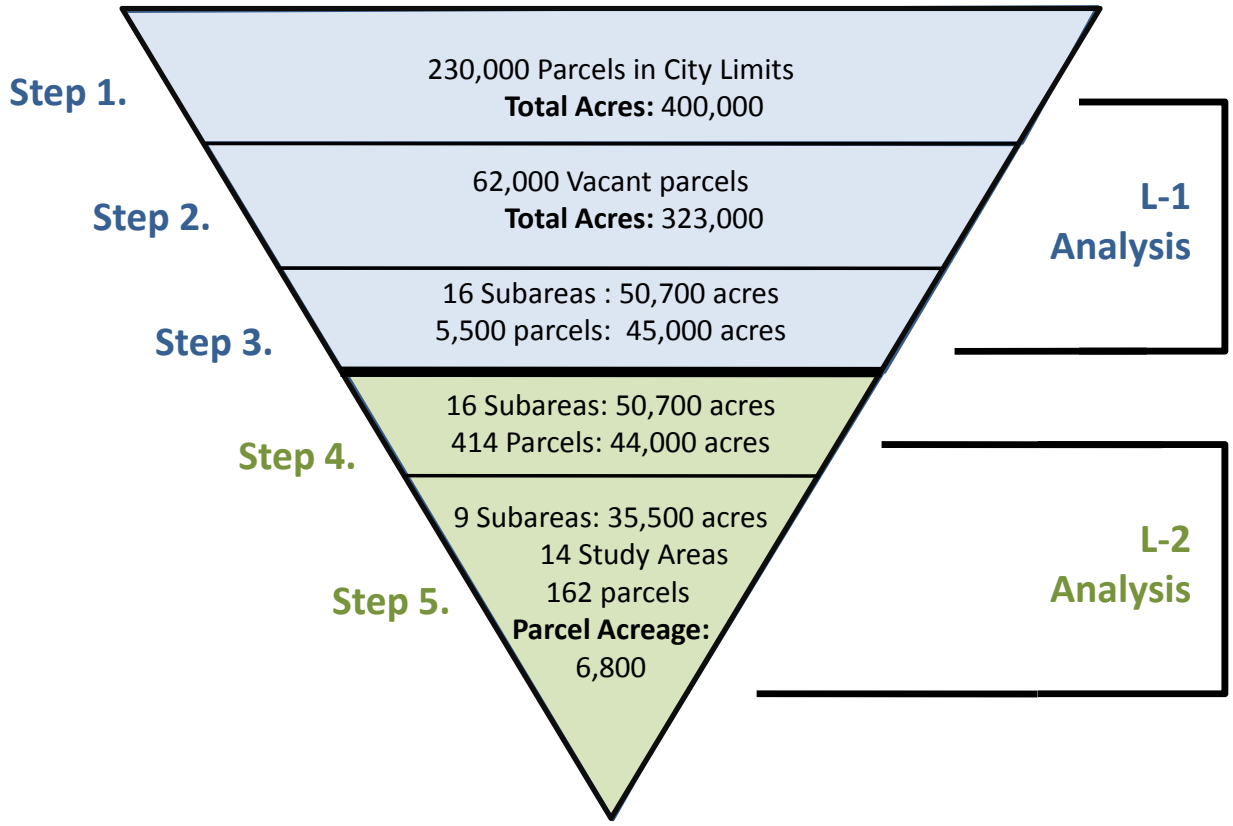


Map created by Group Mackenzie.

C. LEVEL-2 ANALYSIS

The L-1 analysis started with all parcels within the City limits (Figure 1: Step 1) and then further reduced those by screening out residential, educational, and developed land down to 62,000 parcels (Figure 1: Step 2). The team applied quantitative and qualitative analyses to these parcels, resulting in 16 subareas and 5,500 parcels (Figure 1: Step 3) throughout the City where industrial development could occur. The next step was to further refine the inventory and evaluate suitability and capacity for future development in these 16 subareas. Through further analysis, the subareas were segregated into 14 study areas. These study areas were determined to be the prime locations in the City where potential exists for the creation of development-ready industrial/employment sites. Figure 1 explains the L-1 and L-2 filtering process the team took to evaluate the entire inventory of sites the 5,500 resulting parcels from the L-1 analysis.

Figure 1: Level-1 and Level-2 Analysis Results



The L-2 analysis started with the 5,500 parcels in 16 subareas (Figure 1: Step 3) that were the output of the L-1 analysis. To begin the L-2 analysis the project team chose to only examine parcels that were greater than 50 acres in size **and** received a score of 7.0 or greater in L-1, leaving 414 parcels in the same 16 L-1 subareas (Figure 1: Step 4). These 414 parcels were then individually reviewed and further narrowed based on more detailed/specific considerations to determine study areas. The considerations included:

1. Preference given to adjacency of individual parcels that met basis criteria (>50 acres; >7.0 L-1 score)
2. Currently vacant
3. Reasonable access and proximity to existing infrastructure
4. Preference given to adjacency to industrial development
5. Lack of adjacency to residential or anticipation for future residential development
6. Location of natural features
7. Lack of physical constraints
8. Ownership – public or private

The consultant team presented the initial L-2 inventory results to the client in May 2011. The consultant team met with the project management team and local real estate

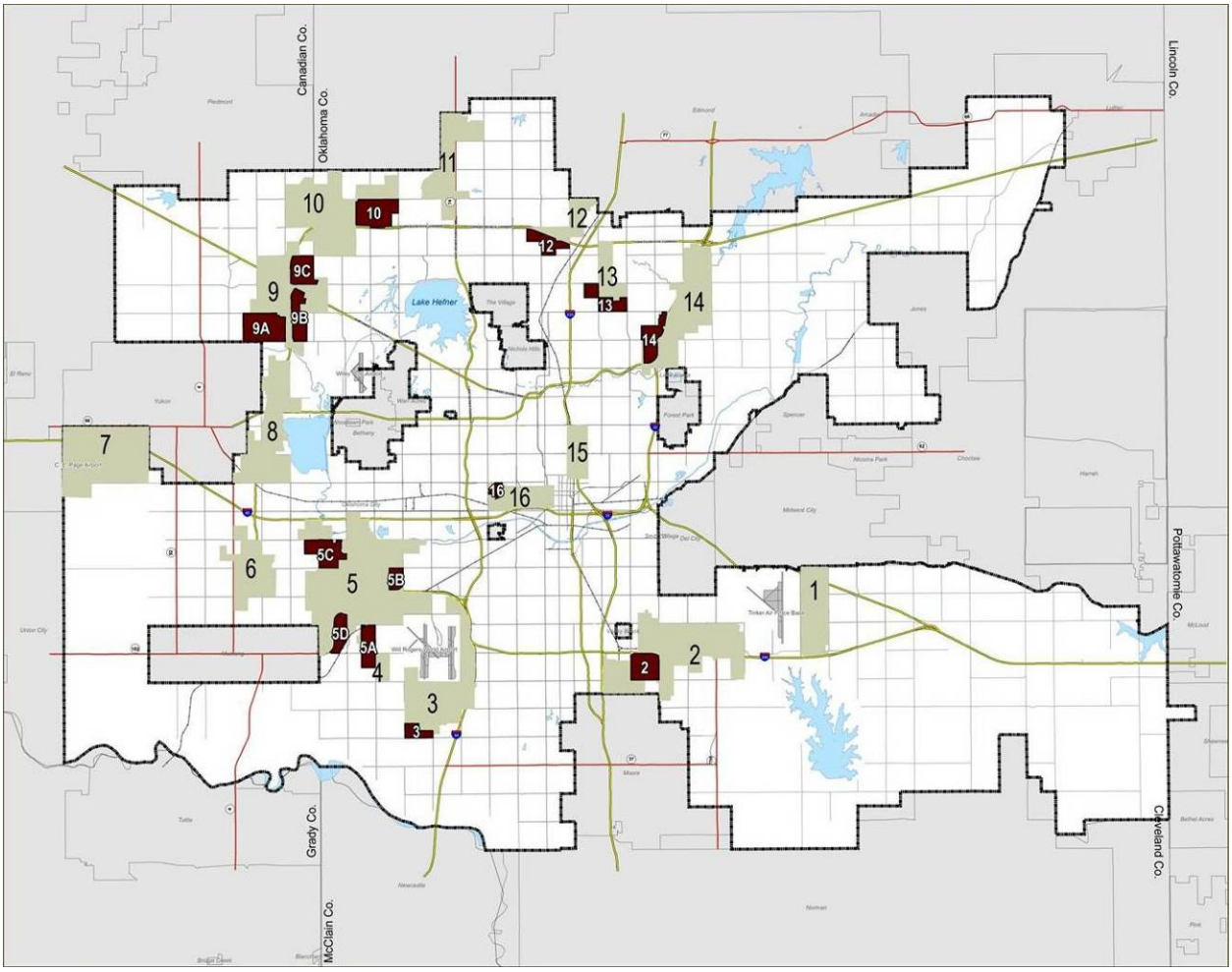
developers and brokers[2] to receive input on the consultant's study area recommendations. Following this trip, the consultant team made changes to the initial study area recommendations based on local knowledge and input. As a result, some study areas were deleted entirely, new study areas were created, and some study areas were increased or decreased in size. Furthermore, the project management team manually added parcels, the majority of which were analyzed in the L-1 analysis but were initially excluded as they did not receive a score higher than 7.0 and were not larger than 50 acres.

The final L-2 results include 9 subareas and 14 study areas (Figure 1: Step 5). A total of 7 subareas were deleted due to a variety of factors including public ownership, proximity to residential development, and distance to infrastructure due to rural location. The remaining 9 subareas have 35,500 gross acres. The final 14 study areas total 6,800 gross acres, ranging in size between a low of 161 acres and a high of 923 acres and contain 162 parcels[3] (Map 5).

[2] List of participants includes: Michael Judd (SAIC); Jeff Napoliello, David Knowles, J. Clare Woodside (Benham); Gerald Gamble (Gerald L Gamble Co.); Carl Edwards (Price Edwards & Company); Stephen Tanenbaum, Richard Tanenbaum (Gardner Tanenbaum Holdings); Michael Raff, David Huffman (Wiggin Properties); Thomas Lange, James Austin, John Lenochan (CBRE Oklahoma) Mark Beffort (Grubb & Ellis); Mark Ruffin (Precor Ruffin).

[3] For more detailed information on each subarea, Study Area, and each parcel, refer to Appendix D.1. This appendix was written by Group Mackenzie as supplemental information to this technical appendix. This document provides more detailed information on the 16 subareas, 14 Study Areas, and all L-2 parcels.

Map 5: 16 Subareas and 14 Study Areas



Once the study areas were confirmed, Group Mackenzie calculated the floodplain, wetlands, and rivers/stream acreages based on current Geographic Information Systems (GIS) data provided by Oklahoma City Planning Department to determine the net developable acreage for each study area. In addition to natural constraints, oil wells were also considered in the net developable acreage. Study Area 10 potentially had oil wells on site that could affect the net developable acreage but further investigation did not find any in the study area. Study Area 2 is the only study area with significant oil wells; decreasing the net developable area by approximately 100 acres. These 100 acres are currently, and will be in the near future, reserved for oil and gas activity.

Table 1 displays the final L-2 study area results with gross and net acres for each study area as well as the total number of parcels and property owners in each study area. The number of parcels and number of owners vary greatly between the study areas. Current zoning and Comprehensive Plan Designations for each of the parcels were provided by the Oklahoma City Planning Department. Appendix D.1[4] provides more detailed information on the study area parcels.

[4] This appendix was written by Group Mackenzie as supplemental information to this technical appendix. This document provides more detailed information on the 16 subareas, 14 Study Areas, and all L-2 parcels.

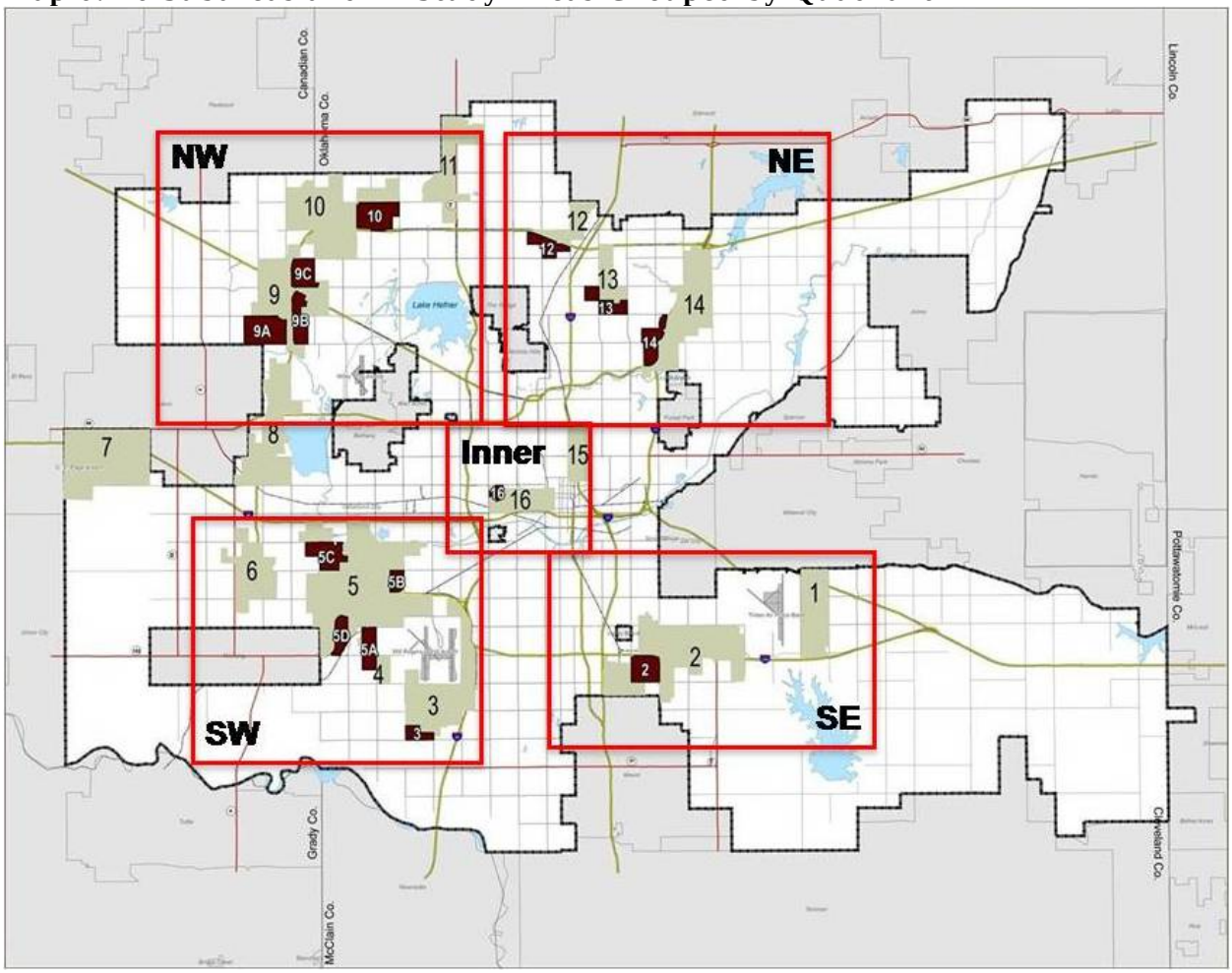
Table 1: Final Level-2 Study Areas Results

Study Area	Gross Acres	Net Developable Acres	Number of Parcels & Owners	Zoning*	Comprehensive Plan Designation
2	582	460	1; 1	I-2; I-1	Standard Industrial
3	239	187	2; 2	I-2	Industrial
5A	456	452	4; 3	AA, I-1, I-2	Industrial; Urban Dev.
5B	240	223	1; 1	I-2	Industrial
5C	635	571	36; 10	R-1, I-2, AA	Industrial; Urban Dev.
5D	359	316	6; 4	AA, R-1, R-2, C-3, I-2, C-1,	Urban Dev.
9A	915	862	7; 7	I-2, AA, AA(SP) R-1	Urban Dev.
9B	511	510	14; 13	I-2, C-3, O-2, R-1, AA	Urban Dev.
9C	522	510	13; 10	AA	Urban Dev.
10	821	810	10; 7	R-1, C-3, R-4, O-2, I-1, R-4M, O1	Urban Dev.
12	403	392	10; 5	I-1, C-3	Protected Industrial; Standard Industrial
13	445	436	13; 8	R-1, R-4	Transportation, Communication, Utilities/Urban Development
14	506	496	42; 34	R-1, I-1	Urban Dev.
16	106	80	3; 3	I-2, I-1	Standard Industrial/Urban Development
Total	**6,800**	**6,300**	**162; 108**		

Source: Group Mackenzie, January 2012.
* Zoning categories are listed in order of land area with the zoning category with the most land area listed first.

The L-2 analysis had finalized the study areas, the number of parcels in each of the study areas, and determined the net developable acreage of each of the parcels. The next step examined infrastructure issues associated with each study area. At this point, one more geographic analysis area was adopted. For purposes of the infrastructure analysis conducted in the L-2 analysis, the project team grouped the study areas into quadrants (See map 6). This allows for a subregional perspective and comparison on service deliverability without going down to the specificity of individual study areas.

Map 6: 16 Subareas and 14 Study Areas Grouped by Quadrant



Oklahoma City's Comprehensive Plan (OKC 2000-2020) identifies four industrial areas that are meant to be the primary locations for manufacturing activities (Industrial; Standard Industrial; Protected Industrial; Industrial Reserve). Some areas are also identified for Urban Development. Table 1 above identifies the Comprehensive Plan Designations and the specific zones for each of the study areas. Figure 2 below overlays the study areas on the Comprehensive Plan map. Study areas in the Southeast and Southwest Quadrants are in or adjacent to industrial designations. Study areas in the Northwest Quadrant are designated as Urban Development. The Northeast Quadrant includes Study Area 12, which is designated industrial, and Study Areas 13 and 14, which are Urban Development. The Inner City quadrant is a combination of Standard Industrial and Urban Development.

