

# Caltrans Airport Forecasting Study

*The Role of California Airports in Smart Growth and Economic Vitality*

## appendices

*prepared for*

**California Department of Transportation  
Division of Aeronautics**

*prepared by*

**Cambridge Systematics, Inc.**

*with*

**Mead & Hunt  
Economic Development Research Group**



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*date*

January 31, 2014

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# Table of Contents

<b>A.</b>	<b>Summary of Data for California Airports and Surrounding Areas .....</b>	<b>A-1</b>
A.1	Historical Data Related to Economic Analysis .....	A-1
A.2	Forecasted Data Related to Economic Analysis .....	A-3
A.3	Initial Population and Employment Profiles .....	A-5
A.4	Representative Airport Traffic Profiles.....	A-9
<b>B.</b>	<b>Characteristics of Smart Growth Potential at Airports.....</b>	<b>B-1</b>
B.1	Characteristics Making Places More Likely to Attract Smart Growth .....	B-1
B.2	How Airport Land Supports Smart Growth Attractive Characteristics .....	B-3
<b>C.</b>	<b>Literature Review: Land Use and Industry near Airports.....</b>	<b>C-1</b>
C.1	Industries that Typically Cluster near Airports .....	C-1
C.2	Illustrations of Industry Reliance on Aviation .....	C-4
C.3	Airport Business and Land Use Activity .....	C-6
C.4	Market Access: List of Candidate Industry Activities to Locate On or Near Airport Facilities .....	C-10
C.5	National Airport Land Use Case Studies .....	C-14
<b>D.</b>	<b>Case Study Interview Guide.....</b>	<b>D-1</b>
D.1	Interview Guide .....	D-1
<b>E.</b>	<b>Methodologies for Estimating Economic Potential of Role 1 and Role 2 Airports.....</b>	<b>E-1</b>
E.1	Role 1: Potential Productivity Impacts Generated by Smart Growth Policies .....	E-1
E.2	Role 2. Potential Productivity Impacts Generated by Smart Growth Policies .....	E-15
<b>F.</b>	<b>Rating and Categorizing Airports .....</b>	<b>F-1</b>
F.1	Smart Growth Roles .....	F-1



# List of Tables

Table B.1	Characteristics Making Places More Likely to Attract Smart Growth.....	B-2
Table B.2	Typical Ratings for Airport Land on Smart Growth Attractive Characteristics .....	B-4
Table C.1	Division of Air services by purchase and self-Supplied by Percent of Total Outlay (in Producers Prices).....	C-4
Table C.2	Examples of Airport-Proximate Industries/ Activities (by Airport Type and Relationship).....	C-8
Table C.3	Industry Sensitivities to Airport Access-”Quality” ranked on Domestic Airport Sensitivity .....	C-12
Table D.1	Examples of Airport-Proximate Industries/ Activities .....	D-2
Table D.2	Why Non-Aviation Businesses Locate at the Airport.....	D-3
Table E.1	Summary of Estimated Employment Change by Land Use .....	E-3
Table E.2	Estimated Employment Mix by 2-digit NAICS Category for Each Land Use .....	E-4
Table E.3	Estimated Potential Employment Change by NAICS from Smart Growth Policy .....	E-5
Table E.4	Employment Scenarios for Four Case Study Airport Zip Codes .....	E-6
Table E.5	Summary of Employment Density Changes by Airport and Resulting Income Growth.....	E-9
Table E.6	Total Economic Impacts to California (2040) .....	E-10
Table E.7	Economic Impacts to California from Buchanan Airport, by Sector.....	E-11
Table E.8	Economic Impacts to California from Santa Monica Airport, by Sector.....	E-12
Table E.9	Economic Impacts to California from Fresno Airport, by Sector ...	E-13
Table E.10	Economic Impacts to California from Gillespie Airport, by Sector.....	E-14
Table E.11	Sample Role 2 Smart Growth Airport Areas.....	E-15
Table E.12	Density Changes Assumed for Smart Growth.....	E-20
Table E.13	Total Job Growth Projected by County .....	E-21

Table E.14	Manufacturing, Wholesale Trade and Truck Transportation Jobs Projected to be Lost by County .....	E-22
Table E.15	Adjusted Estimates to Accommodate Additional Capacity of Sonoma County Airport Smart Growth Area .....	E-23
Table E.16	Direct, Indirect and Induced and Total Impacts by County Due to Jobs Saved in Airport Smart Growth Areas.....	E-24
Table E.17	Potential Total Jobs by Sector Saved Per County in Role 2 Smart Growth Areas .....	E-25
Table E.18	List of Persons Interviewed, by Airport Location .....	E-30
Table F.1	Remaining Airports for Study.....	F-2
Table F.2	Assignment of Scores to Ratings.....	F-3

# List of Figures

Figure A.1	Percent Employment by Industry for Airport Categories (2008).....	A-2
Figure A.2	Percent Employment by Occupation for California Airport Categories (2008) .....	A-3
Figure A.3	Average Employment per Airport by Industry for California Airport Categories (2008 to 2035) .....	A-4
Figure A.4	Average Population per Airport by California Airport Category, 2008 to 2035.....	A-5
Figure C.1	Industry Reliance on Air Travel.....	C-2
Figure C.2	Rates of Employee Air Travel.....	C-3
Figure E.1	California Average Income Elasticity with Respect to Sector- Specific Employment Density .....	E-8
Figure E.2	Comparison of Regression Results for Retail vs. Professional, Scientific, Technical Services .....	E-9
Figure E.3	Prospective Castle Airport Smart Growth Area .....	E-16
Figure E.4	Prospective Santa Maria Public Airport Smart Growth Area.....	E-17
Figure E.5	Prospective Sonoma County Airport Smart Growth Area .....	E-18
Figure E.6	Prospective Yuba County Airport Smart Growth Area .....	E-19



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# Appendices

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# A. Summary of Data for California Airports and Surrounding Areas

This appendix provides data and information in table and charts on key historical and forecasted data about areas surrounding California airports. This material supported the initial qualitative review of California airports, prior to selecting airports for further assessment through the case study methodology. This data is provided as background material and is not directly related to quantitative analysis provided in this report. The aforementioned approach to this qualitative study required some data analysis related to smart growth design principles, but did not support a quantitative, data-driven approach. The nature of the case studies and the uncertainty of economic growth across the state made the qualitative approach the most applicable to practitioners. This data, however, provide useful background to regional demographic and socioeconomic conditions across the state.

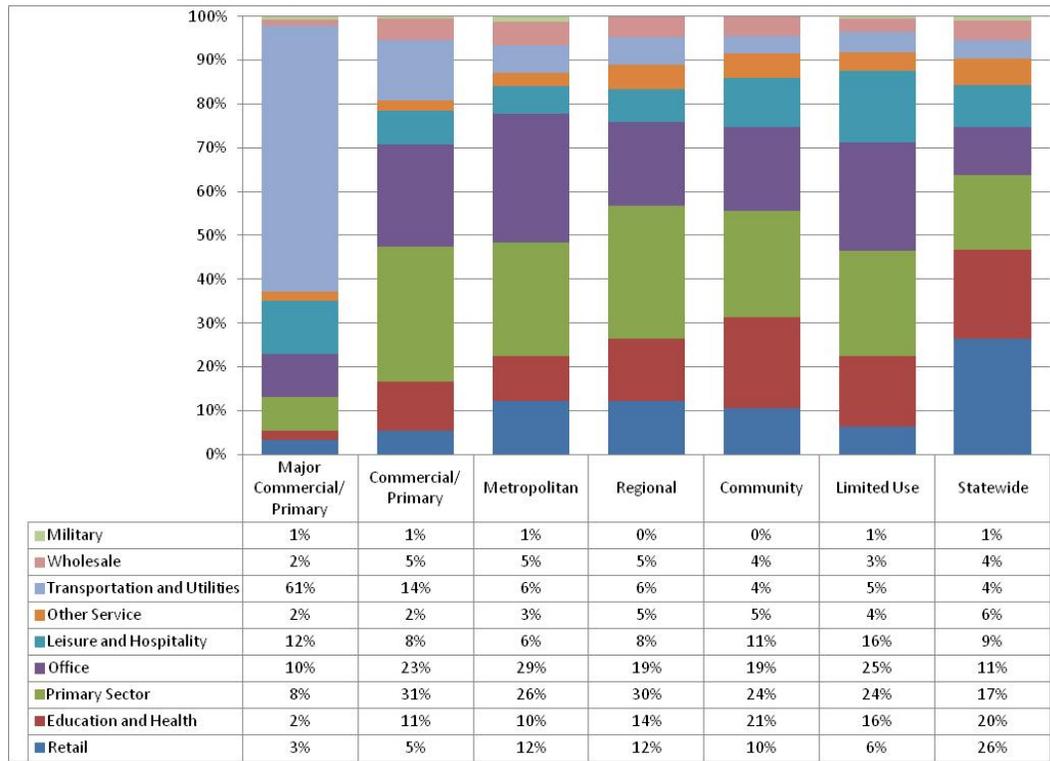
## A.1 HISTORICAL DATA RELATED TO ECONOMIC ANALYSIS

### Employment by Industry

This section describes the distribution of employment across eight industry categories used in the statewide travel demand model, for each airport airside category (Figure A.1).

- Non-major airport categories have a greater share of primary sector industry activity on or near the airport than in the state overall. This is likely due to the low-density land uses such as agriculture near airports in undeveloped areas.
- Non-major airport categories have a greater share of office-related sectors on or near the airport than in the state overall. Metropolitan airports have the largest share of office uses, at nearly 30 percent of all industry sectors. This reflects the opportunities for aviation-compatible administrative and office facilities in low-density areas near most airports.
- Office, education and retail uses are also strongly represented in non-major airports. Community airports have the greatest share of education and health activities of these airport types.

Figure A.1 Percent Employment by Industry for Airport Categories (2008)



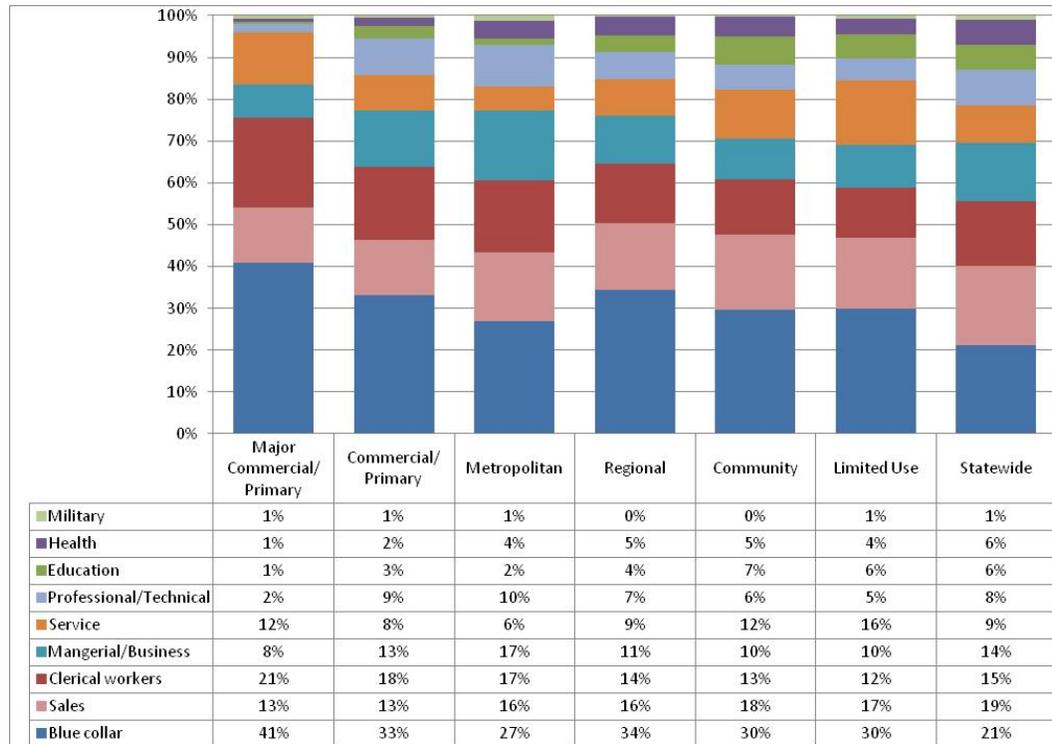
Source: California Statewide Travel Demand Model.