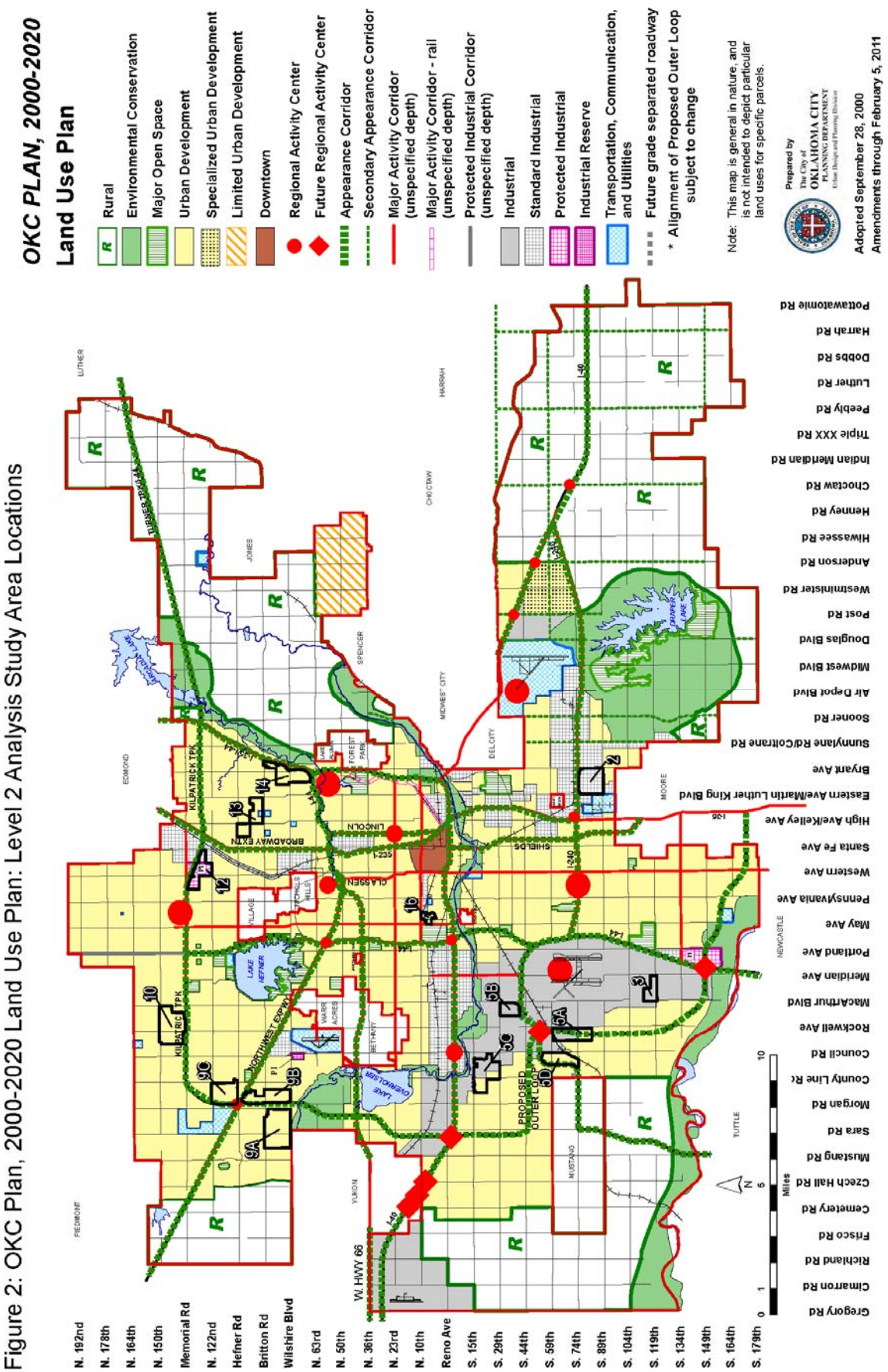


Figure 2: OKC Plan, 2000-2020 Land Use Plan: Level 2 Analysis Study Area Locations

AN OVERVIEW OF THE L-2 FINDINGS BY QUADRANT IS[5]:

Southeast Quadrant
This quadrant is located near Tinker Airforce Base and includes 2 subareas and 1 study area, 2. This study area is located south of I-240 and is owned in its entirety by the School Land Trust. No other parcels in either subarea 1 of subarea 2 met the study area criteria.

Southwest Quadrant
This quadrant is located near the Will Rodgers World Airport and includes 3 subareas and 5 study areas: 3, 5A, 5B, 5C, and 5D. These study areas are located west of I-44 and south of I-40. A significant portion of the land in subarea 3 is publicly owned and is being planned as part of a separate, airport-driven planning process. Study area 3 is privately owned and has some residential development occurring in the surrounding area. Subarea 5 has predominately industrial land uses.

Northwest Quadrant
This quadrant is located at the John Kilpatrick Turnpike and the Northwest Expressway intersection. It includes 3 subareas and 4 study areas; 9A, 9B, 9C, and 10. Study areas 9A, B, and C include larger underdeveloped parcels adjacent to the Turnpike. The area east of the Turnpike has seen residential development occurring. Study area 10 is near the Expressway, higher end housing and some of the only higher quality business park environments in the region.

Northeast Quadrant
This quadrant is located between the John Kilpatrick Turnpike and I-44, west of I-35. It includes 3 subareas and 3 study areas; 12, 13, and 14. This area has good freeway connectivity to the north and east.

Inner City Quadrant
This quadrant is located just north of I-40 and west of I-235. It includes 2 subareas and 1 Study Area; 16. This study area is located in the Neighborhood Revitalization Strategy Area (NRSA). It includes sites that are closer to the downtown and have existing infrastructure and lower development costs. This particular site is larger, scored well, and provides a specific development opportunity within this unique study area. There may be other sites that are smaller and present other opportunities for new development, but they will have other challenges, such as brownfield, smaller sizes, surrounding disinvestment that will make them more challenging as business development locations.

[5] For more detailed information on each subarea, Study Area, and each parcel, refer to Appendix D.1. This appendix was written by Group Mackenzie as supplemental information to this technical appendix. This document provides more detailed information on the 16 subareas, 14 Study Areas, and all L-2 parcels.

III. LEVEL-2 INFRASTRUCTURE ANALYSIS AND FINDINGS

A. INFRASTRUCTURE ANALYSIS

The L-2 analysis resulted in 14 study areas and a total of approximately 6,000 net developable acres. Group Mackenzie calculated the floodplain, wetlands, and rivers/stream acreages based on current Geographic Information Systems (GIS) data provided by the Oklahoma City Planning Department to determine the net developable acreage for each study area. The next step in the analysis was to determine the ability to service these study areas with public and private utilities and transportation infrastructure.

The methodology for determining infrastructure demand for each of the 14 study areas involved assigning industrial profiles to each study area and calculating the expected utility demand that would develop from full build-out of the net developable acres in study area. The industrial profiles were based on the State of Oklahoma's Site Ready Certification Program[6], which has developed profiles of infrastructure and other site requirements for various industrial types. The Project Team identified the industrial uses that most appropriately reflected the business development activities in Oklahoma City. The four industry profiles are summarized in the following table.

Table 2: Oklahoma Site Ready Industrial Profiles

Site Profile	Heavy Industrial	Light Industrial	Warehouse / Distribution	Business Services / Office Park
Site Acreage (ac)	40	15	50	10
Building Size (sf)	300,000	160,000	800,000	50,000
Water Demand (peak gpd)	500,000	150,000	20,000	12,000
Sewer Demand (peak gpd)	400,000	150,000	20,000	12,000
Power Demand (MW)	20	2.0	2.5	1.0
Natural Gas Demand (mcf/month)	90,000	4,000	1,200	2,500

By dividing each utility demand by the profile site acreage, Group Mackenzie converted the State's utility demand models to a per-acre basis for use in this study. In addition to the utility demands defined by the state, Group Mackenzie used the ITE Trip Generation[7] models for each industry type to determine projected traffic trips for each study area. The following table lists the per-acre demands for each industrial profile by utility.

[6] Oklahoma Site Ready Certification Program, online content: http://www.okcommerce.gov/Community-Resources/Certify-And-Market-Buildings-And-Sites-1, accessed April 26, 2011.

[7] *Trip Generation (8th Edition),* Institute of Transportation Engineers, 2008.

Table 3: Industrial Profile by Utility

Utility Type	Heavy Industrial	Light Industrial	Business Services / Office Park	Warehouse Distribution Park
Water	12,500 gpd peak 2,083 gpd average	10,000 gpd peak 1,667 gpd average	1,200 gpd peak 400 gpd average	400 gpd peak 133 gpd average
Sanitary Sewer	10,000 gpd peak 1,667 gpd average	10,000 gpd peak 1,667 gpd average	1,200 gpd peak 400 gpd average	400 gpd peak 133 gpd average
Electric Power	0.5 MW	0.13 MW	0.1 MW	0.05 MW
Natural Gas	2,250 mcf / month	267 mcf / month	250 mcf / month	24 mcf / month
Transportation	7 trips	52 trips	165 trips	57 trips

Based on their experience and local market knowledge, the Greater Oklahoma City Chamber of Commerce and the City assigned industrial use profiles to each of the study areas in order to model the build-out scenario for each study area. Minor adjustments were made based on a review by the previously mentioned group of brokers and developers. The assigned industrial uses are described in the following table.

Table 4: Study Area Land Use Profiles

Study Area	Heavy Industrial	Light Industrial	Business Services/ Office Park	Warehouse Distribution Park	Commercial[1]	Other/ Existing[2]
2	17%	35%	7%	36%	5%	
3	10%	40%		50%		
5A	25%	32%	5%	38%		
5B		60%	10%	30%		
5C	10%	40%		45%	5%	
5D	40%	25%	10%	25%		
9A		30%	30%	30%	10%	
9B		20%	35%	30%	15%	
9C		20%	35%	30%	15%	
10		30%	60%		10%	
12		20%	30%	30%	20%	
13		20%	35%	15%	10%	20%
14		25%	20%	50%	5%	
16		39%	18%	41%		

[1] For the purposes of the land use profiles, 'Commercial' use is considered to account for support retail (gas stations, restaurants, etc) that are expected to develop with the projected nearby industrial development.

[2] Study Area 13 has existing telecommunications antennas on site, which are assumed to remain. The area used for antenna infrastructure and associated clearances is taken out of the net available industrial area.

Study Area Utility Demand Profiles

Because each study area was comprised of multiple industry types, the total utility demand was a composite value reflecting the contribution of each industry type in the study area. Group Mackenzie calculated the total utility demand by multiplying the per-acre utility demand for each industry type by the respective acreage assigned to that

industry type in each study area. Net industrial acreage refers to the net developable acreage minus the acreage designated for commercial use. The utility demand of the commercial acreage portion of each study area was assumed to be met by the industrial uses utility demand and was not calculated separately. It is assumed that the commercial infrastructure demands are minimal and will be met through the provision of the industrial infrastructure.

The utility demands developed using this method are presented in Table 5 below and represent the anticipated utility demands from the full build-out of each study area, assuming an industrial land use pattern which matches the land use models assigned by the Chamber of Commerce and the City and reviewed by development sector representatives.

Table 5 – Total Utility Demands by Study Area

Study Area	Peak Water Demand (gpd)	Average Water Demand (gpd)	Peak Sewer Demand (gpd)	Average Sewer Demand (gpd)	Power (MW)	Natural Gas (mcf/month)	Transp. (trips/day)
2	2,697,355	467,071	2,501,494	434,428	71.7	231,388	23,715
3	1,017,243	175,762	970,580	167,985	23.7	64,170	9,333
5A	2,955,639	508,582	2,673,052	461,484	86.2	302,735	21,838
5B	1,393,454	241,175	1,393,454	241,175	23.0	42,965	14,470
5C	3,101,806	534,105	2,958,997	510,303	71.1	195,705	26,934
5D	2,440,755	418,385	2,124,595	365,692	80.6	315,449	14,717
9A	3,002,022	569,349	3,002,022	569,349	72.5	140,008	70,910
9B	1,297,051	262,134	1,297,051	262,134	38.8	75,627	43,533
9C	1,297,127	262,149	1,297,127	262,149	38.8	75,632	43,535
10	3,421,730	680,667	3,421,730	680,667	91.1	211,651	105,411
12	972,755	193,505	972,755	193,505	27.8	53,188	30,202
13	1,081,652	215,167	1,081,652	215,167	29.9	63,024	33,453
14	1,458,328	279,430	1,458,328	279,430	38.4	63,864	36,954
16	342,168	62,381	342,168	62,381	7.2	13,177	6,089

Infrastructure Improvement Cost Estimates

Using the utility demand profiles developed for each study area, the local utility service providers each completed a capacity analysis of the impact on the utility infrastructure from the projected development. The following sections describe the analysis that was completed for each infrastructure type.

Part of the capacity analysis for each utility included developing construction cost estimates to extend or upgrade utilities to the boundary of the study area. Construction costs related to utility installations inside the study area were considered incidental to specific development projects and were not considered in this study.

Transportation System Analysis Methodology

Benham/SAIC performed the capacity and cost analysis of the transportation system for each study area. In summary, the analysis involved adding the projected build-out traffic growth from the industrial development to the current traffic in the study area vicinity. The baseline existing traffic was determined based on the Association of Central

Oklahoma Governments (ACOG) traffic database with a 20-year, 2-percent annual growth rate applied to model future traffic.

The current and build-out performance of the transportation system was evaluated based on the Level of Service (LOS), calculated using the Highway Capacity Software (HCS) methodology. For areas that exhibited inadequate LOS at the build-out scenario, Benham/SAIC recommended transportation improvements to improve the system performance under the future demand. Cost estimates for the proposed improvements were developed based on locally established and assumed construction costs.

Water and Sewer Analysis Methodology

The City of Oklahoma City Utilities Department conducted system analyses for the water and sewer infrastructure, based on the utility demand profiles developed by Group Mackenzie. The demands included both average and peak flow demands. For the water system, no pressure requirements or fire demands were provided and, therefore, the system could not be fully analyzed in regards to these items.

The Utilities Department analyzed each study area in regards to water and sewer demand. The analysis included modeling the proposed developments and their respective demands within the City's water and sanitary sewer models. For the water system, the water model within InfoWater software was utilized. For the sanitary sewer system, the sanitary sewer model within InfoWorks software was utilized.

Franchise Utilities Analysis Methodology

Oklahoma Natural Gas and OGE performed capacity and cost analyses for their respective systems, using the same build-out capacity approach. Each utility developed cost estimates for the infrastructure upgrades needed to meet the projected future demand.

B. INFRASTRUCTURE FINDINGS

All infrastructure demand, deficiency, and full build-out cost analyses were conducted on a study area basis. This allowed cost comparisons to be developed between individual study areas, between regional quadrants, and between total and per-acre costs. The following sections briefly discuss each regional quadrant and highlight some of the key findings of this analysis.

Southeast Quadrant

The Southeast Quadrant comprises only study area 2. The total developable land in this study area covers approximately 461 acres, all of which is in single ownership. The 438 acres in this study area are assumed to be industrial in this study. The predominant industrial uses considered in this study area are Warehouse/Distribution (38 percent), Light Industrial (27 percent), and Heavy Industrial (18 percent). Key findings include:

- Total development cost: $22.3 million (ranked 2rd lowest in quadrant costs)
- Average development cost: $50,900 per acre (ranked 3rd lowest in average quadrant costs)
- Transportation ($9.9 million) and power ($10.5 million) are the most expensive utility upgrades in this quadrant.
- $5.0 million of the power upgrades are currently funded in the capital improvement plan

- Water and sewer utilities are relatively well-served for industrial development in this quadrant
- Study area 2: 438 acre industrial acreage, $50,900 per acre cost (ranks 7th lowest)

Southwest Quadrant

The Southwest Quadrant comprises five study areas: 3, 5A, 5B, 5C, and 5D. The total developable land in these study areas covers approximately 1,750 acres, of which 1,721 acres are assumed to be industrial in this study. The predominant industrial uses considered in these study areas are Warehouse/Distribution (39 percent), Light Industrial (38 percent), and Heavy Industrial (18 percent). This quadrant includes both the highest- and lowest-cost study areas (5D and 5B) based on per-acre utility costs. Key findings include:

- Total development cost: $112 million (ranked 2nd highest in quadrant costs)
- Average development cost: $65,000 per acre (ranked 2nd highest in average quadrant costs)
- Power ($38.5 million) and transportation ($24.1 million) are the most expensive utility upgrades in this quadrant
- Sewer is relatively well-served, but other utilities generally require significant upgrades for industrial development in this quadrant
- Study area 3: 187 acre industrial acreage; 2 parcels/2 property owners; $68,600 per acre cost (ranks 4th highest)
- Study area 5A: 452 acre industrial acreage; 4 parcels/4 property owners; $79,500 per acre cost (ranks 3rd highest)
- Study area 5B: 223 acre industrial acreage; 1 parcel/1 property owner; $16,900 per acre cost (ranks lowest)
- Study area 5C: 542 acre industrial acreage; 36 parcels/10 property owners; $42,300 per acre cost (ranks 6th lowest)
- Study area 5D: 316 acre industrial acreage; 6 parcels/4 property owners; $115,400 per acre cost (ranks highest)

Northwest Quadrant

The Northwest Quadrant comprises four study areas: 9A, 9B, 9C, and 10. The total developable land in these study areas covers approximately 2,804 acres, of which 2,472 acres are assumed to be industrial in this study. The predominant industrial uses considered in these study areas are Business Services/Office Park (47 percent), Light Industrial (30 percent), and Warehouse/Distribution (23 percent). Key findings include:

- Total development cost: $165.6 million (ranked highest in quadrant costs)
- Average development cost: $67,000 per acre (ranked highest in average quadrant costs)
- Transportation ($90.1 million) is the most significant utility upgrade in this quadrant, primarily due to improvements in Study Area 10 ($47.3 million).
- All of the utilities in this quadrant require significant upgrades to serve industrial development.
- Study area 9A: 776 acre industrial acreage; 7 parcels/7 property owners; $63,300 per acre cost (ranks 6th highest)
- Study area 9B: 434 acre industrial acreage; 14 parcels/13 property owners; $83,400 per acre cost (ranks 2nd highest)
- Study area 9C: 434 acre industrial acreage; 13 parcels/10 property owners; $56,500 per acre cost (ranks 7th highest)

- Study area 10: 828 acre industrial acreage; 10 parcels; 7 property owners; $67,000 per acre cost (ranks 5th highest)

Northeast Quadrant

The Northeast Quadrant comprises three study areas: 12, 13, and 14. The total developable land in these study areas covers approximately 1,324 acres, of which 1,090 acres are assumed to be industrial. The predominant industrial uses considered in these study areas are Warehouse/Distribution (40 percent), Business Services/Office Park (34 percent) and Light Industrial (27 percent). Key findings include:

- Total development cost: $37.9 million (ranked 3rd lowest in quadrant costs)
- Average development cost: $34,700 per acre (ranked 2nd lowest in average quadrant costs)
- Transportation is the most expensive utility upgrade in this quadrant ($23.3 million)
- Power upgrades cost $12.5 million in this region, of which $4.5 million is funded in OG&E's current capital improvement plan
- Water and sewer utilities are relatively well-served for industrial development in this quadrant
- Study area 12: 314 acre industrial acreage; 10 parcels/5 property owners; $30,100 per acre cost (ranks 3rd lowest)
- Study area 13: 305 acre industrial acreage; 13 parcels/7 property owners; $12,600 per acre cost (ranks 4th lowest)
- Study area 14: 471 acre industrial acreage; 42 parcels/34 property owners; $33,600 per acre cost (ranks 6th lowest)

Inner City Quadrant

The Inner City Quadrant comprises only study area 16. This study area is located in the Neighborhood Revitalization Strategy Area (NRSA).The total developable land in this study area covers approximately 80 acres, of which 78 acres is considered industrial in this study. The predominant industrial uses considered in this study area are Light Industrial (40 percent), Warehouse/Distribution (39 percent), and Business Services/Office Park (21 percent). Key findings include:

- Total development cost: $2.4 million (ranked lowest in quadrant costs)
- Average development cost: $31,000 per acre (ranked lowest in average quadrant costs)
- Transportation upgrades ($2.3 million) comprise the majority of the infrastructure costs in this quadrant
- All other utilities are relatively well-served for industrial development in this quadrant
- Study area 16: 78 acre industrial acreage; 3 parcels/3 property owners; $31,000 per acre cost (ranks 3rd lowest)

Quadrant Cost Summary

Comparing the total costs of infrastructure upgrades by quadrant provides a perspective of the costs required to provide utility service for industrial development in the study areas grouped by geographic areas of the city. Figure 2 and Table 6 below summarizes the total infrastructure costs by quadrant and demonstrates the wide range of costs between the city quadrants. This figure indicates that the study areas in the eastern portion of the city have relatively low infrastructure costs, and that the western areas of the city are generally more expensive than other areas of the city. The primary reason

that the northwest and southwest quadrants have higher total costs is that these quadrants contain more industrial acreage than the other quadrants.

The high costs for the northwest quadrant are primarily driven by a need for significant transportation improvements. These improvements are needed due to the high concentration of Business Services/Office Park land uses in the northwest quadrant, which results in higher traffic demands than the other quadrants.

These results also show that the southwest quadrant requires significant power and water upgrades to serve the concentration of Heavy Industrial and Light Industrial uses in this area.

Figure 2: Total Quadrant Costs by Utility Type

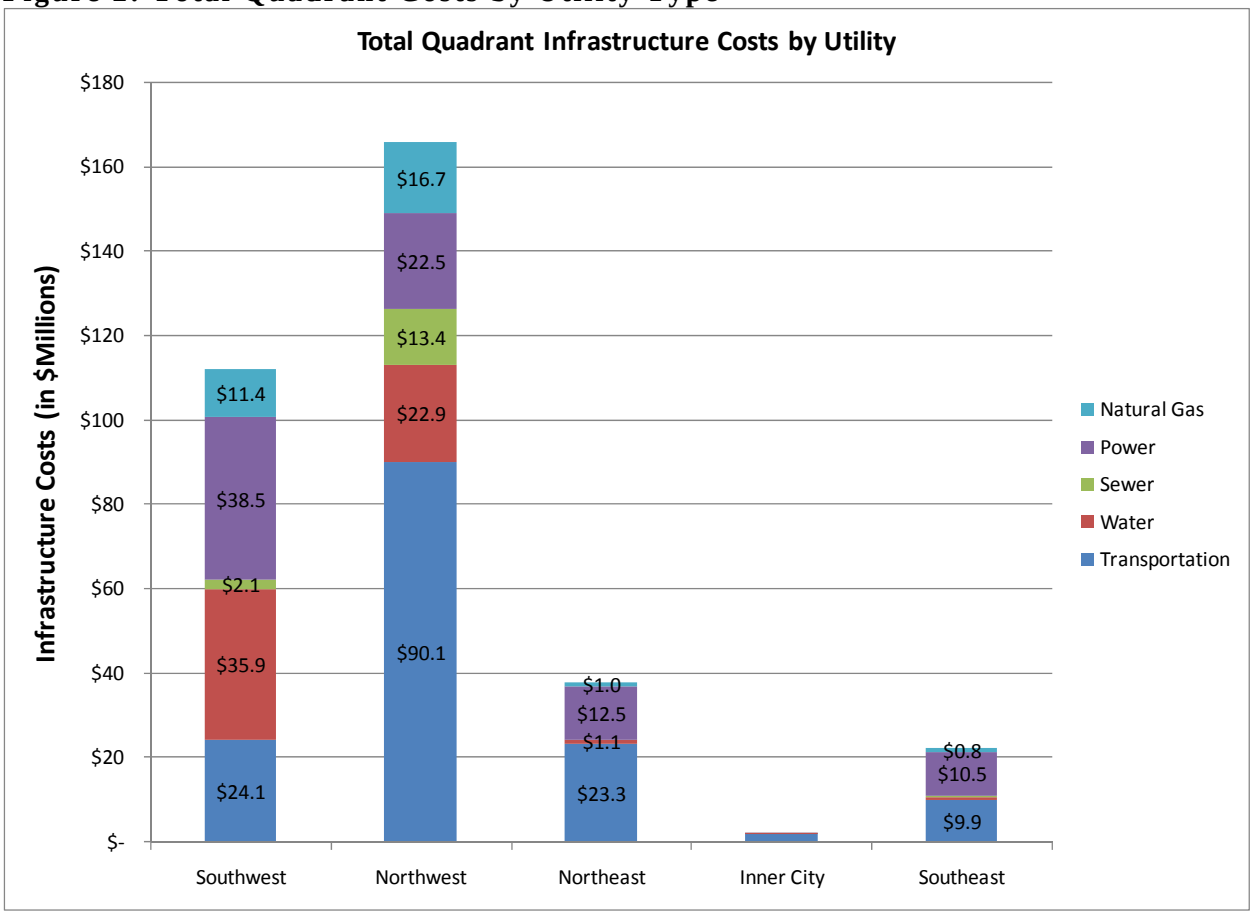


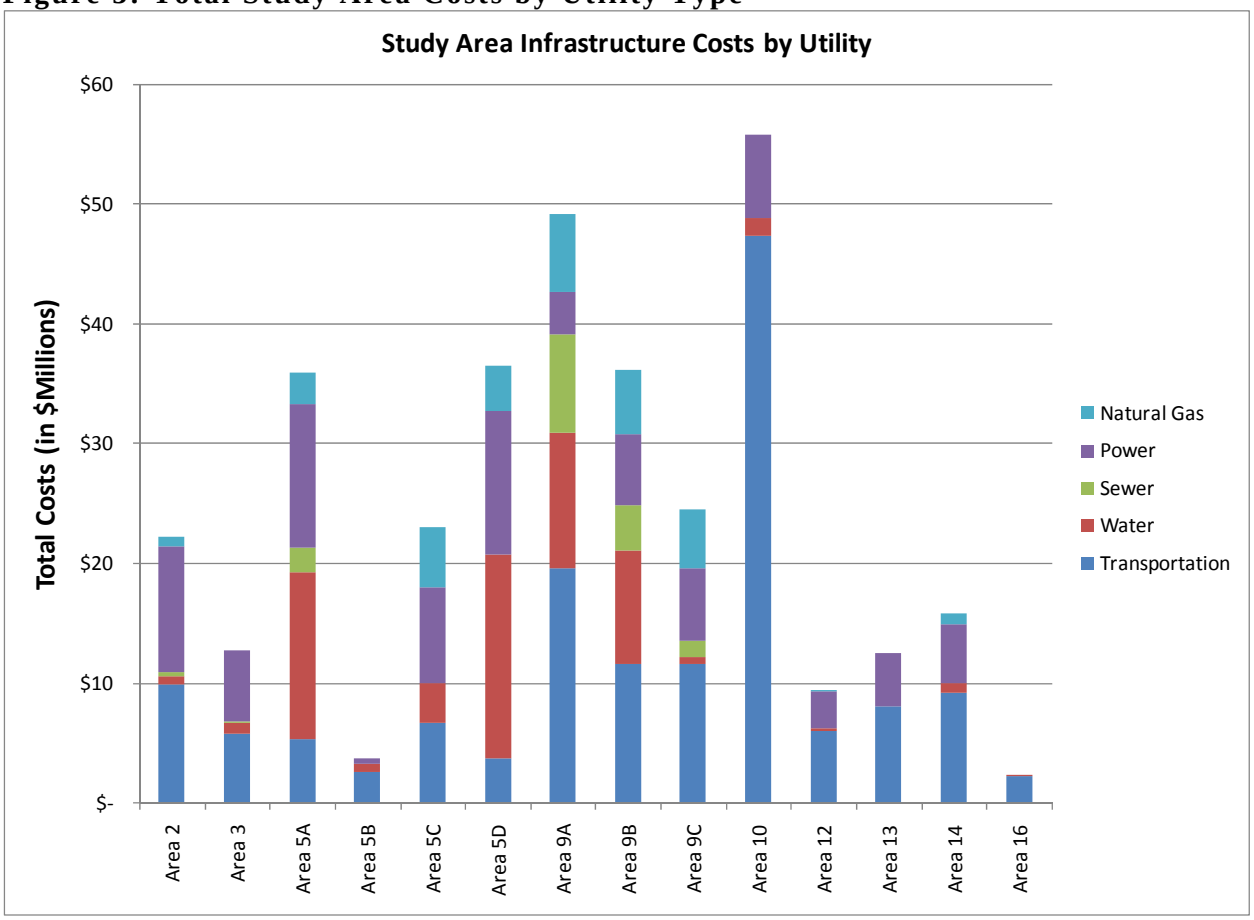
Table 6: Total Infrastructure Upgrade Costs per Quadrant

	South East	North West	North East	Inner City	South East
Water	$ 35.86	$ 22.94	$ 1.07	$ 0.10	$ 0.68
Sewer	$ 2.10	$ 13.40	$ 0.00	$ 0.00	$ 0.40
Transportation	$ 24.14	$ 90.07	$ 23.32	$ 2.32	$ 9.92
Power	$ 38.50	$ 22.50	$ 12.50	$ 0.00	$ 10.50
Natural Gas	$ 11.43	$ 16.73	$ 1.00	$ 0.00	$ 0.80
Total Costs	$ 112.02	$ 165.63	$ 37.89	$ 2.42	$ 22.30

Costs are displayed in millions

Looking in more detail at the specific study areas, the results identify the infrastructure costs for the 14 study areas included in the analysis. As shown in Figure 3 below, study areas 9A and 10 (both in the northwest quadrant) have substantially higher improvement costs than the other areas, but for different utility upgrades. Study area 9A costs are attributed to substantial improvements to all of the utilities, while study area 10 costs are attributed primarily to transportation upgrades. Study areas 5B and 16 have the lowest total improvement costs.

Figure 3: Total Study Area Costs by Utility Type



Per-Acre Normalized Costs

Comparing the quadrant infrastructure costs by the average per-acre cost provides a normalized perspective of the costs required to provide services to industrial developments across the city. Figure 4 below shows the infrastructure costs for each quadrant, normalized by the net industrial acreage in each quadrant. Net industrial acreage refers to the net developable acreage minus the acreage designated for commercial use. The normalized cost data show that the northeast and inner city quadrants require lower infrastructure upgrade costs in order to serve new industrial developments (approximately $30k-$35k per acre of industrial development). The cost of extending services to the remaining quadrants of the city is higher and relatively equal ($50k-$67k per industrial acre).

The normalized cost data also demonstrate that all quadrants of the city require significant transportation improvements to accommodate the modeled industrial development in this study. Transportation costs range between a low of 22% of total per

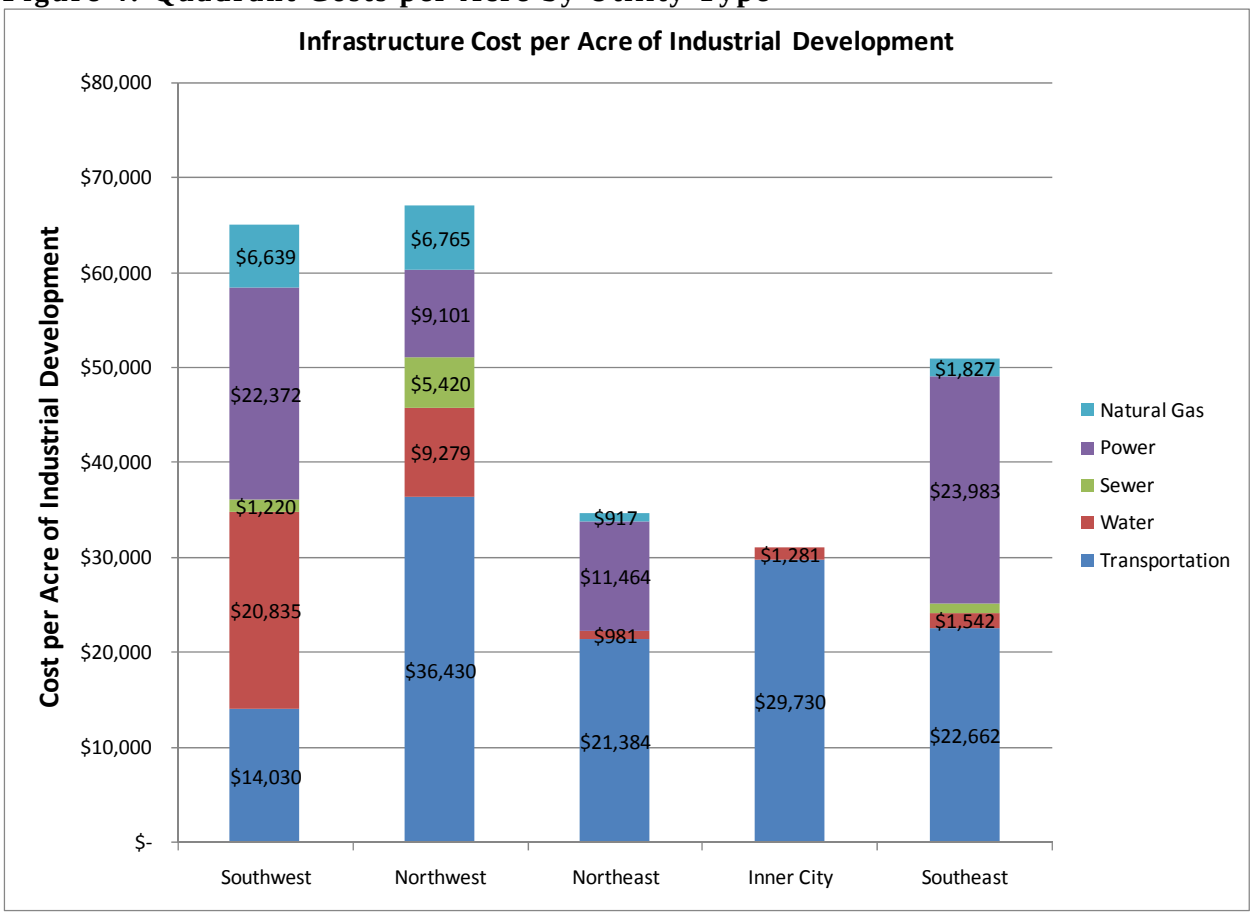
acre infrastructure costs in the southwest quadrant, to a high of 96% of the total per acre costs in the inner city quadrant. Transportation averages 56% of the total per acre infrastructure costs for all the quadrants.

The next highest infrastructure cost per acre across all the quadrants is electricity, which ranges between a high of 48% of the per acre costs in the southeast quadrant to a low of 14% in the northwest quadrant.

The inner city quadrant has the lowest overall infrastructure costs per acre ($31,000) due to the existing capacity that is in place. For the inner city study area, the highest cost is for transportation (96% of the total), which could change if a different mix of uses were assumed for the study area.

An advantage of development on inner city sites is generally lower infrastructure costs due to being able to take advantage of existing infrastructure. A disadvantage for inner city sites is often previous uses that have resulted in brownfield contamination. Study area 16, which is located in the City's Neighborhood Revitalization Strategy Area (NRSA), has the lowest overall infrastructure costs compared to all other study areas and has no indication of brownfield contamination based on the City's brownfield inventory. This makes this study area a potentially advantageous site for the right type of user who could benefit from a more urban location.