### Employment by Occupation

This section describes the distribution of employment across nine occupation types used in the TDM, for each airport category (Figure A.2).

- Airports in all categories have a greater share of blue collar occupations than in the state overall. This corresponds to the greater industry representation in primary sector.
- Office labor, including clerical, managerial and sales occupations, is strongly represented at and near non-major airports. This corresponds closely to statewide occupation shares.

Figure A.2 Percent Employment by Occupation for California Airport Categories (2008)



Source: California Statewide Travel Demand Model.

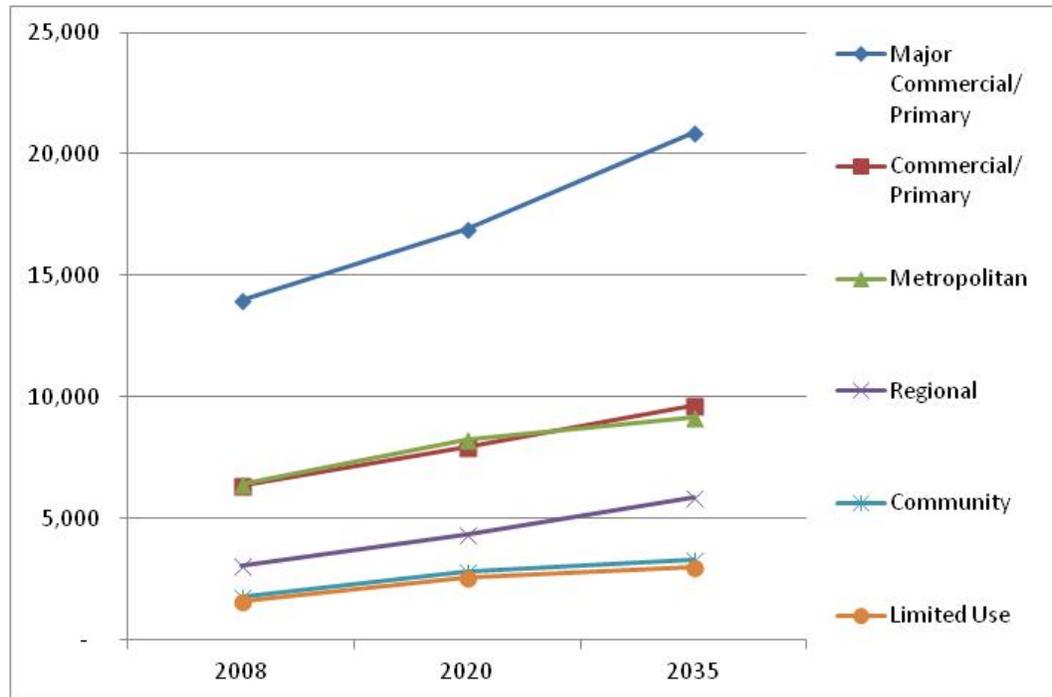
## A.2 FORECASTED DATA RELATED TO ECONOMIC ANALYSIS

### Projected Employment Growth

The statewide transportation demand model includes forecasts of employment based on local and regional planning efforts. The forecasts extend to the year 2040, with intermediate years included. The forecasts for this study go to the year 2035, in order to align with data available from air travel forecasts. The employment forecasts were estimated by the State’s MPOs as part of regional planning activities, which include extensive public outreach and technical modeling. See Figure A.3.

- Employment is expected to grow steadily to 2035 in all airport categories.
- Regional, commercial, and major commercial airports are forecast to experience greater employment growth from 2020 to 2035 than the preceding decade.

Figure A.3 Average Employment per Airport by Industry for California Airport Categories (2008 to 2035)



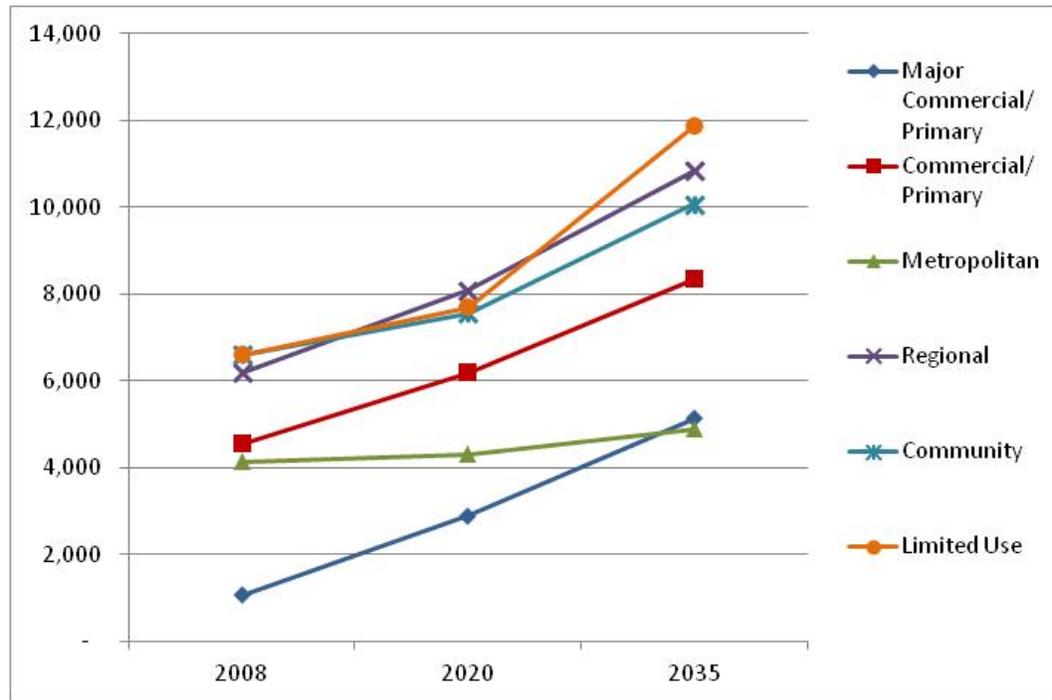
Source: California Statewide Travel Demand Model.

### Projected Population Growth

The state travel demand model also includes population forecasts based on local and regional planning efforts and travel demand modeling. Population is generally greatest near airport types with the least existing development (limited use, community, regional). Population growth at these airports is expected to continue, with the growth rate increasing after 2020. See Figure A.4.

- Commercial airports are expected to experience population growth near the airport at rates similar to areas near smaller airports. Major commercial airports, which had the lowest nearby population in 2008, are expected to have nearby population roughly equal to metropolitan airports by 2035.
- Metropolitan airports will experience flat population growth to the year 2020, then increase growth rate slightly to 2035.

Figure A.4 Average Population per Airport by California Airport Category, 2008 to 2035



Source California Statewide Travel Demand Model.

### Projected Aviation Capacity Demands

Future air travel demand at different airport types is provided by the Federal Aviation Administration (FAA) in the Terminal Area Forecasts<sup>1</sup>. The data include enplanements (boarding), vehicle activity (take off and landing), and number of vehicles stored at the airport. This study focuses on landside activity (e.g. population, employment, zoning) and therefore did not consider aviation demands directly. The Caltrans Division of Aeronautics coordinates with the FAA to develop and integrate travel demand data into statewide planning efforts.

## A.3 INITIAL POPULATION AND EMPLOYMENT PROFILES

Table A.1 provides an overview of population and employment data for areas surrounding selected airports from Caltrans’ five airport categories. The data is

<sup>1</sup> For more information, see the Federal Aviation Administration forecast data available at <https://aspm.faa.gov/main/taf.asp>.

presented based on observed data in 2010, as well as future forecast data from the CSTDM. These airports were selected for representative purposes and may or may not reflect the data used in the case studies prepared for this study.

Study areas for the selected airports were considered to be the travel analysis zones (TAZ) surrounding the airport. TAZs vary in geographic size, based largely on the amount of travel expected in the area. TAZs in less populous areas will typically cover relatively large land areas, while TAZs in urban areas may cover only several blocks. Therefore the airports in urban areas are typically located in zones that encompass only the airport property.

**Table A.1 Overview of Demographic and Socioeconomic Profiles of Representative Airports by Airside Category**

Airport Name	County	City	Employment in Nearest Municipality		Employment in Airport TAZ		Population in Airport TAZ	
			2008	2035	2008	2035	2008	2035
<b>Major Commercial/Primary</b>								
Los Angeles International	Los Angeles	Los Angeles <sup>1</sup>	1,820,092	1,994,134	22,616	15,002	-	35
Sacramento International	Sacramento	Sacramento <sup>2</sup>	966,316	1,327,424	2,213	9,819	3,152	15,367
San Francisco International	San Francisco	San Bruno	-	-	17,103	37,755	-	-
<b>Commercial/Primary</b>								
Fresno Yosemite International	Fresno	Fresno	881	4,418	8,300	9,143	1,363	1,839
McClellan Airfield	San Diego	Carlsbad	1,711	2,333	23,122	26,214	10,245	11,715
Ontario International	San Bernardino	Ontario	109,075	208,240	8,313	25,235	163	151
Redding Municipal	Shasta	Redding	1,703	1,899	1,621	8,861	5,184	8,434
San Diego International	San Diego	San Diego	9,316	20,942	4,740	5,390	50	81
<b>Metropolitan</b>								
Buchanan Field	Contra Costa	Concord	1,588	1,907	16,771	25,501	1,402	1,734
Hayward Executive	Alameda	Hayward	1,017	1,513	6,567	10,024	630	453
Livermore Municipal	Alameda	Livermore	16,771	25,501	5,053	8,715	6,825	8,279
Santa Monica Municipal	Los Angeles	Santa Monica	89,493	101,699	6,387	5,776	580	533
Van Nuys	Los Angeles	Los Angeles <sup>1</sup>	1,820,092	1,994,134	9,683	19,541	935	915