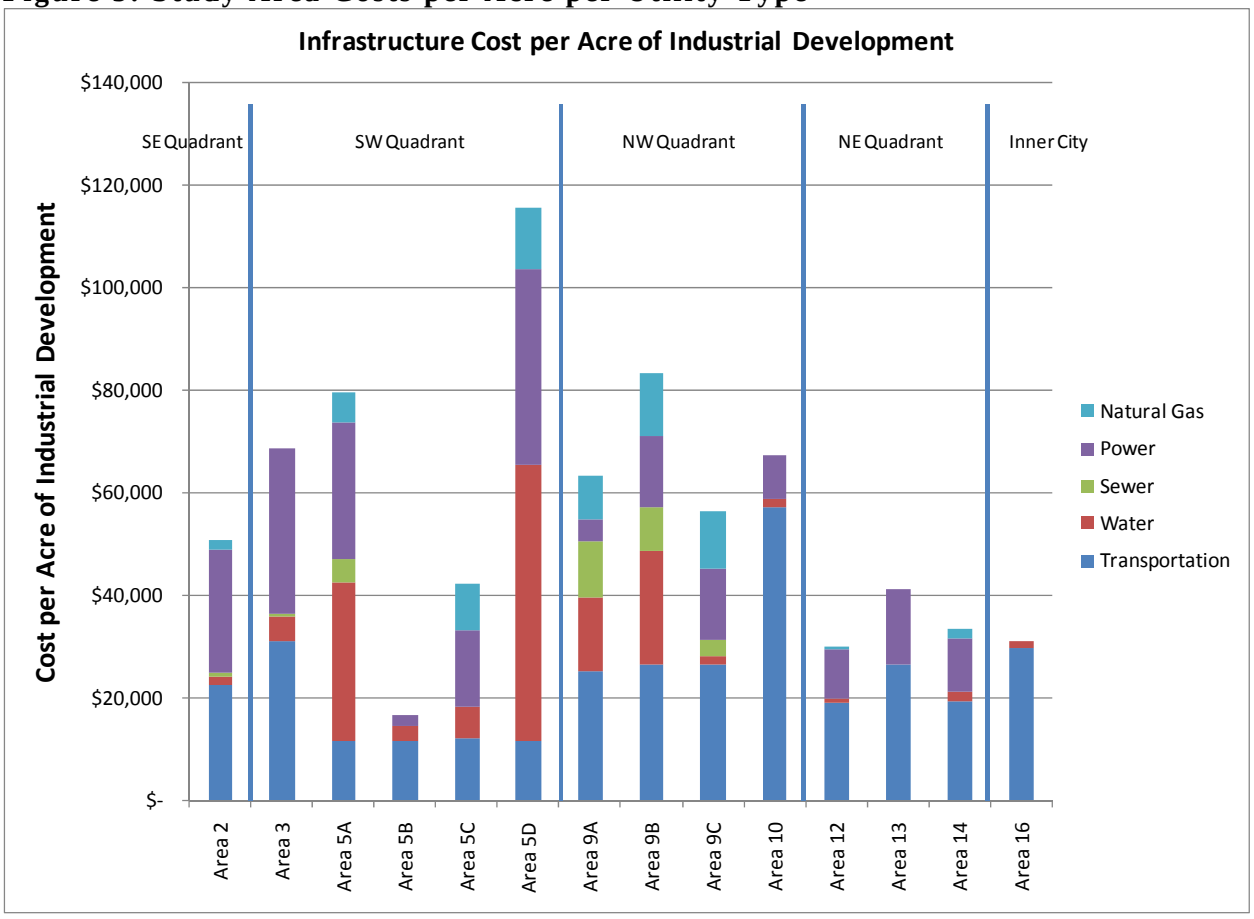
Figure 4: Quadrant Costs per Acre by Utility Type



The individual study area cost results are shown below in Figure 5. These results show the average per-acre normalized costs of constructing infrastructure improvements at the specific study areas across the city. Note that while study area 10 had the highest total cost of all the study areas, the normalized cost is close to the average per-acre cost for all the study areas. Alternatively, study area 5D ranked third-highest in total costs, but has a per-acre cost that is substantially higher than the other study areas.

The results also indicate that the normalized costs vary widely between study areas in the same quadrant. For example, study areas 5B and 5D have the lowest and highest per-acre costs but are both located in the southwest quadrant.

Figure 5: Study Area Costs per Acre per Utility Type



It is important to note that the upgrade costs developed using the methodology presented here are based on the industrial land use profiles assigned to the study areas. If the land use profiles were to change, then the projected utility demands would adjust. In some cases, the adjusted utility demands may result in different infrastructure upgrade requirements than those presented here.

IV. CONCLUSIONS

The results of this analysis indicate that the costs of providing utility service to new industrial developments will vary widely across the city. The primary infrastructure costs are associated with the transportation, electrical power, and water systems. Table 7 shows the infrastructure costs for all 14 study areas assuming the market demand profiles that were used in the study. The lowest total infrastructure cost study areas are 16, 5B, 12, and 13. The highest total infrastructure cost study areas are 10, 9A, 5D and 9B. Transportation infrastructure is the major cost component for each of the highest cost study areas.

Table 7: Total Study Area Costs (in millions) by Utility Type

	Net Developable Acres	Water	Sewer	Transportation	Power	Natural Gas	Total Costs	Rank
Area 2	460	$0.68	$0.40	$9.92	$10.50	$0.80	$22.30	7
Area 3	187	$0.90	$0.10	$5.80	$6.00		$12.80	5
Area 5A	452	$14.00	$2.00	$5.31	$12.00	$2.65	$35.96	10
Area 5B	223	$0.66	$0.00	$2.62	$0.50		$3.77	2
Area 5C	571	$3.30	$0.00	$6.69	$8.00	$5.00	$22.99	8
Area 5D	316	$17.00	$0.00	$3.72	$12.00	$3.78	**$36.50**	12
Area 9A	862	$11.30	$8.30	$19.57	$3.50	$6.48	**$49.14**	13
Area 9B	510	$9.55	$3.70	$11.58	$6.00	$5.35	$36.18	11
Area 9C	510	$0.64	$1.40	$11.58	$6.00	$4.90	$24.52	9
Area 10	810	$1.45	$0.00	$47.34	$7.00		**$55.79**	14
Area 12	392	$0.30	$0.00	$6.00	$3.00	$0.15	$9.45	3
Area 13	436	$0.00	$0.00	$8.10	$4.50		$12.60	4
Area 14	496	$0.77	$0.00	$9.21	$5.00	$0.85	$15.83	6
Area 16	80	$0.10	$0.00	$2.32	$0.00	$0.00	$2.42	1

While Table 7 presents overall infrastructure costs per study area, Table 8 presents costs on a per-acre basis for each of the study areas. The lowest per acre cost study areas are 5B, 12, 16 and 14. The highest per acre costs study areas are 5D, 9B, 5A and 3.

Table 8: Total Study Area Costs by Utility Type per Acre

	Net Developable Industrial Acres[1]	Water	Sewer	Transportation	Power	Natural Gas	Total Cost per Industrial Acre	Rank
Area 2	437.8	$1,541.77	$913.64	$22,661.79	$23,983.14	$1,827.29	$50,927.63	7
Area 3	186.7	$4,821.86	$535.76	$31,090.28	$32,145.73	$0	$68,593.62	11
Area 5A	452.1	$30,963.86	$4,423.41	$11,744.65	$26,540.45	$5,861.02	$79,533.39	12
Area 5B	223.3	$2,933.14	$0.00	$11,715.78	$2,239.04	$0	$16,887.96	1
Area 5C	542.7	$6,081.01	$0.00	$12,335.69	$14,741.84	$9,213.65	$42,372.18	6
Area 5D	316.2	$53,770.24	$0.00	$11,768.64	$37,955.47	$11,940.16	$115,434.50	14
Area 9A	776.4	$14,554.63	$10,690.57	$25,205.28	$4,508.07	$8,339.93	$63,298.49	9
Area 9B	434.1	$22,001.95	$8,524.31	$26,676.50	$13,823.21	$12,325.70	$83,351.67	13
Area 9C	434.1	$1,474.39	$3,225.23	$26,674.93	$13,822.40	$11,288.29	$56,485.24	8
Area 10	827.8	$1,751.55	$0.00	$57,187.52	$8,455.76	$0	$67,394.83	10
Area 12	313.8	$956.05	$0.00	$19,120.95	$9,560.47	$478.02	$30,115.49	2
Area 13	305.3 [2]	$0.00	$0.00	$26,543.95	$14,739.36	$0	$41,283.31	5
Area 14	471.2	$1,634.03	$0.00	$19,548.90	$10,610.56	$1,803.80	$33,597.29	4
Area 16	78.1	$1,280.92	$0.00	$29,730.11	$0.00	$0.00	$31,011.03	3

1. Net industrial acreage refers to the net developable acreage minus the acreage designated for commercial use. The per acre costs were derived from the net industrial acres, as opposed to the net developable acres. It is assumed that the commercial infrastructure demands are minimal and will be met through the provision of the industrial infrastructure.
2. This acreage deletes both commercially designated portion of the site and area used for antenna infrastructure and associated clearances

Study areas 5B, 12 and 16 are both the lowest cost per acre study areas and the lowest total infrastructure cost study areas. The fourth lowest cost per acre study area (14) is the sixth lowest total cost study area and the fourth lowest total cost study area (13) is the fifth lowest per acre study area. Looking at infrastructure costs, from either a total or a per-acre basis, study areas 5B, 12, 13, 14 and 16 are the lowest cost, based on the prospective study area land uses identified in this study.

Study area 16, which is located in the City's Neighborhood Revitalization Strategy Area (NRSA), has the lowest overall infrastructure costs compared to all other study areas and has no indication of brownfield contamination based on the City's brownfield inventory. This makes this study area a potentially advantageous site for the right type of user who could benefit from a more urban location.

The prospective study area land uses were identified by Chamber and City staff, who considered surrounding land uses and prospective company interests to identify the types of uses that could potentially develop in each of the study areas. These uses were also confirmed in the meetings held with the brokerage and development community, so they provide a market perspective to the analysis. Table 9 shows the distribution of potential uses by study area.

Table 9: Study Area Acreage Prospective Land Use Distribution

	Total Acreage	Net Developable Acreage	Net Industrial Acreage	Heavy Industrial	Light Industrial	Business Services	Warehouse - Distribution
Area 2	582.9	460.9	437.8	78.3	161.3	32.3	165.9
Area 3	239.2	186.7	186.7	18.7	74.7	0.0	93.3
Area 5A	464.9	452.1	452.1	113.0	144.7	22.6	171.8
Area 5B	229.4	223.3	223.3	0.0	134.0	22.3	67.0
Area 5C	645.1	571.2	542.7	57.1	228.5	0.0	257.1
Area 5D	363.3	316.2	316.2	126.5	79.0	31.6	79.0
Area 9A	922.9	862.7	776.4	0.0	258.8	258.8	258.8
Area 9B	518.2	510.7	434.1	0.0	102.1	178.7	153.2
Area 9C	523.1	510.7	434.1	0.0	102.1	178.7	153.2
Area 10	930.3	919.8	827.8	0.0	275.9	551.9	0.0
Area 12	407.0	392.2	313.8	0.0	78.4	117.7	117.7
Area 13	449.5	436.2	305.3	0.0	87.2	152.7	65.4
Area 14	514.9	496.0	471.2	0.0	124.0	99.2	248.0
Area 16	106.4	79.5	78.1	0.0	31.0	16.7	30.2

If existing land uses and market interest screens are considered, business services and business parks were seen to be more likely to go to study area 10. Study areas 5A-D are currently light industrial and therefore present a likely location for these uses. Study Areas 13 and 14 were seen as warehouse and distribution locations due to their freeway and locational access.

While the above discussion is based on the specific employment land use profiles assigned to the study areas, interpreting the results a different way suggests that some regions of the city may be better suited to serve industry types with high utility demands. For example, the Heavy Industrial and Light Industrial land use profiles have higher water, sewer, and power demands than other uses. These industries could be directed toward regions of the city that have available water, sewer, and/or power capacity, which may be reflected by low per-acre utility costs. Table 10 below summarizes some possible pairings of industry types with study areas from the perspective of infrastructure cost minimization that could result in lower overall infrastructure costs.

Table 10: Possible Industry Types and Study Area Pairings

Industrial Use	Primary Utility Demand	Suggested Target Study Areas
Heavy Industrial	Water, Sewer, Power, Gas	Study Areas 12, 13, 14
Light Industrial	Water, Sewer	Study Areas 2, 3, 10
Warehouse/Distribution	Transportation	Study Areas 5A, 5B, 5C, 5D
Business Services/Office Park	Transportation, Water, Sewer	Study Areas 5B, 5C, 12, 14

In addition to infrastructure costs and market interest, another study area factor that will influence future development opportunities will be parcelization. Table 11 shows the parcelization that exists in each of the study areas. Some of the study areas, such as 2 and 5B, are single-parcel, single-owner sites. Study area 2, however, is in the middle of both total and per-acre infrastructure costs. Other study areas have significant numbers of parcels and property owners, making them potentially challenging to bring to market. Study Area 14, which has a relatively low per acre infrastructure cost, has 42 parcels and 34 property owners. The other study areas have a variety of parcels and property owner numbers between these low and high extremes.

Table 11: Study Area Parcelization

Study Area	Gross Acres	Net Developable Acres	Number of Parcels	Number of Owners	Zoning*
2	582	460	1	1	I-2; I-1
3	239	187	2	2	I-2
5A	456	452	4	3	AA, I-1, I-2
5B	240	223	1	1	I-2
5C	635	571	36	10	R-1, I-2, AA
5D	359	316	6	4	AA, R-1, R-2, C-3, I-2, C-1,
9A	915	862	7	7	I-2, AA, AA(SP) R-1
9B	511	510	14	13	I-2, C-3, O-2, R-1, AA
9C	522	510	13	10	AA
10	821	810	10	7	R-1, C-3, R-4, O-2, I-1, R-4M, O1
12	403	392	10	5	I-1, C-3
13	445	436	13	8	R-1, R-4
14	506	496	42	34	R-1, I-1
16	106	80	3	3	I-2, I-1
Total	6,800	6,300	162	108	

* Zoning categories are listed in order of land area with the zoning category with the most land area listed first.

NEXT STEPS

The conclusions of this study identify infrastructure costs, market considerations, and parcelization/ownership patterns as critical factors in identifying subareas of the city in which future industrial development can occur. Current zoning may also be a factor depending on the likelihood of zoning changes. Overall, the study areas are concentrations of parcels that provide the best opportunity for the City to indentify an inventory of industrial sites. Further analysis is required to analyze these study areas to create a site specific inventory.

Table 12 looks at the critical factors of infrastructure cost, parcelization and zoning and shows the study areas that may provide the top opportunity areas where larger industrial sites could be identified. The table shows the tradeoffs that are required in identifying subareas that provide the best opportunity for large lot industrial development. Study areas 2, 5B and 16 are the highest priority study areas that have the fewest number of property owners; the lowest (5B and 16) or relatively low (2) infrastructure costs; and industrial zoning. Study area 14 has relatively low infrastructure costs but has a very high number of parcels and property owners, making aggregation likely in order to deliver larger sites to the market. Study area 13 has relatively low infrastructure costs and property owners but is zoned residential. Study area 5C provides an opportunity area, falling in the relative middle of both infrastructure costs and ownership and having a combination of industrial and residential zoning.

Table 12: Potential Study Areas for Further Analysis

Study Area	Net Developable Acres	Total Infrastructure Cost Rank *	Total Infrastructure Cost per Industrial Acre Rank *	Number of Parcels	Number of Owners	Zoning
2	582	7	7	1	1	I-2; I-1
5B	223	2	1	1	1	I-2
5C	571	8	6	36	10	R-1, I-2, AA
12	392	3	2	10	5	I-1, C-3
13	436	4	5	13	8	R-1, R-4
14	496	6	4	42	34	R-1, I-1
16	80	1	3	3	3	I-2, I-1

*The study areas are ranked from 1 to 14, with 1 being the least expensive and 14 the most expensive study area. This ranking is used to compare total costs and total costs per acre for each study area.

The study has found that Oklahoma City has an inventory of approximately 6,000 acres in the 14 study areas from which to create a large lot, development-ready inventory of sites. The analysis of these areas shows that in order to make this land development-ready, the City will need to implement a combination of infrastructure investments, aggregation strategies, and planning policies to prepare, reserve, and maintain it for industrial development and jobs.

GROUP MACKENZIE

TABLE OF CONTENTS

I. Level 2 Analysis Study Area Recommendations.....1
Subarea 1..... 3
Subarea 2..... 3
Subarea 3..... 3
Subarea 4..... 4
Subarea 5..... 4
Subarea 6..... 6
Subarea 7..... 6
Subarea 8..... 6
Subarea 9..... 7
Subarea 10.....10
Subarea 11.....10
Subarea 12.....11
Subarea 13.....12
Subarea 14.....13
Subarea 15.....14
Subarea 16.....15

Appendix D.1: Level 2 Industrial Land Supply Analysis and Final Study Area Results

For
Oklahoma City Buildable Lands Analysis

Submitted
April 1, 2012

Project Number
2100186.01

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Since 1960

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I. LEVEL 2 ANALYSIS STUDY AREA RECOMMENDATIONS

The goal of L-1 analysis was to identify subareas in the City most likely to have large areas that are suitable to accommodate development for employment uses, now and in the future. Based on the L-1 analysis, the project team was able to determine 16 subareas throughout the City where development could occur. The next step was to determine 12-15 study areas throughout the City to further evaluate their suitability and capacity for future development, as well as potential for the creation of development ready industrial/employment sites. It was anticipated that each study area will consist of multiple parcels.

The enhanced parcel file from Benham/SAIC was reviewed to identify L-2 study areas. The initial L-1 parcel file included over 62,000 vacant parcels. The L-1 analysis results included 16 subareas, 5,500 parcels, and a total of approximately 45,000 acres. To begin the L-2 analysis, Group Mackenzie examined parcels that were greater than 50 acres in size and received a score of 7.0 or greater, leaving 414 of the 5,500 parcels to investigate in 16 subareas. These 414 parcels were then individually reviewed and narrowed down to 49 based on more detailed/specific considerations to determine study areas. The considerations included:

1. Requirement to be currently vacant
2. Preference given to adjacency of individual parcels that met basis criteria (>50 acres; >7.0 L-1 score)
3. Reasonable access/proximity to existing infrastructure
4. Preference given to adjacency to industrial development
5. Lack of adjacency to residential or anticipation for future residential development
6. Location of natural features
7. Lack of physical constraints
8. Ownership – public or private

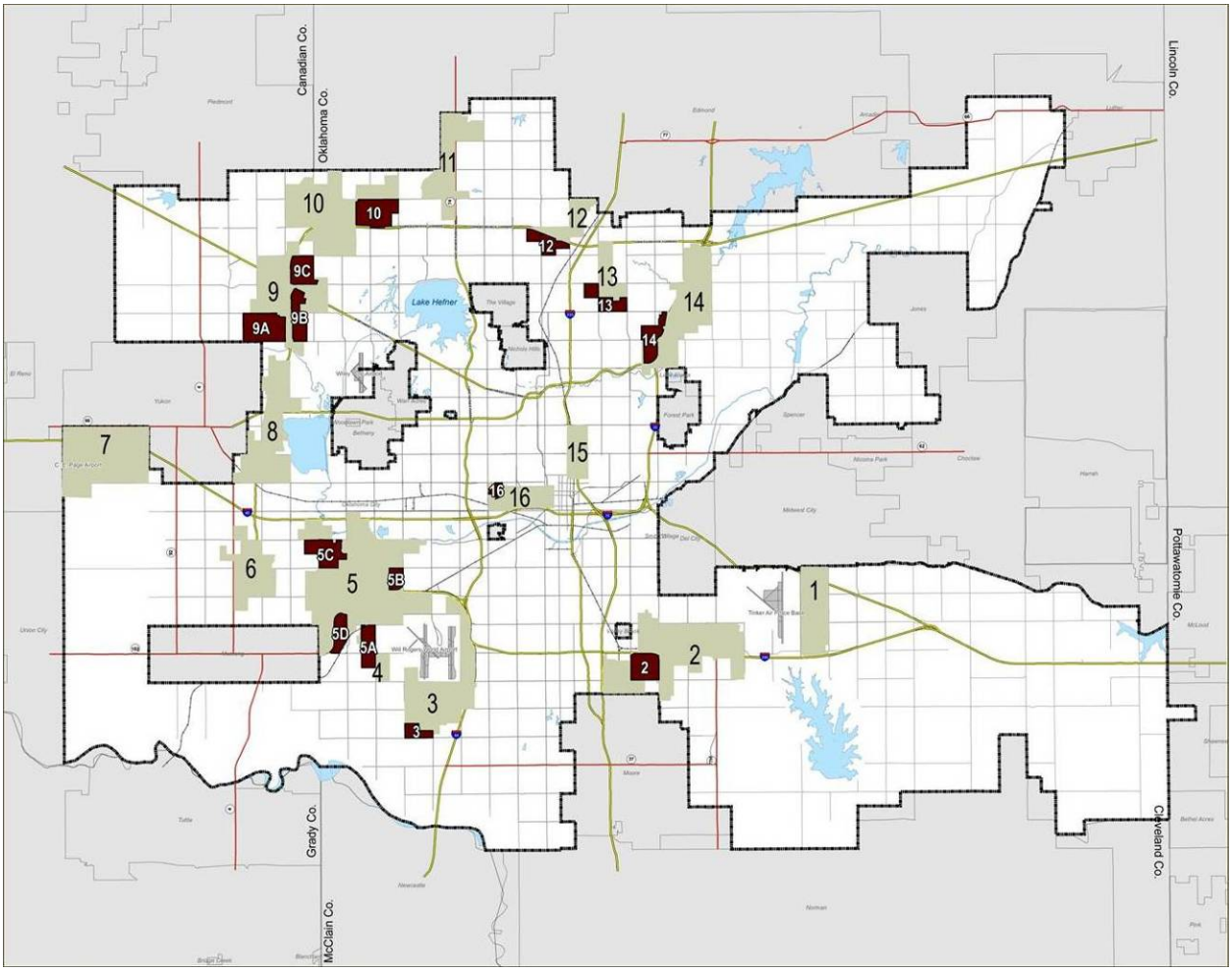
The project management team manually added 107 parcels, of which 93 were analyzed in the L-1 analysis but were initially excluded as they did not receive a score higher than 7.0 **and** were not larger than 50 acres. 14 of the manually added parcels were not analyzed in the L-1 analysis and therefore, did not have scores. These 14 parcels were included in the study areas due to their adjacency to other vacant parcels in the inventory.

Following are the final recommendations based on project team discussions following the May 16, 2011 consultant team trip. The consultant team met with the project management team and local real estate developers and brokers[1] to receive input on the consultant's initial study area recommendations. Following this trip, the consultant team made changes to the initial study area recommendations based on local knowledge and input. Some study areas were deleted entirely, new study areas were created, and some study areas were increased or decreased in size. Furthermore, City Planning staff reviewed the final parcel recommendations in January 2012 to provide current zoning and Comprehensive Plan designations for each parcel. Through this review, Staff indicated that 6 of the 156 parcels have been subdivided after the initial analysis was completed. As a result of these subdivisions, the final study areas have a total of 162 parcels.

[1] List of participants includes: Michael Judd (SAIC); Jeff Napoliello, David Knowles, J. Clare Woodside (Benham); Gerald Gamble (Gerald L Gamble Co.); Carl Edwards (Price Edwards & Company); Stephen Tanenbaum, Richard Tanenbaum (Gardner Tanenbaum Holdings); Michael Raff, David Huffman (Wiggin Properties); Thomas Lange, James Austin, John Lenochan (CBRE Oklahoma) Mark Beffort (Grubb & Ellis); Mark Ruffin (Precor Ruffin).

The final project geography identifies 16 subareas distributed throughout Oklahoma City, which total 50,710 acres. Of these 16 Subareas, 9 contain one or more study areas. The final 14 study areas total approximately 6,800 acres and range in size between a low of 161 acres and a high of 923 acres.

Map 1: 16 Subareas and 14 Study Areas



II. RESULTS

SUBAREA 1

Subarea 1 is 1,964 gross acres. No study areas are recommended. This subarea is east of Tinker Air Force Base. Most large parcels are publicly owned (Federal, City, or Oklahoma Industries Authority) and have limitations due to their proximity to runways.

SUBAREA 2

Subarea 2 is 5,519 gross acres and contains one study area.

Study Area 2: Total of 582.28 gross acres and is located south of I-240 and east of I-35. Parcel 1741168612360 is preferred lease only and has over 200 easements, which makes it challenging to develop. This study area originally included ID 1738168612300 and ID SDC2 10 3W 2002, which are owned by BNSF railroad but were later excluded in the L-2 analysis. All other land in the subarea is adjacent to residential or not vacant.

ID	ACRES	OWNERSHIP	SCORE	ZONE	COMP PLAN
1741168612360	582.28	SCHOOL LAND	7.85	PUD-1404 (I-2; I-1)	Standard Industrial

Industry Profiles:

HEAVY INDUSTRIAL	LIGHT INDUSTRIAL	BUSINESS SERVICES OFFICE PARK	WAREHOUSE DISTRIBUTION PARK	COMMERCIAL	ANTENNAS
17%	35%	7%	36%	5%	0%

SUBAREA 3

Subarea 3 is 3,670 gross acres and contains one study area.

Study Area 3: Total of 239.2 gross acres and is located south of Will Rogers World Airport. The parcels below are the only parcels in this study area that are not publicly owned. Access is problematic and the area is bisected by natural features. All other land is owned by the City Airport Trust and will be analyzed separately as part of the Airport Master Plan.

ID	ACRES	OWNERSHIP	SCORE	ZONE	COMP PLAN
SDC2 10 4W 10003	159.97	WILLIAMSON, WILLIAM IVAN	7.29	I-2; Overlay: AE-1, AE-2	Industrial
SDC2 10 4W 10005	79.26	SHROYER TRT	7.32	I-2; Overlay: AE-1, AE-2	Industrial

Industry Profiles:

HEAVY INDUSTRIAL	LIGHT INDUSTRIAL	BUSINESS SERVICES OFFICE PARK	WAREHOUSE DISTRIBUTION PARK	COMMERCIAL	ANTENNAS
10%	40%	0%	50%	0%	0%

SUBAREA 4

Subarea 4 is 472.5 gross acres. No study areas are recommended. The two eastern parcels, ID 1931168654525 and ID 1932168654500, are owned by the City Airport Trust and will be analyzed separately as part of the Airport Master Plan. ID 1925168654375 and ID 1925168654400 have been included in Study Area 5A.

SUBAREA 5

Subarea 5 is 9,109 gross acres and contains four study areas.

Study Area 5A: Total of 456.18 gross acres and is located west of Will Rodgers World Airport in an already developed industrial area. Parcels ID 1925168654375 and ID 1925168654400 from Subarea 4 are in single ownership and have been combined with other privately owned parcels in this study area due to their adjacency. This study area may have an opportunity for a rail served site.

ID	ACRES	OWNERSHIP	SCORE	ZONE	COMP PLAN
1913168654100	147.34	HUSTON FAMILY REV TRUST ET AL	8.15	AA	Industrial
1914168654150	154.88	FIRST NATIONAL BANK & TRUST	7.58	AA	Industrial
1925168654375	77.48	T B P HOLDINGS INC	7.15	PUD-404 (I-1, I-2)	Urban Development
1925168654400	76.91	T B P HOLDINGS INC	7.15	PUD-404 (I-2, I-1)	Urban Development

Industry Profiles:

HEAVY INDUSTRIAL	LIGHT INDUSTRIAL	BUSINESS SERVICES OFFICE PARK	WAREHOUSE DISTRIBUTION PARK	COMMERCIAL	ANTENNAS
25%	32%	5%	38%	0%	0%

Study Area 5B: Total of 240 gross acres. Previously included parcels were taken out of this study area because they were determined to be already slated for future development by private corporations and therefore, it was not feasible to include them in this analysis. ID 1862168652600 was included because it is adjacent to other industrial developments, near to arterials, and is a large parcel with a high L-1 score.

ID	ACRES	OWNERSHIP	SCORE	ZONE	COMP PLAN
1862168652600	240.04	STATE OF OKLAHOMA	8.41	I-2	Industrial

Industry Profiles:

Heavy Industrial	Light Industrial	Business Services Office Park	Warehouse Distribution Park	Commercial	Antennas
0%	60%	10%	30%	0%	0%

Study Area 5C: Total of 635.5 gross acres. These parcels are adjacent to other industrial developments, near to arterials, and include large parcels with high scores. ID 1831142034055 and ID 1825142022050 were deleted because they are already developed and planned for expansion. Other parcels were included because they are surrounded by industrial development, although the land appears to be plotted for residential, the project team decided to include this land in this study area. All other land is developed with manufacturing and distribution or a landfill (PIN 1836168652051).

ID	ACRES	OWNERSHIP	SCORE	ZONE	COMP PLAN
1825142022000	85.84	CACTUS DRILLING COMPANY LLC	8.35	I-2	Industrial
1826168651825	79.15	WESTERN FLYER EXPRESS INC	8.35	I-2	Industrial
1827168651850	100.11	SCHAEFER SUSAN E ETAL	7.68	R-1	Industrial/Urban Development
1827168651855	50.73	SWATEK FAMILY LP	7.63	R-1	Industrial/Urban Development
1828168651800	148.57	SWATEK FAMILY LP	7.58	R-1	Industrial
090004567	154.49	BOHANON,RICHARD L TRUSTEE	7.29	AA	Urban Development
1826208401040	0.52	CONCHY LLC	6.18	R-1	Industrial
1826208401050	0.52	CONCHY LLC	5.98	R-1	Industrial
1826208401290	0.71	CONCHY LLC	6.08	R-1	Industrial
1826208401230	0.51	CONCHY LLC	6.18	R-1	Industrial
1826208401240	0.69	CONCHY LLC	6.08	R-1	Industrial
1826208401250	0.68	CONCHY LLC	6.28	R-1	Industrial
1826208401260	0.51	CONCHY LLC	6.18	R-1	Industrial
1826208401110	0.61	CONCHY LLC	6.18	R-1	Industrial
1826208401120	0.62	BRADLEY KEITH E & AMANDA B	6.18	R-1	Industrial
1826208401140	0.52	CONCHY LLC	6.18	R-1	Industrial
1826208401150	0.51	CONCHY LLC	5.98	R-1	Industrial
1826208401160	0.52	CONCHY LLC	5.98	R-1	Industrial
1826208401270	0.54	CONCHY LLC	6.18	R-1	Industrial
1826208401280	0.54	GRUNDY DONNA ADELE	6.18	R-1	Industrial
1826208401000	0.50	CONCHY LLC	6.38	R-1	Industrial
1826208401010	0.52	CONCHY LLC	6.28	R-1	Industrial
1826208401020	0.52	CONCHY LLC	6.18	R-1	Industrial
1826208401030	0.52	CONCHY LLC	6.18	R-1	Industrial
1826208401220	0.54	ONB BANK & TRUST CO	6.18	R-1	Industrial
1826208401060	0.52	CONCHY LLC	5.98	R-1	Industrial
1826208401070	0.64	OWENS DOUGLAS E	5.98	R-1	Industrial
1826208401080	0.53	CONCHY LLC	5.98	R-1	Industrial
1826208401090	0.51	CONCHY LLC	5.98	R-1	Industrial
1826208401100	0.52	CONCHY LLC	5.98	R-1	Industrial
1826208401170	0.61	CONCHY LLC	5.88	R-1	Industrial
1826208401180	0.60	CONCHY LLC	5.78	R-1	Industrial
1826208401190	0.52	CONCHY LLC	6.08	R-1	Industrial
1826208401200	0.52	CONCHY LLC	6.18	R-1	Industrial

ID	ACRES	OWNERSHIP	SCORE	ZONE	COMP PLAN
1826208401210	0.54	CONCHY LLC	6.08	R-1	Industrial
1826208401130	0.53	BRADLEY KEITH E & AMANDA B	N/A	R-1	Industrial

Industry Profiles:

HEAVY INDUSTRIAL	LIGHT INDUSTRIAL	BUSINESS SERVICES OFFICE PARK	WAREHOUSE DISTRIBUTION PARK	COMMERCIAL	ANTENNAS
10%	40%	0%	45%	5%	0%

Study Area 5D: Total of 358.9 gross acres. These parcels have been decreased in size as they are bisected by Highway 152. Portions of the parcels west of Highway 152 are not included in this study area.

ID	ACRES	OWNERSHIP	SCORE	ZONE	COMP PLAN
1874168653050	83.75	CLEARWATER DEVELOPMENT GROUP LLC	8.08	PUD-1365 (R-2, C-1); PUD-1440 (R-2)	Urban Development
1874141851020	15.44	CLEARWATER DEVELOPMENT GROUP LLC	N/A	PUD-1211 (C-3)	Urban Development
1874141851015	1.51	CLEARWATER DEVELOPMENT GROUP LLC	N/A	PUD-1365 (C-1)	Urban Development
1917168654175	147.2	ROSS GEORGE W LIFE ESTATE	7.76	AA	Urban Development
1918168654225	104.4	AG FARM-RANCH LLC	7.45	PUD-1361 (R-1, C-3)	Urban Development
1919168654250	6.6	ELLIS LLOYD M & JOYCE L TRS	7.26	AA	Urban Development

Industry Profiles:

HEAVY INDUSTRIAL	LIGHT INDUSTRIAL	BUSINESS SERVICES OFFICE PARK	WAREHOUSE DISTRIBUTION PARK	COMMERCIAL	ANTENNAS
40%	25%	10%	25%	0%	0%

SUBAREA 6

Subarea 6 is 2,093 gross acres. No study areas are recommended. All parcels are adjacent to residential development. There is also limited access in this subarea.

SUBAREA 7

Subarea 7 is 4,222 gross acres. No study areas are recommended. This area contains City owned land but the lack of infrastructure, especially sewer, prohibits any near term development.

SUBAREA 8

Subarea 8 is 3,321 gross acres. No study areas are recommended. This area contains rural development and emerging subdivisions.

SUBAREA 9

Subarea 9 is 4,660 gross acres and contains three study areas.

Study Area 9A: Total of 915.46 gross acres and is located west of John Kilpatrick Turnpike. The area is adjacent to an interchange and is a large rectangle of vacant land. Parcel ID zzz4614 was manually added to this study area after further analysis.

ID	ACRES	OWNERSHIP	SCORE	ZONE	COMP PLAN
090033596	132.37	GOODMAN,CARL O	7.55	PUD-902 (I-2)	Urban Development
090033599	154.41	CHEEK,EARL J & TIMOTHY CO-TRUSTEES	7.58	AA	Urban Development
090033602	152.06	GOODMAN,MINNIE A MAINTENANCE	7.55	PUD-902 (I-2)	Urban Development
090092810	156.84	CHEEK,TIM N &CHEEK,EARL CO-TR	7.10	PUD-902 (I-2)	Urban Development
090033591	158.21	WHEATLEY,DONELDA LIFE EST	7.23	AA; SP-259	Urban Development
zzz4614	4.71	Information not available	5.75	AA, R-1	Urban Development
090033595	156.86	CHEEK PROPERTIES LLC	7.09	AA	Urban Development

Industry Profiles:

HEAVY INDUSTRIAL	LIGHT INDUSTRIAL	BUSINESS SERVICES OFFICE PARK	WAREHOUSE DISTRIBUTION PARK	COMMERCIAL	ANTENNAS
0%	30%	30%	30%	10%	0%

Study Area 9B: Total of 511.4 gross acres and is located east of John Kilpatrick Turnpike and is adjacent to an interchange. This study area has large rectangles of vacant land. ID 090033615, ID 090033133, ID zzz4588, and ID 090033134 were manually added to this study area as they did not initially meet the minimum acreage requirement.