Airport Name	County	City	Employment in Nearest Municipality		Employment in Airport TAZ		Population in Airport TAZ	
			2008	2035	2008	2035	2008	2035
<b>Regional</b>								
Chino	San Bernardino	Chino	2,156	380	410	3,359	1,140	10,636
Hollister Municipal	San Benito	Hollister	1,052	1,315	2,017	6,996	8,601	15,380
Lake Tahoe	El Dorado	South Lake Tahoe	1,247	1,446	2,322	10,035	7,437	2,929
Napa County	Napa	Napa	2,017	6,996	9,123	12,783	89	233
Yuba County	Yuba	Olivehurst	3,023	3,654	1,134	2,280	5,402	7,616
<b>Community</b>								
California City Muni.	Kern	California City	583	2,950	244	814	2,530	3,788
Cameron Air Park	El Dorado	Cameron Park	1,867	1,260	1,049	1,627	5,223	12,065
Castle	Merced	Atwater	2,356	3,223	4,012	6,163	2,626	5,042
Marina Municipal	Monterey	Marina	607	1,780	2,295	4,035	10,773	10,917
University	Yolo	Davis	1,597	851	12,016	13,475	2,355	4,294
<b>Limited Use</b>								
Adin	Modoc	Adin	635	1,351	113	1,190	2,814	4,160
Blue Canyon	Placer	Blue Canyon	113	1,190	3,901	2,348	8,841	18,787
Dinsmore	Humboldt	Dinsmore	635	1,351	4,187	9,951	16,599	4,225
Gravelly Valley	Lake	Lake	113	1,190	635	1,351	6,541	7,043
Harris Ranch	Fresno	Coalinga	3,589	9,557	3,589	9,557	4,137	10,582

Source: 1) SCAG 2008 RTP – 2010 and 2035 Employment Estimates; 2010 is the most approximate year to 2008; and 2) SACOG 2012 MTP/SCS – 2008 and 2035 Employment Estimates for the SACOG region.

## A.4 REPRESENTATIVE AIRPORT TRAFFIC PROFILES

This data is based on reports to the Federal Aviation Administration (FAA) and the California Department of Transportation. Airport data will be supplemented or confirmed through interviews with airport managers. The data includes current year enplanements, air traffic, and air freight. Forecasted enplanements are also included for future years from the FAA (Table A.2).

**Table A.2 Summary of Air Traffic for Preliminary Case Study Airports by Airport Category**

Airport Name	2011 Air Traffic	2011 Freight (U.S. Tons)	Enplanements	
			2011 Actual	2035 Forecast
<b>Major Commercial/Primary</b>				
Los Angeles International	433,452	1,860,540	30,528,737	55,222,199
Sacramento International	125,151	72,028	4,370,895	9,252,370
San Francisco International	427,074	420,220	20,056,568	34,815,661
<b>Commercial/Primary</b>				
Fresno Yosemite International	135,454	11,025	615,320	896,676
McClellan Airfield	137,718	NA	45,518	104,904
Ontario International	90,751	410,120	2,271,458	2,625,537
Redding Municipal	104,674	1,221	38,290	68,493
San Diego International	201,720	130,850	8,465,683	15,460,950
<b>Metropolitan</b>				
Buchanan Field	93,874	NA	15	15
Hayward Executive	86,069	NA	2	2
Livermore Municipal	124,213	NA	2	2
Santa Monica Municipal	165,130	NA	100	100
Van Nuys	504,502	2	1,018	1,018
<b>Regional</b>				
Chino	164,588	NA	13	13
Hollister Municipal	NA	NA	14	14
Lake Tahoe	23,540	NA	32	32
Napa County	53,953	NA	69	69
Yuba County	35,300	NA	6	6
<b>Community</b>				
California City Municipal	37,200	NA	NA	NA

Airport Name	2011 Air Traffic	2011 Freight (U.S. Tons)	Enplanements	
			2011 Actual	2035 Forecast
Cameron Air Park	36,036	NA	NA	NA
Castle	72,153	NA	NA	NA
Marina Municipal	40,000	NA	NA	NA
University	NA	NA	NA	NA
<b>Limited Use</b>				
Adin	1,000	NA	NA	NA
Blue Canyon	100	NA	NA	NA
Dinsmore	23,540	NA	NA	NA
Gravelly Valley	1,200	NA	NA	NA
Harris Ranch	NA	NA	NA	NA

Source: FAA (Air Traffic, Growth forecast), Caltrans (2011 Actual, 2011 Air Freight).

Note: Forecasted 2035 enplanements estimated by applying the growth rate from the Federal Aviation Administration Terminal Area Forecast, years 2011 and 2035.

## B. Characteristics of Smart Growth Potential at Airports

This analysis includes a two-step exercise to determine a set of characteristics for evaluating the potential for smart growth at airports. Two questions were explored.

1. Determine what characteristics make some places more likely to attract smart growth than other places.
  - a. If you were trying to predict where Smart Growth will occur next, what would you look for?
  - b. If you were a developer looking for a location to build a Smart Growth development, what would you look for?
  - c. If you were an agency trying to encourage Smart Growth, where would you do it?
2. Assess whether airports and the land near airports fare better on any of these characteristics than other places.

### B.1 CHARACTERISTICS MAKING PLACES MORE LIKELY TO ATTRACT SMART GROWTH

Interviews were conducted with the following experts:

- Chris Ratekin, Sustainable Mobility Branch, California Department of Transportation;
- Dr. Daniel Chatman, Department of City and Regional Planning, University of California, Berkeley; and
- William Fulton, Smart Growth America

The report summarizes finding from the following reviewed reports:

- California Department of Housing and Community Development (HCD) Transit-Oriented Development (TOD) Housing Program Second Round Criteria;
- California Department of Housing and Community Development (HCD) Infill Infrastructure Grant (IIG) Program Second Round Criteria;
- Smart Scorecard for Development Projects, Congress for New Urbanism, U.S. EPA, January 2002;

- New Jersey Smart Growth Scorecard; and
- Maryland Smart Growth Scorecard, November 2001.

Table B.1 summarizes the characteristics that make a place more likely so attract smart growth.

**Table B.1 Characteristics Making Places More Likely to Attract Smart Growth**

	Characteristic
1	Surrounding population density
2	Surrounding employment density
3	Good supporting transportation infrastructure (auto, transit, bicycle, walking)
4	Permanence of transportation infrastructure
5	Easy to walk around (e.g., block length, continuous sidewalks, lighting, street width)
6	Supportive parking environment
7	Amenities within ½ mile
8	Availability of land for development
9	Suitability of land for development (e.g., not steep slope, floodplain, stream)
10	Proximity to service infrastructure (e.g., water, sewer, fire, police)
11	Lack of resistance to development in surrounding area

Source: Cambridge Systematics, 2013.

The key to smart growth is to generate pedestrians. The first seven characteristics in Table B.1 correlate with generating pedestrians at a given location. A location with high population or employment density nearby is more able to attract pedestrians. Good supporting transportation infrastructure is necessary to get people to and from the location. Permanent transportation infrastructure is more likely to attract development (rail and airports are permanent, buses are not). A location with a good walking network will be attractive to pedestrians.

For most locations in the United States, a supportive parking environment is needed as most people travel by private automobile. This means sufficient parking, but in a way that allows for an attractive walking environment (e.g., parking behind or in structures rather than in large surface lots between building fronts and sidewalks).

A location with amenities nearby is more likely to attract pedestrians. Several amenities are listed in the documents reviewed. They generally fall into the following categories:

- Retail (e.g., grocery store, convenience store, etc.);
- Entertainment (e.g., theater, restaurant, etc.);

- Services (e.g., bank, child care, senior center, dry cleaner, medical, dental, etc.);
- Recreation (e.g., recreation center, health club, etc.);
- Public spaces (e.g., park, playground, etc.); and
- Public services (e.g., school, social service center, library, post office, etc.).

The last four characteristics in Table B.1 address the likelihood developers would be willing to develop in a certain location.

A good proxy for the 11 characteristics listed in Table B.1 is to look for places with high land value. A high land value indicates the desirability of a place for development. The higher the land value, the more attractive it is for higher density development, which is in turn a key component of smart growth.

## B.2 HOW AIRPORT LAND SUPPORTS SMART GROWTH ATTRACTIVE CHARACTERISTICS

How airports fare with respect to the 11 characteristics listed in Table B.1 will vary on an airport-by-airport basis. However, some broad statements can be made:

- **Surrounding population density.** The population density near airports is generally lower than the surrounding region.
- **Surrounding employment density.** Some airports have significant employment activity nearby, other do not. Those that do not could generate it by identifying economic development possibilities based on economic location efficiency (i.e., identify economic activity that is efficient to locate near an airport).
- **Good supporting transportation infrastructure.** Airports generally have good supporting transportation infrastructure. However, it is typically focused on getting people to and from the airport terminal complex itself, and less so on getting people to and from the surrounding land. Thus, some redevelopment of the transportation infrastructure may be needed to attract Smart Growth to land near airports.
- **Permanence of transportation infrastructure.** The airport itself and the roadway network are permanent. However, most airports are served by bus transit, which is not permanent.
- **Easy to walk around.** The environment near airports is generally not conducive to walking. However, it could be made walking conducive by implementing form based codes for future development.
- **Supportive parking environment.** Airports generally have ample parking supply. However, it is typically provided in a manner that precludes an

attractive walking environment. Thus, some redevelopment of the parking infrastructure may be needed to attract Smart Growth to land near airports.

- **Amenities within ½ mile.** There are generally fewer amenities in the vicinity of airports than in the surrounding region.
- **Availability of land for development.** This varies airport-by-airport. The airport terminal itself could be a possibility for development.
- **Suitability of land for development (e.g., not steep slope, floodplain, stream).** The land near airports is generally suitable for development.
- **Proximity to service infrastructure (e.g., water, sewer, fire, police).** Service infrastructure is generally provided at or near airports.
- **Lack of resistance to development in surrounding area.** There is usually less resistance to development near airports than in the surrounding region.

Based on the above general statements, Table B.2 provides a typical rating for airports and the land near airports relative to the 11 characteristics making places attractive for smart growth. Again, these ratings should be adjusted for individual airports.

Of the first seven characteristics (i.e., those related to generating pedestrians at a given location), airport land typically rates better than the surrounding region on two, and worse than the surrounding region on three.

Of the last four characteristics (i.e., those related to the likelihood developers would be willing to develop), airport land typically rates better than the surrounding region on three.

**Table B.2 Typical Ratings for Airport Land on Smart Growth Attractive Characteristics**

	Smart Growth Attractive Characteristics	Typical Rating for Airport Land
1	Surrounding population density	-
2	Surrounding employment density	-
3	Good supporting transportation infrastructure (auto, transit, bicycle, walking)	+
4	Permanence of transportation infrastructure	+
5	Easy to walk around (e.g., block length, continuous sidewalks, lighting, street width)	-
6	Supportive parking environment	-
7	Amenities within ½ mile	-
8	Availability of land for development	-
9	Suitability of land for development (e.g., not steep slope, floodplain, stream)	+
10	Proximity to service infrastructure (e.g., water, sewer, fire, police)	+
11	Lack of resistance to development in surrounding area	+

+ = Better than surrounding region      - = Worse than surrounding region

Source: Cambridge Systematics, 2013.

TBD – breaking down the table into residential versus commercial smart growth attractive characteristics.