ID	ACRES	OWNERSHIP	SCORE	ZONE	COMP PLAN
090033131	74.09	RAF PROPERTIES INC	7.75	R-1, AA	Urban Development
090033608	78.99	GOODMAN,MINNIE A MAINTENANCE	7.58	PUD-902 (I-2)	Urban Development
090033611	79.04	JAMES,BERYLE E & PATRICIA TR*	7.83	PUD-902 (I-2, C-3, R-4)	Urban Development
090033614	78.56	R A F PROPERTIES INC	7.55	PUD-902 (I-2, C-3, R-4)	Urban Development
090033617	70.51	ROGREBO INC	7.93	PUD-902 (I-2, C-3)	Urban Development
090033127	53.86	EXPRESS DEVELOPMENT IV LLC	N/A	PUD-731 (O-2, C-3)	Urban Development
090033116	12.78	FRANCIS INVESTMENTS	N/A	R-1	Urban Development
090033117	10.25	TREPAGNIER,DENNIS & J F ETAL	N/A	C-3	Urban Development
090033324	15.08	LOWERY,DEBRA A	N/A	R-1	Urban Development
zzz4595	5.91	Information not available	8.50	R-1	Urban Development
090033615	9.61	Information not available	6.88	PUD-902 (C-3, I-2)	Urban Development
090033133	9.80	SMITH,S F & AGNES C TRUSTEES	6.93	R-1	Urban Development
090033132	9.00	FIRST TIMOTHY 1:15 LLC	6.88	R-1	Urban Development
090033134	0.90	PRICE,BEVERLY L & TODD ALLEN	N/A	R-1	Urban Development

Industry Profiles:

HEAVY INDUSTRIAL	LIGHT INDUSTRIAL	BUSINESS SERVICES OFFICE PARK	WAREHOUSE DISTRIBUTION PARK	COMMERCIAL	ANTENNAS
0%	20%	35%	30%	15%	0%

Study Area 9C: Total of 521.79 gross acres and is located east of John Kilpatrick Turnpike; adjacent to an interchange. This study area has large rectangles of vacant land. ID 090033086, ID 090033088, and ID 090033085 were original parcels. The remaining parcels were manually added to this study area as they did not initially meet the minimum acreage requirement.

ID	ACRES	OWNERSHIP	SCORE	ZONE	COMP PLAN
090033085	93.16	HENDERSON,EVELYN JOY TRUSTEE	7.98	AA	Urban Development
090033086	101.09	HAROLD ROTHER FARMS INC	7.88	AA	Urban Development
090033088	78.12	LOWERY,ALBERT & CAROLYN TRUSTEES	8.10	AA	Urban Development
090107356	37.56	BORELLI PROPERTIES LLC	7.65	AA	Urban Development
090112895	28.04	RJAK-OKC, INC	7.95	AA	Urban Development
090033089	10.11	CORNERSTONE REAL PROPERTY	7.85	AA	Urban Development
090095788	3.98	WILEY,MICHAEL A & CYNTHIA E	5.90	AA	Urban Development
090033081	38.61	NICHOLS,BLAKE A & BRUCE J	7.53	AA	Urban Development
090033082	39.77	NICHOLS FAMILY CO	7.43	AA	Urban Development
090033083	40.00	NICHOLS FAMILY CO	7.63	AA	Urban Development
090033084	39.42	NICHOLS FAMILY CO	7.85	AA	Urban Development
090086857	1.35	LOWERY,ALBERT J&CAROLYN A TRUS	N/A	AA	Urban Development
3875140805000	10.58	BAILEY JAMES M	7.85	PUD-954 (O-2, C-3)	Urban Development

Industry Profiles:

HEAVY INDUSTRIAL	LIGHT INDUSTRIAL	BUSINESS SERVICES OFFICE PARK	WAREHOUSE DISTRIBUTION PARK	COMMERCIAL	ANTENNAS
0%	20%	35%	30%	15%	0%

SUBAREA 10

Subarea 10 is 4,994 gross acres and contains one study area.

Study Area 10: Total of 821.7 gross acres. Parcel ID 3830149524000 was manually added to this study area as it did not initially meet the minimum acreage requirement. This study area was added due to its potential for office park and employment related development based on existing development in the area and market interest by developers and prospective companies. Other parcels within this subarea, but outside study area 10, are adjacent to residential or constrained by natural features.

ID	ACRES	OWNERSHIP	SCORE	ZONE	COMP PLAN
3835168681350	157.96	KAY BEE INVESTMENT COMPANY	7.48	PUD-316 (I-1, C-3, O-2); PUD-1442 (C-3); PUD-1299 (C-3)	Urban Development
3834168681325	72.17	DAHR A S	7.85	PUD-616 (C-3, 0-2, O-1); PUD-1033 (R-4)	Urban Development
3829168680525	43.05	LUTHERAN CHURCH EXTENSION FUND	7.55	PUD-1300 (O-2, R-1, C-3)	Urban Development
3829149521010	40.76	GREYSTONE PRESBYTERIAN CHURCH	N/A	PUD-1300 (R-1)	Urban Development
3829149521015	67.17	SAEED BARI	N/A	PUD-1300 (R-1)	Urban Development
3833168681275	77.19	7M COMPANY	7.65	R-1, R-2, C-3, O-1	Urban Development
3833168681300	78.65	7M COMPANY	7.60	R-1	Urban Development
3836168680650	156.78	KAY BEE INVESTMENT COMPANY	7.60	PUD-316 (R-1, R-4, C-3); PUD-1442 (R-4, C-3)	Urban Development
3830149524000	28.59	K ROCK DEVELOPMENT LLC	7.43	PUD-1425 (R-4); PUD-206 (R-4M); PUD-829 (C-3, R-4)	Urban Development
3830168680575	99.34	K ROCK DEVELOPMENT LLC	7.43	PUD-206 (C-3, R-4M); PUD-829 (C-3, R-4)	Urban Development

Industry Profiles:

HEAVY INDUSTRIAL	LIGHT INDUSTRIAL	BUSINESS SERVICES OFFICE PARK	WAREHOUSE DISTRIBUTION PARK	COMMERCIAL	ANTENNAS
0%	30%	60%	0%	10%	0%

SUBAREA 11

Subarea 11 is 2,244 gross acres. No study areas are recommended. All parcels are adjacent to residential.

SUBAREA 12

Subarea 12 is 1,124 gross acres and contains one study area.

Study Area 12: Total of 403.1 gross acres and is located west of Broadway Extension Highway and south of John Kilpatrick Turnpike. ID 3665168511000, ID 3664168513000, and ID 3662168513025 were original parcels in the study area. ID 3665168511000 was previously slated for retail and office. ID 3662168513025 has a natural gas pipeline running through the site. ID 3664168513000 is divided by the highway and the portion of the parcel north of the John Kilpatrick Turnpike was not included in this study area.

ID	ACRES	OWNERSHIP	SCORE	ZONE	COMP PLAN
3665168511000	102.41	HOUGHTON HEIGHTS	8.53	PUD-321 (C-3)	Protected Industrial
3663168513050	81.55	STATE OF OKLAHOMA	8.35	PUD-707 (I-1, C-3); R-1	Protected Industrial
3663202481000	61.79	STATE OF OKLAHOMA	6.8	PUD-707 (I-1, C-3); PUD-380 (C-3); R-1	Protected Industrial
3663202481010	9.04	STATE OF OKLAHOMA	6.15	PUD-707 (I-1, C-3); PUD-380 (C-3); R-1	Protected Industrial
3664131253000	9.33	VICTORY BIBLE BAPTIST CHURCH	6.6	PUD-380 (C-3); R-1	Protected Industrial
3665134381000	9.3	HOUGHTON HEIGHTS LP	7.46	PUD-321 (C-3)	Protected Industrial
3665134381005	8.85	HOUGHTON HEIGHTS LP	7.55	PUD-321 (C-3)	Protected Industrial
3665134381010	0.94	HOUGHTON HEIGHTS LP	6.9	PUD-321 (C-3)	Protected Industrial
3662168513025	69.84	CLEMENTS FOODS	8.30	I-2	Standard Industrial
3664168513000	50.05	DAHR PROPERTIES MEMORIAL	8.40	PUD-380 (C-3)	Protected Industrial

Industry Profiles:

HEAVY INDUSTRIAL	LIGHT INDUSTRIAL	BUSINESS SERVICES OFFICE PARK	WAREHOUSE DISTRIBUTION PARK	COMMERCIAL	ANTENNAS
0%	20%	30%	30%	20%	0%

SUBAREA 13

Subarea 13 is 1,322 gross acres and contains one study area.

Study Area 13: Total of 445.74 gross acres and is located east of Broadway Extension Highway and south of the John Kilpatrick Turnpike in an undeveloped area. ID 3703134937100, ID 3702168514050, and ID 3702168514055 were original recommended parcels. Surrounding parcels were manually added to this study area as they did not initially meet the minimum acreage requirement. ID 3705134480900 was determined to be vacant and appropriate to include in this study area. Other parcels are rural residential or adjacent to residential. A charter school is located within this study area.

ID	ACRES	OWNERSHIP	SCORE	ZONE	COMP PLAN
3703134937100	82.05	ARCADIA FARM LLC	7.33	R-1	Urban Development
3702168514050	75.46	ARCADIA FARM LLC	7.13	R-1; PUD-588 (AA)	Urban Development
3702168514055	58.08	ARCADIA FARM LLC	7.03	R-1; PUD-588 (AA)	Urban Development
3705134480900	143.72	ARCADIA FARM LLC	7.47	R-1	Urban Development
3705134480490	7.90	JOHNSTON NANCY ANN TRS	6.75	R-1	Urban Development
3705134480505	1.98	JOHNSTON J MIKE & NANCY	4.48	R-1	Urban Development
3705134481000	2.68	MARTIN LANCE TRS	5.08	R-1	Urban Development
3703134936000	9.40	ARCADIA FARM LLC	7.18	R-4	Urban Development
3703134937200	46.33	LOCAL TV OKLAHOMA LLC	6.98	R-1	Transportation, Communication, Utilities/Urban Development
3703134936750	5.05	SPARKS ROBYN R	5.88	PUD-392 (O-1); R-1	Transportation, Communication, Utilities/Urban Development
3703134937000	4.49	BRITTON PLACE DEVELOPMENT	5.68	R-1; PUD-392 (O-1)	Urban Development
3703134936500	8.46	ARCADIA FARM LLC	7.40	R-1	Urban Development
3703134936250	0.14	CITY OF NICHOLS HILL	5.55	R-1	Urban Development

Industry Profiles:

HEAVY INDUSTRIAL	LIGHT INDUSTRIAL	BUSINESS SERVICES OFFICE PARK	WAREHOUSE DISTRIBUTION PARK	COMMERCIAL	ANTENNAS
0%	20%	35%	15%	10%	20%

SUBAREA 14

Subarea 14 is 3,787 gross acres and contains one study area.

Study Area 14: Total of 506.15 gross acres and is located at the intersection of I-35 and I-44, adjacent to the interchange. The initial study area included only two parcels, ID 3524168623800 and ID 3742168514400. The remaining parcels were manually added to this study area as they did not initially meet the minimum acreage requirement.

ID	ACRES	OWNERSHIP	SCORE	ZONE	COMP PLAN
3524168623800	102.34	BRITTON ROAD DEVELOPMENT LLC	7.73	PUD-771 (I-1); R-1	Urban Development
3742168514400	154.02	WILSHIRE LAND COMPANY LLC	7.43	R-1	Urban Development
3523141616607	0.43	SWALWELL ELMER F	N/A	R-1	Urban Development
3523168626605	0.54	Information not available	N/A	R-1	Urban Development
3523141616625	1.52	CULTON DANA	N/A	AA, R-1	Urban Development
3523141616620	2.6	JOHNSON LEONARD & BETTY ANN	N/A	AA	Urban Development
3523141616610	2.01	KOHLMAN-FIELDS LOU ANN	N/A	R-1, AA	Urban Development
2601140872000	4.75	BOWERS JACQUELENE & JOHNIE SR	N/A	R-1	Urban Development
2601140872420	1.09	NICHOLS BOB	N/A	I-2	Urban Development
2601140872600	1.62	SHIPMAN DUANE G & CATHY	N/A	R-1, PUD-197 (R-MH-2, C-3)	Urban Development
2601140872800	0.62	REAMY DONALD	N/A	R-1	Urban Development
2601140871400	0.97	BAHREINI AHMAD & NASSER SHAKIBER	N/A	PUD-197 (C-3)	Urban Development
2601140872825	0.70	ASPLUNDH TREE EXPERT COMPANY	N/A	I-2	Urban Development
2602140875210	9.87	HALL OF FAME ASSOCIATES LLC	6.68	C-4; UCD	Urban Development
2601140871800	3.48	NEIGHBORS HOLDING LLC	7	PUD-373 (O-2)	Urban Development
2601140872200	11.07	KAMPER KEEPERS LLC	7.73	PUD-197 (R-MH-2, C-3)	Urban Development
2602140874800	2.45	THIBAUILT ANNA MARIA TRUST	4.35	R-1	Urban Development
2602140874810	7.71	3 L INVESTMENTS LLC	6.68	R-1	Urban Development
2602140874300	11.93	BELSHALAT COMPANY	7.13	I-2	Urban Development
2602140874600	1.19	HEARTLAND HOME & LAWN MAINTENANCE INC	5.58	C-3	Urban Development
2602140874610	1.19	PUTT KEVIN & LISA TRUST	5.58	C-3	Urban Development

ID	ACRES	OWNERSHIP	SCORE	ZONE	COMP PLAN
2602140874620	2.92	JACKSON MICHAEL A	5.98	C-3	Urban Development
2601140870500	9.60	BELSHALAT COMPANY	6.3	R-1	Urban Development
2601140870520	80.29	BELSHALAT COMPANY	6.58	R-1	Urban Development
2601140871000	4.55	MARKS STEVEN	7.07	PUD-197 (C-3)	Urban Development
2601140871200	1.75	BAHREINI AHMAD & NASSER SHAKIBER	6.16	PUD-197 (C-3)	Urban Development
2602140875240	6.75	SCALES GLENN	6.38	C-4, R-1, I-2; UCD	Urban Development
(2601140870530) Zzz1436	13.63	Information not available	6.825	R-1	Urban Development
2601140872805	4.77	URBAN YARDS LLC	6.15	I-2, R-1	Urban Development
2601140872810	3.18	BLICKENSTAFF JON & FRANCES	5.45	I-2	Urban Development
2601140873400	18.24	JOHNSON A SCOTT TRUST	7.11	R-1	Urban Development
2601140873600	18.24	MASSEY GREG J & ELISA ADAIR	5.86	R-1	Urban Development
2601140871600	4.53	NEIGHBORS HOLDING LLC	7.20	PUD-373 (O-2); PUD-197 (C-3)	Urban Development
3523141616602	4.70	WILLIAMS CECIL R & BARBARA A TRUST	6.7	C-3, C-4	Urban Development
3523141616615	0.41	KOHLMAN-FIELDS LOU ANN	5.7	AA, R-1	Urban Development
3523141616645	1.30	CORBIN JOAN ANNETTE ETAL	5.6	R-1	Urban Development
3523141616650	0.58	KOHLMAN LOU A	5.4	R-1	Urban Development
3523141616640	0.48	KOHLMAN-FIELDS LOU ANN	5.4	R-1	Urban Development
3523141616575	0.66	KOHLMAN-FIELDS LOU ANN	5.8	R-1	Urban Development
3523141616600	0.56	SWALWELL ELMER FRANK	6.1	R-1	Urban Development
3523141617600	5.91	MARTIN EQUITIES LLC	5.99	PUD-1083 (I-1)	Urban Development
(3523168626630) Zzz2606	1.00	Information not available	5.8	R-1	Urban Development

Industry Profiles:

HEAVY INDUSTRIAL	LIGHT INDUSTRIAL	BUSINESS SERVICES OFFICE PARK	WAREHOUSE DISTRIBUTION PARK	COMMERCIAL	ANTENNAS
0%	25%	20%	50%	5%	0%

SUBAREA 15

Subarea 15 is 915 gross acres. No study areas are recommended.

SUBAREA 16

Subarea 16 is 1,292 gross acres and contains one study area.

Study Area 16: Total of 82.38 gross acres. This study area is located near downtown.

ID	ACRES	OWNERSHIP	SCORE	ZONE	COMP PLAN
2724133523400	19.38	ACME BRICK COMPANY	8.05	I-2, I-1	Standard Industrial
2724133521950	39.84	BROWNE HENRY W JR TRS	8.81	I-2	Standard Industrial/Urban Development
2724133521970	23.16	OKLAHOMA REALTY DEVELOPMENT CO LLC	8.07	I-2	Standard Industrial/Urban Development

Industry Profiles:

HEAVY INDUSTRIAL	LIGHT INDUSTRIAL	BUSINESS SERVICES OFFICE PARK	WAREHOUSE DISTRIBUTION PARK	COMMERCIAL	ANTENNAS
0%	39%	18%	41%	2%	0%

Appendix E Context for Policy Evaluation[1]

Any recommendations about public policy for employment and industrial land should include an assessment of existing policies that address *land and infrastructure* as they relate to economic development. There are, of course, many types of policies that address aspects of economic development: business retention, expansion, and recruitment; business financing; incentives for businesses; industry clusters; supply chain development; and many more. This appendix addresses *only* policies that relate to land and infrastructure, and three broad questions: (1) What kinds of things can a city can do to address land and infrastructure for industrial development? (2) What institutions and policies can now be used in Oklahoma City to address land and infrastructure for economic development purposes? and (3) What policies might the City consider for improving the process by which land suitable for large industries is made available and developed? This appendix provides a context for policy recommendations that are contained in the main report.

This appendix was completed a few months before the final report was completed. Much more work was done on policy issues in the several drafts of the final report. Thus, **the policy discussion and recommendations in the final report supersede those in this appendix.** This appendix was retained, however, because it was the original framework for the policy section of the final report and contains material that may be of value to the City even though it did not fit in the shortened version of the final report.

FRAMEWORK

Land is often a critical element to a business siting decision. "Land" means more that square feet of space: to be suitable for a particular use it must be in the right location, at the right price, in the correct configuration, in a state of development-readiness, and on the market. A shortcoming, irregularity, or delay in any of these elements can sour a land transaction and derail a potential business siting.

The Chamber of Commerce reports that Oklahoma City has, in some recent instances, been unable to present appropriate industrial or office sites as location alternatives for important business prospects. Even though the land area of Oklahoma City is large, much of the property within its boundaries does not have adequate levels of infrastructure to support employment uses. Moreover, when those services do become available there is evidence that residential developers seize the opportunity presented and have been successful in changing zoning and land use from

[1] This appendix is primarily the work of Larry Pederson of IronWolf Community Resources, a subcontractor to ECONorthwest.

industrial or commercial to accommodate residential development. As a consequence, while the City has invested in infrastructure for industrial sites, it has not been able to fully capitalize on that investment with the siting of new industrial uses.

For most companies making location decisions, land is a means to an end; that is, they need the land to locate some kind of facility so they can produce the product or service that is their primary business. Companies require sites that have the appropriate level of services, willing sellers, and cooperative government processes for development. They are not interested in protracted negotiations with multiple landholders, waiting for not-yet-developed infrastructure, or inflexible government partners; they want the process to be as quick and painless as possible. Often, in fact, the actual land price is of lesser importance to the company than how the entitlement process affects their project time lines and ultimate time-to-market of their product. The crucial role that the property transaction plays in the success or failure of these projects made it clear to City leadership and staff that the ability to control, or at least influence, land transactions could be of critical importance.

Policies to affect land supply and development can be classified broadly into three categories:

1. **Land use and entitlement**: Policies that make land development efficient (e.g., planning for appropriate spatial arrangements; regulation of negative external impacts) and legal (e.g., permitting).
2. **Infrastructure**: Policies that extend needed infrastructure to entitled land.
3. **Site availability**: Where appropriate, policies that help remove barriers created by small lots or idiosyncratic desires of owners (e.g., land assembly).

Moreover, how the public sector is organized to coordinate with its own organizations and with the private sector on these factors can also affect the efficiency with which suitable industrial land is found and developed by the private sector.

The consultant team looked at some of these issues in other parts of the overall study. For example, the availability and cost infrastructure (both current and planned) is investigated at greater length in Appendix D.

Appendix E (this appendix) gives an overview of how the City and its partners are organized to address industrial land supply issues, the policies it now uses, and the ones it might consider using. It does not make recommendations about industrial land policy: it provides information that

helped in developing those policies, which are described in the final section of the summary report.

EXISTING POLICIES RELATED TO LAND USE FOR ECONOMIC DEVELOPMENT

A fundamental purpose of this project is make recommendations about how to improve land-use policy in Oklahoma City that relates to economic development. Such recommendations require an assessment of existing policies and institutions (i.e., of the organizational arrangements for *implementing* these policies). This section provides an overview of the policies in place in Oklahoma City that affect the supply, quality, and availability of industrial land.

OKLAHOMA CITY COMPREHENSIVE PLAN

Oklahoma City is currently operating under the OKC 2000-2020 Plan, as amended. The comprehensive plan lays out specific assets, directions, and actions related to industrial property in the community. Excerpts from the plans are as follows (page numbers in parentheses relate to the OKC 2000-2020 Plan):

Industrial areas [p. 37]

> Although manufacturing employment has been declining in recent years as a share of total employment in our nation, the industrial sector remains a significant employer and generator of wealth for many Oklahomans, and will no doubt continue to be so for the foreseeable future. Following the oil bust of the mid-1980's, Oklahoma City business and government leaders actively worked to diversify our economy. The City will continue its efforts to foster new growth and a diversified economy.
>
> Oklahoma City faces stiff competition in our attempts to attract high profile wealth generators, such as high tech industry and tourism. The City, therefore, needs to continue focusing on its particular strengths—an industrious work force, its highly rated universities, the availability of developable land, low cost of living, minimal environmental constraints, and three major interstate highways, including the NAFTA (North American Free Trade Act) corridor. To remain competitive with other communities, the City will also need to focus more attention on its overall appearance.

Assets

- Abundance of affordable, easily developable land
- Proximity to major interstate transportation routes, including NAFTA corridor
- Stable economy
- Major universities and Vo-Tech facilities
- Plentiful water supply
- Participation in the Brownfield's program to clean up polluted sites
- Diversified production capacity

Directions

- Ensure adequate supply of land and infrastructure to support continued industrial growth.
- Attract development that optimizes the Oklahoma City economy via high employment, high wages, low environmental impact, significant growth potential and long term viability.
- Improve the aesthetic appearance of industrial areas.
- Review existing barriers to industrial expansion with view to mitigating these wherever possible.
- Address any historic environmental issues that may be hindering development in industrially zoned areas.
- Aggressively market Oklahoma City strengths for industrial development to out of state companies.
- Provide public infrastructure support as required to support expansion and new industrial development.
- Encourage the development of industrial parks to accommodate varying land use needs.
- Protect land designated for industrial development from encroachment by conflicting uses.

Industrial areas [p. 39]

Industrial Areas (shown as "Industrial," "Standard Industrial," "Protected Industrial," and "Industrial Reserve" on the Land Use Map, page 18) contain the primary locations for manufacturing activities within Oklahoma City. These areas are also associated with major transportation facilities serving the manufacturing activities including major highways, railways, airports, and freight terminals. Amended 12/10/2009, see Appendix A

Directions

1. Promote industrial areas which are economically viable, well-served by transportation and public infrastructure, and compatible with surrounding development.
2. Improve the appearance of industrial areas.

Actions

1. Designate sufficient lands for major industry and for industrial parks.
2. Create a Technology Park/Research and Development zoning classification. The development regulations for this zoning classifications should provide for specialized communications technology, underground utilities, enhanced landscaping including berms and trees, and other amenities including sidewalks and trails.
3. Encourage industrial development around airports.
4. Confine heavy industrial zoning to established industrial districts and farther than a quarter-mile from designated appearance corridors.
5. Encourage oil drilling in industrial areas to locate near major streets so as to keep interior areas free of obstructions that could hinder industrial development.
6. Increase landscaping and screening requirements and develop a program to address screening and landscaping needs adjacent to residential areas and along highways and arterial streets abutting industrial uses.
7. Apply special design controls to areas designated for Protected Industrial development. These controls could be implemented through Planned Unit Developments (PUDs) or by creation of a new zoning district. Encourage industrial park design which includes sensitive design and placement of buildings, screening or prohibiting outdoor storage, parcel sizes which allow for long term expansion for individual users, special landscaping requirements, and buffering treatments for truck access and loading facilities.

8. Facilitate high quality industrial development which brings about significant public benefits including expanded employment opportunities through targeted extension of public utilities and transportation services. High-technology developments may have special service needs including fiber optic communications, grade separated highway access, rail access, proximity to airports, and high volume demand for electric, natural gas, water, and sewer utilities.

Standard industrial

The Standard Industrial designation reflects development patterns and zoning patterns existing in Oklahoma City and allows for a broad range of industrial uses. Typical land uses range from outdoor storage of oil field equipment to large indoor manufacturing and warehousing facilities.

1. Standard Industrial Development should occur in areas designated for industrial use within the Inner Loop and Urban Growth Areas.
2. Certain areas currently projected and/or zoned industrial but which are predominantly residential in character should be evaluated for redesignation and rezoning to residential use if there are no expectations for eventual transition to industrial development.
3. Developments adjoining the city's aviation facilities should enhance the long-term viability of these facilities. Industrial uses would be especially well-suited at these locations since they do not unduly impact aviation operations and gain certain advantages when located near airports.

Protected industrial

This designation allows for the growing number of industrial uses which require a higher standard for industrial infrastructure, urban design, access, and other factors. This designation applies to certain areas already committed to industrial development, but which remain relatively vacant. The types of anticipated development include research, high technology manufacturing, manufacturing headquarters, and warehouse operations.

- Planned Unit Developments and I-1 zoning should be used to ensure quality development and compatibility of land uses.
- The creation of a new zoning classification should be considered to assist in obtaining the type and quality of development desired for this area.
- Industrial development in this category should be subject to appropriate design controls. These could include sensitive design and placement of buildings, screening or prohibiting outdoor storage, parcel sizes which allow for long term expansion for individual users, special landscaping requirements, buffering treatments for truck access and load facilities, and other features.

Clearly, the comprehensive plan identifies the Planning Department as having the mission and authorization to play a proactive role in designating, developing, and protecting employment land in the greater Oklahoma City area. In some cases, while the mission and authorization exist, the tools could be refined to facilitate the Planning Department's role.

FORWARD OKLAHOMA CITY IV

Oklahoma City has had a series of five-year economic development strategies entitled "Forward Oklahoma City." Currently, the community is involved in Forward Oklahoma City IV. All elements of the community contribute to the preparation of these plans, with the primary responsibility

for the "care and feeding" of the plan resting with the Greater Oklahoma City Chamber of Commerce (the "Chamber").

As identified on the Chamber's web site, the cornerstones of Forward Oklahoma City IV are:

Grow Oklahoma City companies and industries

Maximize Oklahoma City's competitive advantage

Market to attract new companies and investment

Seize Oklahoma City's opportunities

Embedded within these cornerstones are specific action items relating to property, sites, and infrastructure:

- Grow Oklahoma City companies and industries
  - *Action item:* Ensure an infrastructure of shovel-ready sites throughout the region, including at Will Rogers World Airport
- Maximize Oklahoma City's competitive advantage
  - *Action item:* Continue to support funding for regional infrastructure improvements, including a regional transportation system.
- Market to attract new companies and investment
- Seize Oklahoma City's opportunities
  - *Action item:* Continue work to support a strong urban core with links to surrounding communities, including redevelopment activities to expand the retail sales tax base.
  - *Action item:* Participate in and support efforts to implement MAPS 3 and other initiatives to enhance our community infrastructure and natural amenities alongside our economic efforts

The economic development plan for Oklahoma City clearly supports efforts to ensure an adequate supply of appropriately sized, served, and available employment sites around the region.

Operating Authorization for Oklahoma City Economic Development Trust and Economic Development Foundation

The citizens of Oklahoma City authorized General Obligation Limited Tax bonds in December of 2007, the proceeds of which were directed to support private sector investment and job creation through the creation of the Oklahoma City Economic Development Trust (the "Trust"). The investments of these funds were to:

- Focus on outcomes including investment, job creation, and targeted industries and targeted areas
- Take into account "speed to market"
- Ensure program accountability
- Encourage "pay for performance"

- Focus on existing and new targeted industries

According to the authorizing language, Trust funds may be used for:

1. Site acquisition or land assembly
2. Facility construction or renovation
3. Infrastructure, including site improvements
4. Engineering and design as well as other forms of assistance to specific projects (equipment purchases, loan guarantees, and financing).

Oversight for the Trust resides with a board of trustees, who are nominated by the mayor and approved by city council. While the trustees have broad overview powers, the Trust chooses to contract with the Oklahoma City Economic Development Foundation (the "Foundation").

The Foundation is housed within the Chamber, and the professional staff members that administer Foundation programs and activities are Chamber economic development professionals. The close operating relationship between the City and the Chamber continues through the Trust/Foundation relationship and the shared goals of both entities related to economic development.

OKLAHOMA CITY AIRPORT TRUST AND DEPARTMENT OF AIRPORTS

The Oklahoma City Department of Airports, which oversees Will Rogers World Airport and two small airports in the City, is a major regional player due to the amount and location of developable property it controls.

Will Rogers World Airport sits on just over 8,000 acres of land and serves seven major airlines, regional airlines and a growing number of charter services. Will Rogers World Airport is one of the largest small-hub commercial airports in the United States with over 1.9 million boarding passengers each year. The City also operates **Wiley Post Airport**, the largest corporate and business jet general aviation airport in Oklahoma and **Clarence Page Airport**, a smaller grass roots general aviation airport in west Oklahoma City with jet capable runways.

Will Rogers World Airport is home to 67 companies and over 10,000 employees, including the Mike Monroney Aeronautical Center, the Federal Bureau of Prisons Transfer Center, Southwest Airlines Reservation Center and the Metro Tech Aviation Career Center.

Oversight of the Department of Airports falls to the Oklahoma City Airport Trust. The Trust is described on its Website as follows:

> It's a small group, but an effective one. Composed of five members, the Oklahoma City Airport Trust is entering its 55th year of providing leadership and oversight for the Oklahoma City Department of Airports.
>
> The trust oversees the operations of three facilities -- Will Rogers World Airport, Wiley Post Airport and Clarence E. Page Airport -- plus buildings and grounds for the Mike Monroney Aeronautical Center, a major national Federal Aviation Administration Complex,

City management and elected officials are part of the board of trustees and influence decisions related to strategic direction and operations.

OKLAHOMA COUNTY STRATEGIC PLAN

Oklahoma County, which shares its area with much of Oklahoma City, has a strategic plan that lays out its objectives related to economic development. Among the goals laid out in the County strategic plan are:

Goal 5: "Be the economic development leader for Central Oklahoma"

Goal 6: "Achieve infrastructure excellence."

Clearly, the County's policy framework is supportive of economic development activities and forms a basis for a partnership with the City.

OKLAHOMA CITY WATER UTILITIES TRUST

Oklahoma City has a policy-making body for water and wastewater utilities known as the Oklahoma City Water Utilities Trust. It is described on the City's web site as follows:

> The **Oklahoma City Water Utilities Trust** (OCWUT) was established in 1960 to oversee construction of the Atoka Reservoir and Pipeline Project. That project assured Oklahoma City would have plenty of water in years to come.
>
> It was originally known as the Oklahoma City Municipal Improvement Authority. It was renamed in 1990 to more accurately describe its function as the policy-making body for Water & Wastewater Utilities.
>
> OCWUT strives to ensure that utility customers receive outstanding quality water and wastewater services and that the utilities operate in a professional businesslike manner to the benefit of the citizens of Oklahoma City.
>
> OCWUT has five trustees: the Mayor, a Council member, the City Manager, and two citizens suggested by the Mayor and subject to City Council approval

Because of its ability to provide key infrastructure services, as well as its ability to acquire property, the OCWUT has a role to play in employment property development.

CONCLUSION

This section illustrates that in Oklahoma City (1) there is a lot of policy that supports the idea of providing adequate industrial land, and (2) there are many organizations and techniques being used to encourage more and

better use of available industrial land. Thus, there is ample support for developing policies and institutional arrangements to address issues related to industrial land. We examine some possibilities in the next section.

POTENTIAL DIRECTIONS FOR POLICY

POLICIES RELATING TO LAND FOR ECONOMIC DEVELOPMENT

This appendix stops short of final recommendations about which organizations should be taking what actions with respect to industrial land in Oklahoma City. Those recommendations are in the final report that this appendix supports. The purpose of this appendix was to get to summarize possible policy directions for consideration by the project's Advisory Committee. The recommendations in the final report reflect that Committee's comments.

We organize potential policies in four categories of activity that impact the development-readiness of employment land in the Oklahoma City area, and address each in subsections that follow:

- Land use regulation and policy
- Infrastructure availability, proximity, and capacity
- Characteristics of parcel sizes, configuration and surrounding development of employment lands
- Institutions (public and private) whose interactions impact the success of locating desired development into targeted areas

Planning, Zoning, Permitting

The first step for the public sector in any land development process is to do an effective job of the planning that is usually expected and required of it. Almost all cities have zoning; most have land use plans that are the basis for that zoning. The assumption is that a thoughtful arrangement of land uses can reduce conflicts and increase efficiencies among uses. Some examples of how such planning and zoning can improve the efficiency of land development and use:

- Protection of natural and environmentally sensitive areas
- Efficient extension of backbone infrastructure
- Arrangement of land uses that make transportation work better
- Protecting certain land uses from conflicting uses

- Enhancement of agglomerative economies (creating clusters of industrial and commercial development).

Oklahoma City already has a process for planning, zoning, and permitting, and it is clear what City departments are in charge of this process. Though improvements in efficiency are always possible, the consultant team's cursory review did not uncover any special problems with that process, with one possible exception. There is a lack of clarity in policy regarding industrial zone designations, and how binding they are. Both staff and planning commission members commented that City policy is not providing sufficient guidance about its intentions for the creation or preservation of key industrial land. We address that issue in the recommendations in section 5 of the main report.

Infrastructure

Having all the planning and zoning done, and the permitting ready to go, is not enough to make land ready for building. For land to be buildable, it must have available and cost-efficient infrastructure.

In general, Oklahoma City has good infrastructure and policies that have added to it without much difficulty. Highway capacity is high, and travel time and congestion is low, relative to other cities its size. The City has water and sewer capacity, and has generally been able to extend services to accommodate growth and development. The same is true for electric and gas utilities.

Appendix D of this report describes a more detailed analysis of infrastructure that was done for 14 study areas around the City. The analysis showed that some regions of the City are better suited to serve industry types with high utility demands because the cost per acre of providing them with infrastructure are lower. Table E-1 summarizes some possible pairings of industry types with study areas that could result in lower overall infrastructure costs.

Table E-1. Possible Industry Types and Study Area Pairings

Industrial Use	Primary Utility Demand	Suggested Target Study Areas
Heavy Industrial	Water, Sewer, Power, Gas	Study Areas 12, 13, 14
Light Industrial	Water, Sewer	Study Areas 2, 3, 10
Warehouse/Distribution	Transportation	Study Areas 5A, 5B, 5C, 5D
Business Services	Transportation, Water, Sewer	Study Areas 5B, 5C, 12, 14

Appendix D concludes that the study areas represent those areas where there is a concentration of parcels that provide the best opportunity for the City to have an inventory of sites in various acreages in the locations that

meet both market demand and have a basic level of infrastructure and transportation assets that can be leveraged for development.

The infrastructure evaluation did not do an assessment of infrastructure funding. Thus, it is possible that the City could find future constraints on the development of infrastructure. But interviews with the City and utilities that provide that infrastructure now did not uncover any exceptional concerns about their ability to provide the infrastructure in the future.

Available Sites

Even if a city has a good supply of properly zoned, vacant, buildable, serviced *land* for industrial development, it is still possible that it may be short on *sites* that are sized, configured, and available for industrial development. Companies making location decisions are influenced by the ease, speed, and certainty of land transactions.

Beyond the public-sector responsibilities for an efficient planning and permitting process (section E.3.1 above), there are market-based issues that can make land less available. Once vacant, buildable land is available, the problem can be one of *ownership*: the land may not be under a consolidated ownership that is interested in selling in today's market. Big industries need big sites; if parcelization means that big sites can only be made available by consolidating several or many smaller parcels, then *land assembly* must occur if large industrial sites are to be made available.

Attachment E.1 at the end of this appendix provides more information about the purposes, barriers, and techniques of land assembly.

Institutional Arrangements

The previous sections discuss three areas of land-use policy that can have a significant influence on economic development: (1) land-use planning, zoning, permitting; (2) the timely availability and cost of infrastructure; and (3) the availability of large sites. Public policy can influence all of these land factors, and how institutions are organized and coordinated can effect how well their policies in these areas work.