## C. Literature Review: Land Use and Industry near Airports

This appendix provides background and summarizes past airport and market access research on the types of uses around airports. This information was used to develop the structured interview guide and to lay the foundation for the economic assessment of the Tier 1 airports.

### C.1 INDUSTRIES THAT TYPICALLY CLUSTER NEAR AIRPORTS

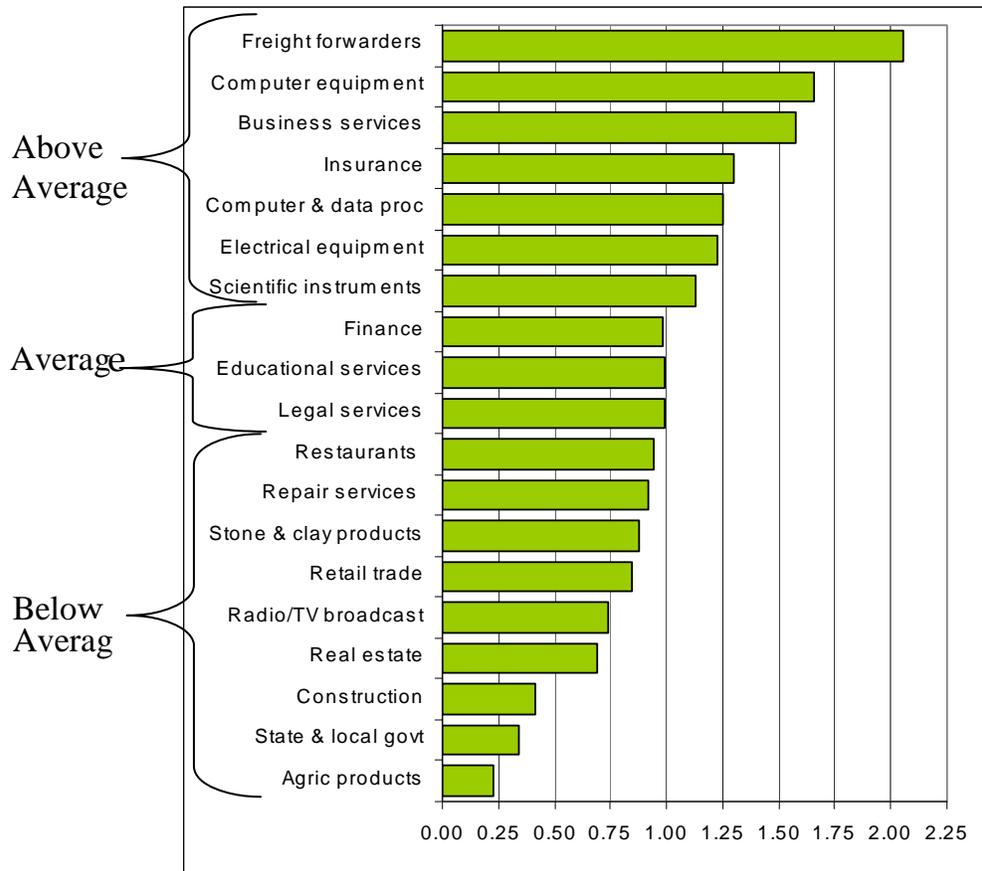
The following types of industries tend to rely most heavily on air transportation, and therefore may cluster near airports.

Technology based manufacturing and services, including sectors such as business and professional services, manufacture of electronic equipment, and instruments. These industries rely on air services much more than other sectors, for both passenger and cargo travel needs, for the following reasons:

- The products produced tend to be delicate and time-sensitive, so that they need to be shipped by air. Typically, these are technology-related products where value reflects high labor costs and precision manufacturing, but may also be perishable agricultural products (including fish and meat, live or processed).
- Products that are heavy to ship, but that carry a large return on transportation costs invested, including just-in-time manufacturing and equipment needed to maintain high yielding production.
- Business and professional services depend on sales of professional expertise, which often require travel to meet with clients and make presentations.
- Companies have statewide, western, national and even global business networks, requiring frequent and often international travel between the various offices.

• Tourism. GA and commercial airports serve resorts and tourist destinations. Producers of high-tech products, business services and computer-oriented firms are among the industries that spend the most money on air services. Most of these industries spend at least 25 percent more on air services than the average industry in the United States, and a few spend 50 percent or more than the average of all industries in the United States. This is shown in national statistics on industry reliance on air travel shown on Figure C.1.

Figure C.1 Industry Reliance on Air Travel



Source: U.S. Dept. of Commerce and Bureau of Transportation Statistics, 2000: Transportation Satellite Accounts, 1996.

Note: Values reflect the relative reliance on air travel among individual industries, represented as a proportion of the national average (which is air travel costs representing 3.6 percent of total industry revenue).

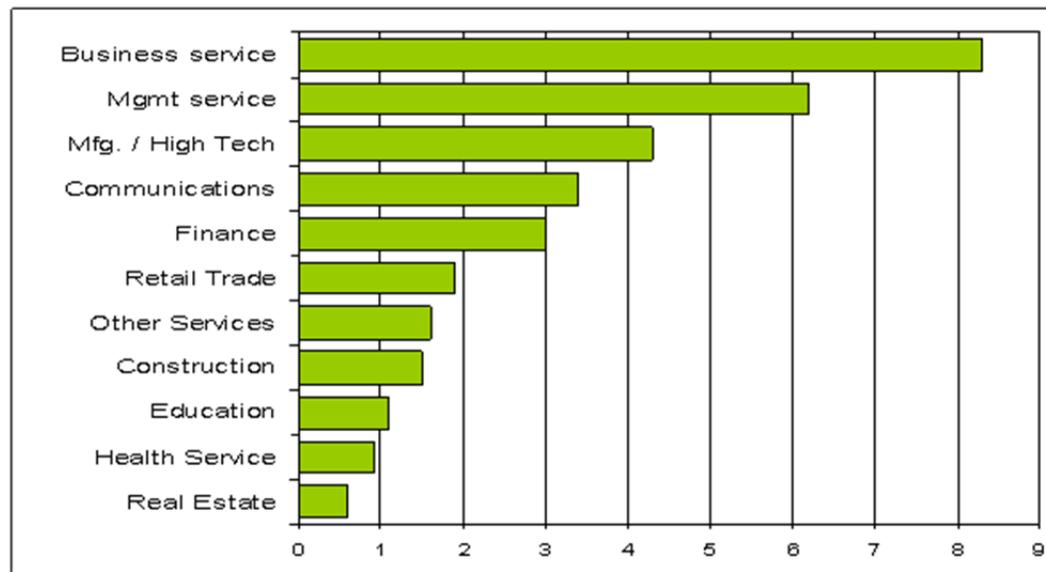
Reliance on air cargo transport is due to the unique characteristics of products:

- Long average shipping distances of cargo in these industries,
- High average value per ton of the goods produced within these sectors,
- High export ratios and long export distances demanded by these sectors, and
- Nature of the demands of product delivery.

Surveys show that rates of airline passenger travel vary widely among businesses, with the greatest amount of employee air travel occurring in the business and management services, local manufacturing sectors and finance, Figure C.2. Many New England businesses in high-growth industries are part of global business networks, requiring frequent and often international travel between the various offices, as illustrated in the text boxes on the following page.

Boston annually hosts 2.8 million delegates to business conventions, representing 21% of all visitors to the City. Over 70% of delegates to business conventions in the City arrive by air, compared to 31% for other (private business, leisure and personal) visits. (Sources: Greater Boston Convention and Visitors Bureau and Massachusetts Office of Travel and Tourism.) Major investments in hotels, convention facilities, and new or expanded businesses are likely to further increase demand for passenger and cargo services at Logan.

Figure C.2 Rates of Employee Air Travel



Source: Massport, Business Survey, 1998.

Note: Values reflect average annual air passenger trips.

The most recent Transportation Satellite Account (2011) provides data not more recent than 1997. Exhibit 3 below shows the propensity by sector to purchase air services (air services for hire or to use private aircraft (in house)).

**Table C.1 Division of Air services by purchase and self-Supplied by Percent of Total Outlay (in Producers Prices)**

Industry	Air Services for Hire	Air Services In-House
Construction	96%	4%
Manufacturing Products	95%	5%
Trade	90%	10%
Utilities	68%	32%
Information	70%	30%
Financial Services	70%	30%
Professional and Business Services	84%	16%
Education and Health Services	70%	30%
Leisure and Hospitality	72%	28%
Other Services	70%	30%

Source: Transportation Satellite Accounts: A Look at Transportation's Role in the Economy, 2011. Data are 1997.

## C.2 ILLUSTRATIONS OF INDUSTRY RELIANCE ON AVIATION

Below are excerpts of interviews and observations from past studies conducted by EDR Group. Note that all airports have logistics components that serve passengers and shippers. These components, including car rental, taxi cab and other passenger transport services; trucking, freight forwarding and other air cargo related supports are service industries that will grow if the demands for these services exist. Therefore, they are not considered in the list below.

### Cargo and Cargo/Business Travel

**Perishables.** A 1997 study of the seafood industry showed that firms throughout eastern Massachusetts are increasing their use of airfreight with increases in demand for fresh seafood both domestically and internationally. Representatives of seafood processing and distribution companies located in Boston said that, despite the fact that more fresh fish is docked and sold in places like Portland, ME and New Bedford, they do not want to leave the city because they are unwilling to lose their easy access to Logan Airport. Typically, freshly caught fish are flown to Boston, cut into steaks or fillets by Boston seafood processors and the flown to the Midwest, so diners at “white table cloth restaurants” can enjoy fresh ocean seafood dinners.

**High-tech Products.** EMC (data storage products) Most of EMC's product is shipped via air cargo to customers worldwide. Even domestic deliveries tend to rely on air transport, as shipments are often time-critical. EMC receives many air

cargo shipments from suppliers that are also time critical. The incoming volume of shipments has increased proportional to EMC's business growth. Also, numerous business trips involving air flights are made daily by employees of EMC operations worldwide.

**Heavy Equipment.** Air travel is critical for both business travel and cargo at a midsized establishment specializing in manufacture and sales of naval and oil exploration equipment. The time factor for these sales is much more important than the actual shipping costs, and the mode of shipment depends upon the customer's needs. The weight of products being shipped is often irrelevant if compared to the costs incurred by oil rigs not being operational while replacement equipment is needed. The industry market has become more global and diversified over the past ten years, resulting in increases in air travel, which is particularly important for sales to the oil industry. Employees at this mid-sized company make approximately 2,000 trips a year, including international flights to the UK, France, Australia, Japan, Korea, Indonesia, Malaysia and Taiwan.

**Just-in-Time for Traditional Manufacturing.** Although airport traffic of a GA Airport in Wisconsin is primarily composed of general aviation operations, the demand for air cargo operations has grown rapidly in recent years. Most of the airport's activity growth can be traced to an increase in "on-demand" services by local automobile assembly and components plants. Such services are vital to automotive plants, where introduction of just-in-time logistics and production methods has increased the importance of uninterrupted materials deliveries. (Other local companies with perishable products, including a cheese manufacturer and a juice company, also use the airport for rapid transport needs.)