For the land-use issue described above, there is a clear and logical institutional structure for addressing them in Oklahoma City: the City is the lead institution. Planning, zoning, and permitting is clearly the job of the City. As part of its efforts to develop plan**okc** the City is conducting several studies (including this one) toward the end of improving the efficiency of its land uses in the long run, and the effectiveness of the zoning that implements the land-use plan. The City is also the lead institution on getting infrastructure to land. It has direct responsibilities for water, sewer

drainage, and transportation. It coordinates with private utilities for electricity and gas.

Regarding site assembly, however, the institutional roles are less clear. In general, public institutions in Oklahoma City are not as heavily involved in site assembly for employment land as they are in some other large cities. The implication is that site assembly for employment land is primarily a private sector activity. The City Planning Department is not directly involved in site assembly (this study was an initial effort to see whether a lack of large sites was really a problem or not). The Chamber of Commerce wants to have large sites to show potential clients, but it has not historically had the mission, and probably does not have the authority or funding, to get involved in assembling those sites. The Oklahoma City Urban Renewal Authority (OCURA) does assemble and hold land for MAPS projects, the expansion of OU Health Science Center, and various other redevelopment projects. If the City were to become more active in employment land assembly, OCURA may be a good place to house that function.

GOING FARTHER

Section 5 of the final report draws on the information contained in this appendix to make recommendations for City policy relating to employment land.

Attachment E.1 Land Assembly

A key problem for economic development policy as it relates to land and industrial development is the availability of large, developable sites. If such sites are not available because of parcelization, they have to be assembled from smaller parcels. This section discusses barriers and opportunities for land assembly.

BARRIERS TO LAND ASSEMBLY

Assembling multiple parcels into a cohesive site/product can be a very difficult task. Among the barriers to land assembly are:

- Property owners can be unwilling to sell (for many reasons: price, tax impact, sentimental value, replacement costs, viable alternative locations)
- The sheer cost of the land; owners have an inflated expectation, or perhaps only *one ownership* out of a larger site assembly is a problem
- In the case of outright City purchase, the carrying cost of major land holdings for future development could be significant
- Ownership interests are fractured (often true in family inheritance situations); this issue often is combined with absentee ownership, so that owners don't really have a "stake" in the transaction and its potential development/economic impact on the community
- Regulatory environment (zoning, environmental overlays, mandated parcel size) can be obstacles
- Infrastructure demands caused by land assembly, and the commensurate ability to finance necessary improvements, often create barriers
- Legal issues, including clear title, easements, and encumbrances
- Existing development or structures on site or on neighboring parcels; in Oklahoma City's case, the existence of oil wells on parcels creates these kinds of problem.

As these possible barriers are viewed from the standpoint of the business making a location decision, it is not difficult to perceive why parcels with fragmented ownership and inadequate infrastructure often represent a "deal-killer" to companies who do not have the time, patience, or expertise to wade through a possible quagmire of issues. How might Oklahoma City be able to mitigate these challenges?

POSSIBLE LAND ASSEMBLY TOOLS

There are many ways that the public sector can assist with land assembly; the rest of this section discusses:

1. Outright purchase by public sector
2. Donation or grant to public sector
3. Cooperative land bank
4. Cooperative land trust
5. Acquisition and holding by foundations
6. Public/private partnership
7. LLC formed with City and property owners as pro-rata share holders
8. Purchase options
9. Acquisition of surplus state or county land

Outright purchase

The ultimate in property control is outright ownership by the City. This ownership allows the community to set its own criteria and requirements for potential purchasers of the property, in terms of uses, compatibility, targeted industries, and other factors. Additionally, the City can represent "patient money"; i.e. the desire to turn land quickly for a profit is often not as pronounced with City ownership as it is with private sector purchases. The initial investment in land can be very significant, and when combined with holding costs can make the decision whether or not to use this tool difficult.

Cities around the region, state and country have taken this course of action, usually in the form of creating a business park. Sometimes, as in the case of Corsicana, Texas' I-45 Park, city property ownership allows creative deal making for targeted businesses. In Corsicana's park, a desired business that meets the threshold for investment and employment ($10 million and 50 FTE) is eligible for a 20 year grant/loan, with 1/20 of the land value forgiven for each year of operations within the stated guidelines. In the case of Chillicothe, Missouri, the city industrial park is so successful that it was recently expanded by a purchase of an additional 174 acres.

As a cautionary note, these business parks exhibit a wide range of successes, from those that are fully occupied, to those that sit vacant for years and can end up being a dump site for debris (e.g., old Christmas trees and worn-out furniture). In some instances, city-owned property is seen as an "unfair" competitor to privately-held property; this is currently a topic of debate in Wichita, Kansas. Cities that have invested in business parks often change criteria for their targets based on changed composition of city leadership and staff; in smaller communities, "who you know" can influence whether your project (often in non-compliance with stated goals)

will be allowed in the business park. As time goes on, and the parks do not provide the economic activity desired, initial criteria often are relaxed or abandoned completely in order to get something going.

Donation or grant

This form of property transfer can have many motivations on the part of the grantor: tax reasons, designation for specific use or purpose, a family or personal memorial, or many others. Clearly, the benefit to the city is the minimal "cost basis" in the property. The minimal initial cost can sometimes be offset by significant ongoing costs for maintenance and upkeep on donated properties. Additionally, observing the wishes of the grantor can lead to a very narrow range of alternative uses.

Prime industrial land, without environmental constraints or other encumbrances like easements, is rarely a subject of grants or donations. Research regarding land donations around the country indicated that undeveloped land contributions to public entities are almost universally targeted at some public purpose, such as parks and open spaces, or for the construction of a public building such as a school or community center. No specific instances were found of land contributions to public entities where the entity in turn could use that property for for-profit development. Some cities that have recently benefited from donated land are:

- Irvine, CA: land to be used for affordable housing development
- Knoxville, TN: land to be used for parks and open spaces
- Conroe, TX: land to be used for parks and open spaces

Cooperative land bank

Land banking as collaboration between a government and private sector or non-profit interests is not uncommon, but typically is targeted for housing or mixed-use development needs. In cities and counties where abandoned or deserted properties are a problem, governments take such properties over and place them in a land bank. In most cases the city (or their agent, like an urban renewal agency) will gain control over a parcel/parcels and then join with for-profit or non-profit organizations who control additional parcels in order to reach a critical mass for development/redevelopment. The "rust belt" in Michigan, Ohio, and the industrial northeast has seen the most activity for land banks of this type.

Another, less frequent purpose of land banking is for open space and natural resource preservation. Nantucket Island, MA is a case in point, where natural areas are preserved in a land bank. The only identified instance of an industrial/commercial land bank was in Cleveland, OH. As their web site indicates:

The Industrial-Commercial Land Bank was established in 2005 by the City as a proactive approach to reusing properties with serious real estate obstacles, such as environmental contamination and/or economic hardships. This land bank provides the opportunity for the City to strategically assemble properties to attract businesses and create long-term economic and community investments.

This form of property control may require the city to purchase parcels outright; in the case of abandoned properties the city could take them over in lieu of unpaid taxes. In any event, this could be an effective tool when City efforts complement development/redevelopment efforts of the private sector.

Cooperative land trust

This differs from a land bank in that the trust has a very specific agenda for property use. In its most common form, the land trust is used for parks, green spaces, or environmentally sensitive land for wildlife habitat or conservation purposes. Land trusts that address that particular agenda include:

- Minnesota Land Trust, protecting resource and scenic lands
- Texas Land Conservancy, protecting specific ecologies

In other cases, land trusts have been used as a means to continue a historic pattern of land use, such as farming or ranching, in the face of encroaching urban development. An example of this type of land trust would be the Mesa Land Trust in Mesa County, Colorado.

Research did not indicate this tool is often used for assembling/holding industrial land; rather, it is a tool that is often used to *prevent* industrial development of a parcel or parcels. That being said, a specific-purpose trust directed at industrial land holdings (whether City-owned or done by a special purpose entity) could be a viable optional strategy.

Acquisition and holding by foundations

Foundations can often acquire and hold land as a part of their investment portfolios. Most often, the land in question would need to be a productive asset that would provide a financial return that could be used to fund the foundation's programs. Alternatively, various foundations hold land for conservation purposes, as in the case of the Conservation Foundation of the Gulf Coast (FL) and the Land Conservation Foundation of Illinois.

An exception to this would be a foundation created specifically for economic development purposes like acquiring and holding industrial land, such as the Abilene (TX) Industrial Foundation. That foundation is empowered to use its funds for a variety of economic development purposes, including providing sites at reduced cost to users who meet

program qualifications. In its scope and purpose, the Abilene Foundation is similar to the Oklahoma City Economic Development Trust.

The advantage to the City is that the holding of land by foundation(s) represents "patient money" (i.e., not seeking a quick turnover and capital gain). Alternatively, land in a foundation portfolio might not easily be sold to prospective users and foundations often prefer to hold title to land and have lease-only structures if program revenues are the objective of property ownership.

As evidenced by the lack of interest in lease-only properties in many metro areas, a foundation taking this approach would be of limited benefit to the City if the purpose of the foundation was to generate long term funding from revenues generated by land leases.

Public-private partnerships

According to the U.S. Economic Development Administration:

> Public-private partnership (referred to as "PPP" or "PPPs") is now a standard concept in business and state and local government circles, especially in the economic development realm. Some regard PPPs as "the" answer to many economic growth and development problems facing state and local governments today, while others express varying degrees of skepticism about their attractiveness and effectiveness. Nonetheless, most seem to agree that PPPs will likely remain an important approach to designing and implementing economic development strategies.

The importance of PPPs is evidenced by the number of governmental and economic development organizations that have devoted energy and resources to the issue; these include the National Council on Public-Private Partnerships (NCPPP), the National Association of State Development Agencies (NASDA) and the International Economic Development Council.

IronWolf Community Resources has first-hand experience with very productive public-private partnerships related to land transactions in the Hillsboro, OR area. Notably, the Ronler Acres Urban Renewal Area (URA) had a very successful collaboration with real estate developer PacTrust on land assembly that resulted in the creation of a site for Intel at Ronler Acres and the Orenco Station mixed-use development that was one of the pioneers of "new urban form". Additionally, the URA facilitated acquisition and development by local electric utility Portland General Electric (PGE) of significant industrial properties in that same area.

As productive as these partnerships can be, they potentially require significant public funds to be successful. In the case of Hillsboro, OR, the Ronler Acres URA had access to very sizeable tax increment funds to facilitate the partnerships noted above, both in terms of property

acquisition and infrastructure investment. As a result, there was an ability to have an equivalency of financial interests with the private sector partners.

The EDA, in a study focused on PPP several years ago, called out examples of partnerships that in their estimation provided effective models for development:

> Various public and quasi-public entities have been established in different cities and states to play the role of the public partner in real estate development projects in the first category. Genesis LA (Los Angeles), the Penns Landing Corporation (Philadelphia), and the National Capital Revitalization Corporation (NCRC, Washington, DC) are illustrative examples. On its website, Genesis LA identifies itself as "a cutting-edge initiative aimed at transforming abandoned and blighted properties throughout Los Angeles' most disadvantaged communities" via "innovative financing vehicles that provide "last resort" gap financing" for real estate development in the inner city. Penns Landing Corporation was established by the City of Philadelphia as a PPP to develop and manage the central Delaware riverfront, providing land, public financing, and associated services to private developers. According to its website, NCRC is "a public-private entity designed to serve as an important manager of major development projects in the District of Columbia," with a mandate to use "a myriad of incentives and other economic development tools . . . to shape development in the District's downtown and neighborhoods."[2]

Within Oklahoma City's comprehensive plan, the desire for crafting efficient and effective public private partnerships is specifically called out in direction to the City's Planning Department:

- Coordinate City economic development efforts carried out under this Plan with the economic development efforts of the Greater Oklahoma City Chamber of Commerce as outlined in *FORWARD OKLAHOMA CITY—THE NEW AGENDA (1996-2000)* and *FORWARD OKLAHOMA CITY II (2001-2005)* to grow the economy and improve the overall quality of life in Oklahoma City.
- Form partnerships combining City departments, trusts, and authorities with local firms, area chambers of commerce, and the State to jointly pursue economic development initiatives including land acquisition and infrastructure improvements.

The project management team has indicated a strong interest in undertaking a collaborative approach with the private sector in Oklahoma City; this collaboration will likely require the organization of one (or several) PPP. The ability of the City to control the type, direction, and speed of development that a PPP will take is a key element in reaching the City's objective to maximize industrial/commercial opportunities and City investment in infrastructure.

[2] Additional case studies can be accessed on the National Council of Public-Private Partnerships at: http://ncppp.org/cases/index.shtml#ecdev

Limited Liability Corporation (LLC) formation

As another type of control mechanism, the City could join together with private landowners and form an LLC for a specified property or parcel. The City's contribution could be investment in infrastructure, with the private owners contributing their land. Ownership of the LLC would then be on a pro-rata basis in proportion to the value of the contribution.

The LLC could be created as a specific-purpose entity to expressly assemble and make development-ready a certain site or sites. As a representation of the desired development pattern for the property, the City can be specific about the type(s) of enterprises and industries targeted for that area consistent with investment and employment goals. The group could then designate a price for the assembled property and represent a single point of contact for any future negotiations. The negotiations to form this specific-purpose LLC could be somewhat tricky, given that private sector landowners are more accustomed to selling on a "first come first served" basis, and might take some convincing that the City's objectives can be met while at the same time preserving the value of the property and timeliness of its sale.

The benefit to the City would be to maximize the value of their infrastructure investments, and possibly make some or all of these infrastructure investments reimbursable when the subject property sells due to pro-rata ownership of the LLC. The creation of an LLC would be a more formalized form of public-private partnership through the formation of a legal entity.

Purchase options

Frequently in large scale land transactions options are negotiated with sellers by a prospective buyer. Often those options cover a definitive time frame (e.g., 3 months, 6 months, or longer), with the ability of the buyer to extend the option through additional financial considerations. Options for a shorter term (0-3 months, depending on the strength of the market and regional conditions) frequently are done with little or no "hard money" (i.e., the prospective buyer does not pay anything for the short term). The prospective buyer can then activate an extension beyond that short term in return for a specified payment to the seller. The buyer typically uses this time to conduct due diligence on environmental and development issues that they then can compare with alternative locations.

In this control methodology, the City or its designated agent(s) could use the option process to assemble parcels from multiple ownerships in order to support the requirements of a particular prospective user, or for the development of a specified targeted area. Specifically in Oklahoma City's

situation, the options could allow holding property off the market as infrastructure is provided, in order to prevent possible development of competing (and inconsistent) uses such as residential tracts.

The assembly of options on larger parcels for nominal cost is definitely an advantage of the option process, as is fixing a transaction price for each of the multiple ownerships. The City or its agent(s) could consider using a third party in the optioning process, since frequent public sector interest in properties can drive prices upward in excess of true market values. It is not unusual for property options to be negotiated confidentially with the identity of the prospective purchaser not disclosed.

The assignment of options is also a common occurrence in property transactions. Companies frequently option property without having fully analyzed the best ownership structure for the transaction. In some cases, companies create a specific LLC for land holdings; in other cases, owner(s) of the company own the land and buildings and lease them back to the company as an additional source of guaranteed revenue for themselves. No additional costs or compensation accrue to the option due to its assignability, according to real estate professionals contacted for the purposes of this study.

Acquisition of surplus state or county land

This is an opportunity that is usually not predictable in most jurisdictions. It frequently occurs when some surplus land is created through infrastructure improvements, such as airport or road projects, resulting in remnants that are not used for the actual project. In less frequent cases, land or buildings that become surplus can be granted to the local jurisdiction by other entities when they no longer serve their intended purpose.

Oklahoma City is in a somewhat unique situation in that it has additional regional public sector partners involved in land acquisition and holding. Oklahoma County created the Oklahoma County Industries Authority, involved in land acquisition and assembly, which was instrumental during construction and expansion of Tinker Air Force Base. The Oklahoma City Airport Trust is involved with property at and around Will Rogers World Airport. Both of these entities could play important roles in the land acquisition and assembly process, along with the Oklahoma City Economic Development Foundation.

Exhibit E.1 summarizes all the techniques for land assembly, and their performance.

Exhibit E-1: Possible site assembly and site control tools

Tool	Initial Cost	Future Cost	Profit	Loss	Risk	Partner Benefit	Alt. Funds
1.Outright purchase by City	Going rate for property acquisition	Carrying cost at City rate of funds	Potential market gain	Potential market loss	"City is competing with other owners"	Quick cash for sellers	Could replenish funds as sales occur
2.Donation or grant to City	Minimal	Carry and maintain	Possible due to zero cost basis to City	Minimal	Deterioration of asset over time	Tax benefit for donors	N/A
3.Cooperative land bank	Uncertain; depends on parcel	Carry and maintain	Potential market gain	Potential market loss	If a key parcel is withheld can fail	Move and market as a group; City leads	N/A
4.Cooperative land trust	Not used in industrial development	N/A	N/A	N/A	N/A	N/A	N/A
5.Acquisition and holding by foundations	Minimal to City	N/A	N/A	N/A	Often goal is a steady return for group; not a good tool for bare land	N/A	Foundation funds for acquisitions
6.Public/private partnership	More moderate than outright purchase of large parcels	Manage properties if partnership calls for this function	Potential market gain (depends on partner-ship agreement)	Potential market loss (depends on partner-ship agreement)	Complex transaction and structure	Private owners get infra-structure from City	N/A
7.LLC formed with City and property owners as pro-rata share holders	City infrastructure funds; may also require some land purchases	Carrying costs	Profit at time of sale	Minimal	Need for infrastructure funds outstrips City ability	City assists property to be ready to develop	Other sources of infra-structure funding (grants)
8.Purchase options	Depends on usual practice in market and amount and price of land	Options roll forward over time; costs increase	Modest chance if only want to use to preserve land and set price and terms	Option money could be forfeit if deal is lost	Minimal commercial risk; some political risk if not uniform process	Prospect company gets single contact and set price	Can recoup initial funds from sale of options
9.Acquisition of surplus state or county land; work with other agencies	Minimal	Carry and maintain	Possible due to small basis and sharing agreement	Minimal	Land may only be use-able under other agency guidelines	Get rid of orphan asset and/or assist in regional economic growth	N/A