**Medical Devices.** Smith-Nephew is a producer of medical devices. Aviation is critical for business travel, hosting visitors, and cargo shipments. Deliveries rely on air transportation. Products are sterile surgical instruments that are delivered to hospital operating theaters worldwide on-demand, and are exceptionally time-sensitive. Forty percent of products are shipped internationally, with major markets in Western Europe, Australia, Japan and South Africa.

## **Business Travel**

**For Profit.** The Global Education Division of IBM sends four to five thousand employees on 6,500 to 8,500 business trips per year, with destinations including San Francisco and various points in Europe and Asia. Regional airports are increasingly used for flights to metro New York, Washington, D.C. and other short-haul destinations.

**Non-Profit.** MITRE is a Federally funded research and development center that performs engineering, systems research, and strategic management for the Departments of Defense, Aviation, Treasury, and other agencies. MITRE has 60 sites globally, with 7 in Europe, 5 in Asia, and 2,500 employees at its Bedford,

MA site. Employees make frequent business trips between sites and rely on Logan for approximately 95% of their air travel. Air travel has increased in the past 10 years as the company has grown and its customer base has expanded and diversified.

### Tourism

**High-end Leisure Travel.** Resorts, depend on GA airports for bringing in high paying customers. A recent study in South Dakota estimated that air travelers to the state spend almost \$51 million annually in staying at hunting resorts. One resort reported that the average visitor arriving through a nearby GA airport spends \$3,300 a day. Similar rates of spending are reported by resorts in Colorado that service skiers that arrive by private jet.

## C.3 AIRPORT BUSINESS AND LAND USE ACTIVITY

This section describes land use and business activities on or proximate to airports and classifies the relationships of those activities to the airport. For the purposes of this discussion, the relationships between airports and “on-airport” or airport-proximate land uses fall into one of three categories:

- **Aviation/airport dependent.** This group includes business activities that operate at an airport or provide services directly to businesses and passengers who use the airport. Examples include charter aircraft services as well as maintenance and flight instruction providers.
- **Aviation/airport reliant.** This group includes businesses or activities that have a higher than average use of air service for freight or business travel, which may motivate location close to airports.
- **Non-aviation/airport reliant:** This group includes businesses or activities that are *not* dependent or reliant on air service for production, shipping, or other business activities. Other factors motivate the location of these businesses on or near airports; these may include real estate costs, proximity to other transportation facilities, or zoning issues related to environmental impacts (e.g., noise).

Various research efforts inform our understanding of the relationships between airports and surrounding land uses. The Bureau of Transportation Statistics Transportation Satellite accounts have identified freight forwarding, computer equipment, business services, computer and data processing, electrical equipment and scientific instrument industries as those with a higher than average reliance on air travel.<sup>2</sup> Similarly, through examining the role of the scale

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<sup>2</sup> U.S. Dept. of Commerce and Bureau of Transportation Statistics, 2000: Transportation Satellite Accounts, 1996.

of aircraft operations and access to the airport (e.g., drive time) on county-level industry composition (e.g., employment *per-capita*) for the U.S., EDRG has found that light manufacturing industries that rely on exporting and importing air cargo, and service industries (such as media, technical or scientific, or administrative services) that rely on employee business travel are among the business sectors that value air transportation.<sup>3</sup> The value these businesses assign to air service may motivate them to locate operations close to airports when possible. This concept is supported by an analysis by Appold and Kasarda (2006), which studied the role of the 25 busiest U.S. airports<sup>4</sup> as urban anchors using an examination of employment composition and dynamics using broad NAICS categorizations from Zip Business Pattern data for 1995 and 2002) identifies that *Manufacturing, Wholesale trade, and Transportation and Warehousing* activities are 1 to 3 times more concentrated within an airport radius (measured in 2.5-, 5-, and 10-mile increments) than within the same radius to the central business the airport serves.<sup>5</sup>

Businesses may have varying types of aviation needs within these aviation-reliant industries, however. For example, some must locate adjacent or in very close proximity to an airport or major transportation artery (such as freight transportation businesses and hotels and lodging), while others simply need convenient and reliable access to an airport, and are more flexible in location decisions.<sup>6</sup> For businesses that are less reliant on air service for their activities (such as broadcasting, construction, agriculture, and stone and clay products industries), their links to the airport are even less clear.<sup>7</sup>

It is also worth noting that despite general patterns in industry aviation dependence or reliance (motivating business location), both the physical spread of business location around an airport (from an immediate district to an “airport region”) and the mix of business activities found will vary widely from one airport facility to another.<sup>8</sup> Factors shaping this variation include land availability, parcel assembly, land ownership, property taxes, land-side access, abutting land uses, airport size or classification (i.e., general aviation versus

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<sup>3</sup> Alstadt and Weisbrod, *The Relationship of Transportation Access and Connectivity to Local Economic Outcomes: A Statistical Analysis*, Transportation Research Board, Annual Conference January 2012. Also see Appendix 1 – Market Access Memo.

<sup>4</sup> All are large or medium commercial hubs and are not the focus of this project. This research is mentioned to note the principle of locating near an airport due to the value assigned to air service.

<sup>5</sup> See Appendix 1: Market Access Memo.

<sup>6</sup> See Appendix 2: TF Green Research Memo.

<sup>7</sup> See “Initial Thoughts of Industries that are Attracted to Airports,” September 19, 2012.

<sup>8</sup> See Appendix 1: Market Access Memo.

regional), among others.<sup>9</sup> The dynamic that determines this mix and physical spread may range from the organic to the highly facilitated (i.e., planning policies were leveraged to market and attract synergistic land uses), and the pace of airport and other land use “co-location” can be difficult to predict.

Table C.2 below categorizes examples of different land use activities identified through this survey according to adjacent airport type and according to the “aviation/airport dependent,” aviation/airport reliant,” and “non-aviation/airport reliant” categories mentioned above. The inclusion of industries or activities in a given category is based on EDRG’s experience researching patterns of aviation dependence.

**Table C.2 Examples of Airport-Proximate Industries/Activities (by Airport Type and Relationship)**

	Industries/Activities Located in Proximity to Airports		
	Dependent	Reliant	Not Dependent or Reliant
General Aviation	<ul style="list-style-type: none"> <li>• Air charter services</li> <li>• Repair and maintenance services</li> <li>• Flight instruction companies</li> <li>• Fixed based operators</li> <li>• Hangar sales and leasing centers</li> <li>• Aerospace manufacturing</li> <li>• Car rentals</li> <li>• Taxi service</li> <li>• Restaurants</li> <li>• Mail/cargo freight forwarders (e.g., FedEx)</li> </ul>	<ul style="list-style-type: none"> <li>• Investment firms</li> <li>• Printer manufacturing</li> <li>• Phone/Internet service providers</li> <li>• Engineering consultants</li> <li>• Pharmaceutical companies</li> <li>• Business administration</li> <li>• Corporate headquarters</li> </ul>	<ul style="list-style-type: none"> <li>• Agricultural operations</li> <li>• Construction companies</li> <li>• Brewing companies</li> <li>• Plastics manufacturing</li> <li>• Construction products manufacturing</li> <li>• Automotive racing schools</li> <li>• Fertilizer manufacturing</li> <li>• Tanning</li> <li>• Rubber mill</li> <li>• Fiber container production</li> </ul>
Reliever	<ul style="list-style-type: none"> <li>• Air charter services</li> <li>• Aircraft component suppliers fueling services</li> <li>• Repair, maintenance, and restoration services</li> <li>• Flight instruction companies</li> <li>• Fixed based operators</li> <li>• Hangar sales and leasing centers</li> <li>• Aviation museums</li> </ul>	<ul style="list-style-type: none"> <li>• High-tech industries</li> <li>• Financial, accounting and engineering services</li> <li>• Real estate services</li> <li>• Electronics manufacturing</li> <li>• Silicone/polymer manufacturing</li> <li>• Corporate offices</li> <li>• Phone/Internet service providers</li> </ul>	<ul style="list-style-type: none"> <li>• Agricultural operations</li> <li>• Packaging manufacturing</li> <li>• Processed food manufacturing</li> <li>• Sports complexes</li> <li>• Public school warehouse and food service facilities</li> <li>• Solar arrays</li> <li>• Golf courses</li> </ul>

<sup>9</sup> Ibid.

Industries/Activities Located in Proximity to Airports			
	Dependent	Reliant	Not Dependent or Reliant
	<ul style="list-style-type: none"> <li>• Aerospace manufacturing</li> <li>• Car rentals</li> <li>• Taxi service</li> <li>• Restaurants</li> <li>• Mail/cargo freight forwarders (e.g., FedEx)</li> </ul>		
Small/ Medium Commercial	<ul style="list-style-type: none"> <li>• Passenger transportation (scheduled and non-scheduled)</li> <li>• Hotels and motels</li> <li>• Couriers</li> <li>• Restaurants</li> <li>• Taxi service</li> <li>• Food service</li> <li>• Retail and restaurants,</li> <li>• Other ground transportation to/from airport</li> <li>• Fuel vendors</li> <li>• Airport support activities</li> <li>• Hangar rental</li> <li>• Flight training</li> <li>• Parking lots and garages</li> <li>• Mail/cargo freight forwarders (e.g., FedEx)</li> </ul>	<ul style="list-style-type: none"> <li>• Merchant wholesalers</li> <li>• Ambulatory health care services,</li> <li>• Machinery manufacturing and maintenance</li> <li>• Electronics repair and maintenance</li> <li>• Electrical equipment and appliance manufacturing</li> <li>• Truck transportation</li> <li>• Computer and electronic product manufacturing</li> <li>• Telecommunications</li> <li>• Publishing industries (except Internet)</li> <li>• Internet service providers</li> <li>• Data processing</li> </ul>	

Source: EDR Group, 2012.

The summary presented in Table C.2 suggests a number of possible land development trends for the areas around general aviation airports.

- Areas adjacent to airports may provide manufacturing facilities with opportunities to expand that may not be available in denser or more developed parts of the community (see the Smyrna/Rutherford County Airport and Corvallis Municipal Airports examples). It is possible that office operations may have similar concerns.
- Airport-area sites are likely attractive for activities that require a lot of space but not necessarily built development. Examples include the solar array at the Smyrna/Rutherford Regional Airport, the farm incubator at the Port of

Skagit, and the raceway and driving schools at the Sebring Regional Airport and Commerce Park.

- While the mix of land uses around a given airport depends on a wide variety of factors – including individual business needs, the characteristics of the airport, and the availability of property elsewhere – facilitation on the part of economic development authorities and others plays an important role in shaping this mix.
- The desire to avoid environmental impact conflicts, specifically related to noise, is likely a significant motivator for non-aviation businesses locating near airports. That said, the combination of manufacturing, sports, and human service activities at the Chesterfield County Airport Industrial Park suggest that potential environmental conflicts among widely different uses can be managed.

As we move forward, we should consider the following factors when interviewing airport operators and tenants of airport or adjacent business/industrial parks, and local economic developers:

- Expansion potential that is considered when making siting decisions. Airport or business park tenants (particularly those in manufacturing) may consider future opportunities to expand as one of their key criteria. Because of this, they may evaluate whether a particular airport and/or related industrial park may provide these opportunities (air service availability aside).
- Complementary factors that create viable economic development climate, including: 1) adjacent transportation facilities, 2) available/access to cost effective infrastructure, including water, sewer, electricity and broadband, 3) real estate prices in comparison with “traditional” local development sites, 4) airport or airport business park business attraction efforts (including tax credits or other financing), 5) open space and supportive zoning, and 6) opportunities to avoid land use conflicts (noise, air quality) when they make business siting decisions on or near airports.

Changes of land use over time, and if development is being attracted to parcels proximate to airports or is leaving airport areas, and if there are discernible reasons for either trend

## **C.4 MARKET ACCESS: LIST OF CANDIDATE INDUSTRY ACTIVITIES TO LOCATE ON OR NEAR AIRPORT FACILITIES**

Opportunities will range from businesses that are typically found *within/around the airport perimeter* depending on land available each side of the fence [supporting passenger/cargo aircraft needs, entities with complimentary needs e.g., Air National Guard, Aerial Spraying-Photographic Services, Aviation-

development activities], to other forms of business location driven by (or not deterred by) proximity to the air services offered (passenger and/or cargo, frequency and scale of operations), such as HQ offices, hotels, restaurants, ground transportation providers (including car rental agencies), and industrial activities that ship/receive goods by air.

The physical spread of business location around an airport (from an immediate district to an “airport region”), as well as the mix of business activities found, will be highly variable from one facility to another (even if the two facilities carry the same State airport functional classification designation) as a result of land availability (determined by topography, extent of pre-existing development, zoning), parcel assembly, land ownership, property taxes, landside access, abutting land uses, producer amenities of the location. The portion of business location within an airport district that is the result of nearby air transportation services will clearly look different within a community airport setting in contrast to a regional airport setting.

The process by which the in-fill around an airport has occurred to date may reflect a dynamic between *entirely organic* (the area and region was endowed with attractive cost and quality assets needed for conducting business) with no zoning conflicts, and a process that is heavily facilitated by leveraging planning policies (at minimum to protect the operating envelop of aircraft) to market and attract synergistic tenant uses to airport-adjacent land.

The pace of co-location can be hard to predict. There are cases where an airport authority has prepared for business park absorption only to wait years before a new link inserted into the road network completes the “corridor functionality” that a new business entrant requires for an improved base of business operations. Likewise, some airport district plans start to come to fruition only after excess (superior grade) commercial/industrial real estate supplies have been exhausted elsewhere in the city/metro-area.

EDR Group has examined the role of *the scale of aircraft operations and access to the airport*, drive time, (# of Annual operations ÷ access time) on county-level industry composition (e.g., employment *per-capita*) for the U.S. In general, business sectors that are known to value air transportation include light manufacturing industries that rely on exporting and importing air cargo, and service industries that rely on employee business travel. The Table C.3<sup>10</sup> showing instances of significant relationship indicates different business activities place different importance on being close to the scale of air services they require (whether for business travel or air-cargo flows). This identification

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<sup>10</sup>Alstadt and Weisbrod, The Relationship of Transportation Access and Connectivity to Local Economic Outcomes: A Statistical Analysis, Transportation Research Board, Annual Conference January 2012.

is not meant to capture key suppliers to the functioning of an airport and fleet of aircraft (*aviation support*).

**Table C.3 Industry Sensitivities to Airport Access-”Quality” ranked on Domestic Airport Sensitivity**

NAICS	Sector Description	Sensitivity to Access Measure Scale -0 to 10
511	Publishing Industries (except Internet)	10
541-551	Professional Scientific, Technical, Services	10
561	Administrative & Support Services	10
711-713	Amusement & Recreation	10
512	Motion Picture & Sound Recording	9
230	Construction	7
323	Printing & Related Support Activities	7
531	Real Estate	7
721-722	Accommodations, Eating & Drinking	7
811-812	Repair, Maintenance, & Personal Services	7
813	Religious, Civic, Professional, Organizations	7
920	Government & non NAICS	7
339	Miscellaneous Manufacturing	5
513	Broadcasting	5
514	Internet & data process services	5
524	Insurance Carriers & Related Activities	5
525	Funds, Trusts, & Other Financial Vehicles	5
532	Rental & Leasing Services	5
533	Lessors of Nonfinancial Intangible Assets	5
212-213	Mining & Support Activities	4
325	Chemical Manufacturing	4
331	Primary Metal Manufacturing	4
221	Utilities	3
335	Electric Equipment, Appliances, etc.	3
336	Transportation Equipment	3
337	Furniture & Related Products	3
420	Wholesale Trade	3
441-454	Retail Trade	3
481-487	Transportation	3

NAICS	Sector Description	Sensitivity to Access Measure Scale -0 to 10
521-523	Monetary, Financial, & Credit Activity	3
562	Waste Management & Remediation	3
611	Educational Services	3
113	Forestry & Logging	2
313	Textile Mills	2
316	Leather & Allied Products	2
327	Nonmetallic Mineral Products	2
332	Fabricated Metal Products	2
333	Machinery Manufacturing	2
334	Computer & Electronic Products	2
491-493	Mail, package delivery & warehousing	2
111	Crop Production	0
112	Animal Production	0
114	Fishing, Hunting & Trapping	0
115	Support for Agriculture & Forestry	0
211	Oil & Gas Extraction	0
311	Food Products	0
312	Beverage & Tobacco Products	0
314	Textile Product Mills	0
315	Apparel Manufacturing	0
321	Wood Products	0
322	Paper Manufacturing	0
324	Petroleum & Coal Products	0
326	Plastics & Rubber Products	0
621-624	Health Care & Social Services	0

Source: EDR Group, 2012.

An analysis by Appold and Kasarda (2006) of airports as urban anchors for the 25 busiest U.S. airports (an examination of employment composition and dynamics using broad NAICS categorizations from Zip Business Pattern data for 1995 and 2002), identifies that *Manufacturing, Wholesale trade, and Transportation & Warehousing* activities are 1-to-3-times more concentrated within an airport radius (2.5, 5, and 10-miles) than within the same radius to the central business the airport serves. While this is of interest, it does not conclusively explain the diverse factors (zoning, land availability, traffic conflicts) that may also be at

work in the location decisions of a manufacturer, a distributor, or a transportation logistics firm.

Case studies would be the best approach for trying to “predict” the spatial lure of airport districts to other business types that profess no real need for airport services.

## C.5 NATIONAL AIRPORT LAND USE CASE STUDIES

The case studies described below include both airports that have been reviewed as part of larger economic impact studies and airports that have been identified through a recent Internet search on land and business activities on or proximate to general aviation airports. These case studies include (when available) information about 1) on-airport and airport area businesses, industries, or activities, 2) the size, tenants, and activities of airport-related or airport-proximate business or industrial parks, and 3) anecdotal information pertaining to business attraction and siting.

### **Mesa Falcon Field Airport (Mesa, Arizona)**

The City of Mesa’s Falcon Field general aviation airport has been identified as the 5<sup>th</sup> busiest general aviation airport in the U.S. in 2011, and Falcon Field’s 105 on-airport businesses employ over 1,000 people.<sup>11</sup> Businesses that depend on Falcon Fields aviation activities traffic include air charter services, aircraft component suppliers, fueling services, repair, maintenance, and restoration services, flight instruction companies, fixed based operators, hangar sales and leasing centers, and a Commemorative Air Force museum, among others.<sup>12</sup> Non aviation dependent airport tenants include several financial, accounting, and real-estate businesses, a software company, an Internet service provider, and an optometry/ophthalmology services center, along with several firms offering office space for lease.<sup>13</sup> The surrounding Falcon Field off-airport employment, which is made up of a series of more than 10 industrial parks, employs over 13,000. Tenants include companies in the aerospace/aviation, high-tech, manufacturing and software industries, with Boeing’s Apache Helicopter facility serving as the largest employer.<sup>14</sup> The Falcon Field area is promoted by the non-profit Falcon Field Area Alliance, which has described itself as seeking to attract

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<sup>11</sup>City of Mesa, Arizona. “Falcon Field Employment Center.” 2012.  
<http://www.mesaaz.gov/economic/FalconField.aspx>. (Accessed October 24, 2012).

<sup>12</sup>City of Mesa, Arizona. “Falcon Field Business Listings.” 2012.  
<http://apps.mesaaz.gov/falconfield/tenants.aspx>. (Accessed October 24, 2012).

<sup>13</sup>Ibid.

<sup>14</sup>City of Mesa, Arizona. “Falcon Field Employment Center.” 2012.  
<http://www.mesaaz.gov/economic/FalconField.aspx> (Accessed October 24, 2012).

regional headquarters and financial services businesses to the area in addition to aerospace and aviation-related firms, suggesting a more structured, intentional approach to creating the land use mix surrounding the airport.<sup>15</sup>

### **Skagit Regional Airport (Burlington, Washington)**

The Skagit Regional Airport, a general aviation airport, is part of the Port of Skagit, which is described as an economic development engine for Skagit County in northwest Washington. The Port includes the La Conner Marina and the Bayview Business Park along with the airport, and identifies its goal as to “attract manufacturers in different sectors, such as aerospace, agriculture processing and clean tech to complement existing tenants.”<sup>16,17</sup> In addition to typical airport tenants such as fixed base operators, restaurants, hangar leasing companies, and repair and maintenance providers, on-airport non-aviation related tenants at Skagit Regional Airport include several construction companies.<sup>18</sup> The Port reports that as of spring 2012, the airport, business park, and marina house “76 businesses that employ nearly 1,000 people.”<sup>19</sup> Slightly more than half of the businesses in the overall Port are part of the aerospace industry, with the largest tenant being aerospace manufacturer Hexcel Corp.<sup>20</sup> Non-aviation-related tenants specific to the business park include Comcast, Seawolf Marine Manufacturing, Olympic Pipeline, Skagit Valley Malting and Brewing, U.S. Mower (industrial, forestry, and roadside mowing equipment), Fiberglass

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<sup>15</sup>Mike Sunnucks, “New Falcon Field Group Promoting Area Development,” *Phoenix Business Journal*, August 29, 2004.  
<http://www.bizjournals.com/phoenix/stories/2004/08/30/story6.html> (Accessed October 24, 2011).

<sup>16</sup>Port of Skagit. “About the Port.” 2012. <http://www.portofskagit.com/about-the-port>. (Accessed October 24, 2012).

<sup>17</sup>Marc Stiles. “Real Estate Buzz: Industrial Market Blooms in Skagit County.” April 26, 2012, Seattle Daily Journal of Commerce.  
[http://www.portofskagit.com/images/uploads/djc\\_real\\_estate\\_buzz\\_clip.pdf](http://www.portofskagit.com/images/uploads/djc_real_estate_buzz_clip.pdf). (Accessed October 24, 2012).

<sup>18</sup>Port of Skagit. “Airport Tenants” 2012. <http://www.portofskagit.com/skagit-regional-airport/tenants/>. (Accessed October 24, 2012.)

<sup>19</sup>Marc Stiles. “Real Estate Buzz: Industrial Market Blooms in Skagit County.” April 26, 2012, Seattle Daily Journal of Commerce.  
[http://www.portofskagit.com/images/uploads/djc\\_real\\_estate\\_buzz\\_clip.pdf](http://www.portofskagit.com/images/uploads/djc_real_estate_buzz_clip.pdf). (Accessed October 24, 2012).

<sup>20</sup>Ibid.

Supply (reinforced plastics manufacturing), along with a vegetable seeds company and a farms incubator program, among others.<sup>21</sup>

### **Chesterfield County Airport (North Chesterfield, Virginia)**

The Chesterfield County Airport, a reliever airport for the Richmond International Airport, adjoins the Chesterfield Airport Industrial Park, a 265-acre industrial park for light industry and manufacturing that is home to more than 100 businesses.<sup>22,23</sup> Airport dependent businesses include fixed-based operators, onsite flight training companies, charter services, repair services, and restaurants.<sup>24,25</sup> Materials, machine and electronics manufacturing comprise a number of the businesses in the industrial park, although packaging and processed food facilities are also represented (for example, as of 2008, Maruchan Virginia, Inc, a ramen and instant-soup manufacturer, was the largest tenant, and moved to expand its existing facilities in 2009).<sup>26,27,28</sup> Neighbors to these operations include a wide variety of activities, ranging from sports and dance complexes to technical and engineering services firms to the Chesterfield County Schools food and warehousing operations to Church of Latter Day Saints

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<sup>21</sup>Port of Skagit. "Current Tenants [Bayview Business Park.]" 2012/  
<http://www.portofskagit.com/bayview-business-park/current-tenants>. (Accessed October 24, 2012.)

<sup>22</sup>Chesterfield County Airport. "Chesterfield County Airport – Richmond, Virginia." 2012. <http://flychesterfield.com/> (Accessed October 24, 2012.)

<sup>23</sup>Chesterfield Economic Development. "Commercial Property Online Search." 2012. <http://www.chesterfieldbusiness.com/page.asp?id=5> (Accessed October 24, 2012.)

<sup>24</sup>Chesterfield County Airport. "Chesterfield County Airport – Richmond, Virginia." 2012. <http://flychesterfield.com/> (Accessed October 24, 2012.)

<sup>25</sup>Chesterfield County, VA. "Chesterfield County Airport." 2010. <http://www.chesterfield.gov/airport/> (Accessed October 24, 2012.)

<sup>26</sup>"Chesterfield Airport Industrial Park: Businesses Located in the Chesterfield Airport Industrial Park." August 25, 2010. <https://maps.google.com/maps/ms?ie=UTF8&hl=en&cid=6921540860998839120&hq=&hnear=&msa=0&msid=113081965295176481565.0004830863ae705daf592&ll=37.402523,-77.525899&spsn=0.012516,0.015396&t=h&source=embed/> (Accessed October 24, 2012.)

<sup>27</sup>Wesley P. Hester. "Industrial Park Expansion: The County Wants to Open Land For Development Around Airport." March 2, 2008. *Richmond Times-Dispatch-Va*. [http://www.redorbit.com/news/business/1277537/industrial\\_park\\_expansion\\_the\\_county\\_wants\\_to\\_open\\_land\\_for/](http://www.redorbit.com/news/business/1277537/industrial_park_expansion_the_county_wants_to_open_land_for/)(Accessed October 24, 2012.)

<sup>28</sup>Chesterfield Economic Development. "2009 Investment Announcements." [http://www.chesterfieldbusiness.com/page.asp?id=239&t=2009\\_Investment\\_Announcements](http://www.chesterfieldbusiness.com/page.asp?id=239&t=2009_Investment_Announcements). (Accessed October 24, 2012.)

recovery and animal welfare facilities.<sup>29</sup> The president of one tenant, Quantum Silicones, Inc, (a silicone and polymer manufacturing business,) indicated that he found the area's "location and potential" attractive when making siting decisions, and uses the nearby air service to connect with clients.<sup>30</sup>

### **Smyrna/Rutherford County Airport (Smyrna, Tennessee)**

The Smyrna/Rutherford County Airport is a reliever airport for the Nashville Area. <sup>31</sup> Airport dependent companies include several fixed base operators and fueling services.<sup>32</sup> The airport is adjacent to the 400 acre Smyrna Airport Business Park, a master planned development that offers aviation sites with direct airfield access, corporate headquarter locations, commercial, and industrial sites.<sup>33</sup> Both Nissan and Thompson Machinery (heavy construction equipment) rent office space on this site.<sup>34</sup> The Smyrna Municipal Golf Course lies on the south side of the airport.

The Nashville Business Journal has reported that as of 2012, the business park is home to more than two dozen businesses but has lacked a corporate powerhouse.<sup>35</sup> As part of an effort on the part of the Smyrna/Rutherford County airport authority to secure new tenants and "color the types of firms that set up

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<sup>29</sup>"Chesterfield Airport Industrial Park: Businesses Located in the Chesterfield Airport Industrial Park." August 25, 2010.  
<https://maps.google.com/maps/ms?ie=UTF8&hl=en&cid=6921540860998839120&hq=&hnear=&msa=0&msid=113081965295176481565.0004830863ae705daf592&ll=37.402523,-77.525899&spn=0.012516,0.015396&t=h&source=embed/> (Accessed October 24, 2012.)

<sup>30</sup>Wesley P. Hester. "Industrial Park Expansion: The County Wants to Open Land For Development Around Airport." March 2, 2008. *Richmond Times-Dispatch-Va*.  
"[http://www.redorbit.com/news/business/1277537/industrial\\_park\\_expansion\\_the\\_county\\_wants\\_to\\_open\\_land\\_for/](http://www.redorbit.com/news/business/1277537/industrial_park_expansion_the_county_wants_to_open_land_for/)(Accessed October 24, 2012.)

<sup>31</sup>Smyrna/Rutherford County Airport. "About Us."  
[http://www.smyrnaairport.com/about\\_us](http://www.smyrnaairport.com/about_us) (Accessed October 24, 2012).

<sup>32</sup>Smyrna/Rutherford County Airport. "Pilot Info."  
[http://www.smyrnaairport.com/pilot\\_info](http://www.smyrnaairport.com/pilot_info) (Accessed October 24, 2012).

<sup>33</sup>Smyrna/Rutherford County Airport. "Business Site Opportunities."  
[http://www.smyrnaairport.com/business\\_sites](http://www.smyrnaairport.com/business_sites) (Accessed October 24, 2012).

<sup>34</sup>Kevin Litwin. "Smyrna Airport is Tennessee's Busiest for General Aviation." April 19, 2012. *BusinessClimate.com* <http://businessclimate.com/murfreesboro-smyrna-la-vergne-tn-economic-development/smyrna-airport-tennessees-busiest-general-avia>. (Accessed October 24, 2012).

<sup>35</sup>Annie Johnson. "Smyrna Aims to Lure Firms with Solar Field." February 10, 2012. *Nashville Business Journal*. <http://www.bizjournals.com/nashville/print-edition/2012/02/10/smyrna-firms-with-solar-field.html?page=all> (Accessed October 24, 2012).

shop and create jobs in the region,” the Business Park recently became home to a 6-acre, 1 megawatt solar farm through a partnership with the airport authority and Soltas Smyrna, LLC.<sup>36,37</sup> Several airports around the country, including both local airports and larger international facilities, have installed solar arrays on airport property.<sup>38</sup> Since the installation of the array, the airport has received a number of inquiries from potential tenants, and Rutherford County’s economic development director noted that, “the installation of a new solar field to the airport continues to position the park and our community as a destination for clients that are pivotal in green technology.”<sup>39</sup>

### **Sebring Regional Airport and Commerce (Sebring, Florida)**

The Sebring Regional Airport and Commerce Park includes the Sebring Regional general aviation airport as part of a 2,000 acre overall site. This area is shared with the Sebring International Raceway, which leases property from the airport, property owned by the Sebring Utility Commission, existing industrial sites, a “catalyst site” that will focus on health care and science activities, along with acreage planned for future commerce, aviation, and industrial development.<sup>40,41</sup> Established aviation and aerospace-related tenants of the airport include Aero-Med/C.J. Systems Aviation Group (aero-medical facility), Carter Aircraft (aircraft maintenance, repair, and painting), Float Planes & Amphibs (sales, repair, and construction of ultra-light sports planes), Lockwood Aviation/Pt Buildings (flight school and engine service center), among others. Non-aviation related tenants include: Everglades Foods, Inc. (seasoning products), Funder America, Inc. (melamine laminate board and other construction products manufacturing), Genpak LLC (Manufacturer of polystyrene products), Globalstar USA, LLC (mobile satellite voice and data services provider), Turf Care Supply Corp. (fertilizer manufacturing plant), Sebring Custom Tanning

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<sup>36</sup>Ibid.

<sup>37</sup><http://www.dnj.com/article/20120429/SPOTLIGHT/304290087/Smyrna-Airport-flying-high-possibilities>

<sup>38</sup>Annie Johnson. “Smyrna Aims to Lure Firms with Solar Field.” February 10, 2012. *Nashville Business Journal*. <http://www.bizjournals.com/nashville/print-edition/2012/02/10/smyrna-firms-with-solar-field.html?page=all> (Accessed October 24, 2012).

<sup>39</sup>Ibid.

<sup>40</sup>Sebring Regional Airport and Commerce Park. “Sebring Regional Airport and Commerce Park.” <http://www.sebring-airport.com/pdf/SRA%20Brochure.pdf> (Accessed October 24, 2010).

<sup>41</sup>Sharise Cruz. “Sebring Regional Airport’s Plan to Change the Face of Florida.” *North America Business Review: U.S. Edition*. <http://www.businessreviewusa.com/company-reports/sebring-regional-airport>. (Accessed October 24, 2010).

(tanning of animal hides), Han Cor Inc. (producer of high-density polyethylene plastic drainage pipe), several granite products manufacturers, and several automotive racing schools, among others.<sup>42</sup> An article in *Highlands Today* (part of Tampa Media Group, which owns the Tampa Tribune)<sup>43</sup>, as well as other reports<sup>44</sup>, describe the proactive work the industrial park's executive director has done to recruit tenants, but there is limited detail about other factors that may have attracted existing tenants to the site. Various forms of tax credits, refunds, and financing are available in the Highlands County area, in which the airport is located, for economic development purposes.<sup>45</sup>

### **Corvallis Municipal Airport (Corvallis, Oregon)**

The Corvallis Municipal general aviation Airport is just south of a 220-acre industrial park, which has attracted nearly 20 high-technology, light manufacturing, and services businesses.<sup>46</sup> On- airport aviation related tenants include fixed based operators, air medical services, hangar rental companies, and flight schools, among others. Industrial Park tenants include Fed Ex, Oregon Rubber Mills, Western Pulp Products (producer of molded fiber containers), WKL Investments, Viewplus Technologies (Braille printers and learning systems), and

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<sup>42</sup>Sebring Regional Airport and Commerce Park. "Sebring Regional Airport and Commerce Park." <http://www.sebring-airport.com/pdf/SRA%20Brochure.pdf> (Accessed October 24, 2010).

<sup>43</sup>Bill Rettew, Jr. "Sebring's Airport Business Park Prepares for Growth." September 21 2008. *Highlands Today*. <http://www2.highlandstoday.com/news/highlands-news/2008/sep/21/la-sebring-airports-business-park-prepares-for-gro-ar-309018/?referer=http://www.google.com/url?sa=t&rct=j&q=airport%20%2B%20business%20parks%20%2B%20general%20aviation&source=web&cd=75&ved=0CDgQFjAE OEY&url=http%3A%2F%2Fwww2.highlandstoday.com%2Far%2F309018%2F&ei=NRB8UP-sNYjW0gHr84CACQ&usq=AFOjCNG6fR0wy5c57Asof0YSZqicv1K5cg&shorturl=http://bit.ly/tT5p7B> (Accessed October 24, 2008.)

<sup>44</sup>"General Aviation Airports: Economic Development Engines for Florida's Community Development." March 2006. <http://www.sebring-airport.com/docs/draft-final-report-feb-2006.pdf> Available From: <http://sebring-airport.com/NewsEvents.html>. (Accessed October 24, 2012). Pages 20-26.

<sup>45</sup>Trade and Industry Development. "Growing, Growing, Growing: Highlands County, Florida." June 30, 2006. <http://www.tradeandindustrydev.com/Region/Florida/growing-growing-growing-highlands-county-florida-3998> (Accessed October 24, 2012).

<sup>46</sup>City of Corvallis, Oregon. "Industrial Park." 2012. <http://www.corvallisoregon.gov/index.aspx?page=1058> (Accessed October 24, 2012).

Kattare Internet systems, among others.<sup>47</sup> Surveys conducted in support of Oregon’s 2008 Aviation plan reported that the Corvallis Municipal Airport has recreation, local business, tourism, out-of-town business, and agricultural users, and provides mail/cargo service to surrounding communities.<sup>48</sup> The Corvallis Airport Industrial Park was made part of the Benton Corvallis Enterprise Zone in 2008; the Enterprise Zone provides tax abatements for new investments that create employment in the area.<sup>49</sup>

The Corvallis Gazette-Times reported that in October 2012, the Benton County Board of Commissioners voted to rezone the airport industrial park from “urban industrial” to special use zone airport industrial park.<sup>50</sup> This means that up to 90,000 square feet of land in the Park can be used for business support services, professional or administrative offices or call centers, and an additional 10,000 square feet can be used for convenience stores, farm stands or restaurants. While the new zoning has been pursued by local economic development authorities to make the property more attractive for development, existing industrial tenants have expressed concern about the zoning change. The president of Oregon Rubber Mills, which has been a tenant of the Park for about 20 years, stated “We have trucks, we have noise, we’re capable of operating 24 hours a day, seven days a week – we have a lot of things that might not mix well with other types of businesses. If you put somebody right next door to us, we could have a problem.” A representative of Western Pulp Products stated that making the park available to non-industrial activities could make it more difficult for companies like Western Pulp Products to operate, expand, or sell their businesses.<sup>51</sup>

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<sup>47</sup>Coffman Associates. *Corvallis Municipal Airport: Airport Master Plan (Draft Final Report). Chapter 1: Inventory.* [http://airportstudy.com/media/corvallis/cvo\\_mp/Ch1%208-2012.pdf](http://airportstudy.com/media/corvallis/cvo_mp/Ch1%208-2012.pdf) (Accessed October 24, 2012). Exhibit 1L.

<sup>48</sup>Mead and Hunt, in cooperation with Economic Development Research Group. *2007 Oregon System Plan.* “Corvallis Municipal Airport – Individual Airport Report.” Prepared for the Oregon Department of Aviation. February 2008. [“http://www.oregon.gov/aviation/docs/system\\_plan/airport\\_reports/corvallis\\_municipal.pdf](http://www.oregon.gov/aviation/docs/system_plan/airport_reports/corvallis_municipal.pdf), Page 25. (Accessed October 24, 2012).

<sup>49</sup>Corvallis Benton Chamber Coalition. “The Corvallis Airport Industrial Park.” 2010. <http://corvallis.snappages.com/airport-industrial-park.htm> (Accessed October 24, 2012).

<sup>50</sup>Bennett Hall. “Airport Industrial Park Rezoned.” October 17, 2012. *Corvallis Gazette-Times.* [http://www.gazettetimes.com/news/local/airport-industrial-park-rezoned/article\\_708de424-17f3-11e2-9dff-001a4bcf887a.html](http://www.gazettetimes.com/news/local/airport-industrial-park-rezoned/article_708de424-17f3-11e2-9dff-001a4bcf887a.html). (Accessed October 24, 2012).

<sup>51</sup>Ibid.

## Donaldson Center/SCTAC (Greenville, South Carolina)

The Donaldson Center general aviation airport is proximate to Greenville, South Carolina (as is the Greenville Downtown general aviation airport and the Greenville-Spartanburg International Airport.) The Donaldson Center general aviation airport lies six miles south of Greenville and is a part of the SC Technology and Aviation Center (SC-TAC), a 2600 acre “progressive business airport and advanced park.”<sup>52, 53</sup> Over 80 companies are located within the Center. SC-TAC reports that the largest categories of industries represented at the park are manufacturing and engineering services, with prominent private-owned employers including Lockheed Martin, Stevens Aviation, 3M, Cytex Carbon fibers and Ethox Chemicals. SC-TAC provided the following employment breakdown (by industry) for 2010:<sup>54</sup>

- “34 percent Aviation-related activities;
- 31 percent Manufacturing-related activities;
- 22 percent Trade businesses; and
- 13 percent others, including 50 diverse categories ranging from biotech research and development, to pharmaceutical development and professional consulting”

An economic impact study completed for Donaldson Airport reports “The airport is a vital component of the Donaldson Center Industrial Air Park [prior to the creation of the SC-TAC] whose tenants, including Lockheed Martin, Michelin, 3-M and many others, depend on the airport to transport people, goods and parts.”<sup>55</sup>

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<sup>52</sup>South Carolina Technology and Aviation Center. “Your Runway to the World Takes Off Here.” 2012. <http://www.sc-tac.com/location.aspx> (Accessed October 24, 2012).

<sup>53</sup>South Carolina Technology and Aviation Center. “A Quick Snapshot of SCTAC.” 2012. <http://sc-tac.com/quick-facts.aspx> (Accessed October 24, 2012).

<sup>54</sup>South Carolina Technology and Aviation Center. Economic Impact Analysis Concludes SCTAC Industries Contribute 1.4 Billion to Local and State Economy in 2010.” 2011  
“<http://www.sc-tac.com/page1881224.aspx> (Accessed October 24, 2012).

<sup>55</sup>Wilbur Smith Associates for the South Carolina Department of Commerce. *The Economic Impact of Donaldson Center Airport*. 2006. [http://www.scaeronautics.com/systemplan/images/EconomicImpactRptsPdf%5CEIR\\_GYH.pdf](http://www.scaeronautics.com/systemplan/images/EconomicImpactRptsPdf%5CEIR_GYH.pdf). (Accessed October 24, 2012). Page 3.

## Terrell Municipal Airport (Terrell, Texas)

This general aviation airport, which is owned by the City of Terrell, is adjacent to the Airport Business Park. <sup>56</sup>Tenants at the Airport Business Park include an Autozone Distribution Center, and Madix, Inc, a manufacturer of store fixtures and shop fittings.<sup>57</sup> Madix, Inc. houses its corporate headquarters as well as manufacturing facilities at this location. Maine's Paper and Food Service, Inc. recently established a distribution center at the Airport Business Park, and according to Maine's President and CEO, "Terrell was the perfect location for the new distribution center, with a strategic distribution site, a strong workforce and city incentives." <sup>58</sup> (The center will serve 196 restaurants throughout Texas, Arkansas, Louisiana, Missouri and Oklahoma.)<sup>59</sup>The Terrell Economic Development Corporation identifies its 4,500 acre tax increment financing district, which includes the Airport Business Park, as "the single largest Rural TIF in Texas" and "one of the most aggressive in the State of Texas," which includes support from Urban Development Action Grants, Industrial Revenue Bonds, Texas Capital Fund, Enterprise Zone, and the Skills Development Fund for Job Training.<sup>60</sup>

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<sup>56</sup>Terrell Municipal Airport. "Welcome to Terrell Municipal Airport."  
<http://www.terrellairport.com/index.htm> (Accessed October 24, 2012).

<sup>57</sup>Terrell Economic Development Corporation. "Airport Business Park."  
[http://www.terrelltexasedc.com/TEDC\\_Airport.pdf](http://www.terrelltexasedc.com/TEDC_Airport.pdf) (Accessed October 24, 2012).

<sup>58</sup>PR Newswire. "Maine's Paper and & Food Service, Inc. to Hire 100 Employees for New Terrell Location." October 21, 2011. <http://www.prnewswire.com/news-releases/maines-paper-food-service-inc-to-hire-100-employees-for-new-terrell-location-132267408.html> (Accessed October 24, 2012).

<sup>59</sup>**Candace Carlisle**, "NY-based Maine's to open a North Texas distribution center, hire up to 400." September 29, 2011. *Dallas Business Journal*,  
[http://www.bizjournals.com/dallas/news/2011/09/29/new-york-based-maines-to-open-a.html?ana=RSS&s=article\\_search&utm\\_source=feedburner&utm\\_medium=feed&utm\\_campaign=Feed%3A+industry\\_20+%28Industry+Commercial+Real+Estate%29](http://www.bizjournals.com/dallas/news/2011/09/29/new-york-based-maines-to-open-a.html?ana=RSS&s=article_search&utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+industry_20+%28Industry+Commercial+Real+Estate%29). (Accessed October 24, 2012).

<sup>60</sup>Terrell Municipal Airport. "Taking Business to New Heights!" 2012.  
<http://www.terrellairport.com/pdf/Airport-brochure.pdf>. (Accessed October 24, 2012). Page 5.

# D. Case Study Interview Guide

## D.1 INTERVIEW GUIDE

### Background Information

1. Airport Name
2. Airport Manager
  - a. Name
  - b. Title
  - c. Contact information

### Interview

Your participation in this interview will last from 15 to 45 minutes, depending on the complexity of activities at the airport.

### Industries around the Airport

1. What is the current range of public and private aviation uses on the airport (e.g., recreational, business, cargo, crop dusting, firefighting)? *Try to inquire exact industries and companies and provide examples. We would like stories here.*
2. What industries are located on your airport, including seasonal activities, and whether there is direct use of aircraft facilities. *Check off uses on List 1. If there are industries not included on the list, please explain.*
3. What industries are located near your airport? Check off uses on List 1. If there are industries not included on the list, please add the type and explain what they do.
4. Who are the businesses that have based aircraft at the airport? *Start with any information that we obtained from web search.*
5. Are there businesses that regularly use the airport that are not based there? E.g., corporate aircraft bringing staff to area businesses; UPS/FedEx (ground and air freight forwarders)/AmeriFlight; seasonal charters, occasional diverted flights from nearby airports that might experience poor weather conditions, etc.

**Table D.1 Examples of Airport-Proximate Industries/Activities**

Industries/Activities Located in Proximity to Airports		
Dependent	Reliant	Not Dependent or Reliant
<input type="checkbox"/> Air charter services	<input type="checkbox"/> Investment firms	<input type="checkbox"/> Agricultural operations
<input type="checkbox"/> Flight instruction companies	<input type="checkbox"/> Printer manufacturing	<input type="checkbox"/> Construction companies
<input type="checkbox"/> Fixed-based operators	<input type="checkbox"/> Phone/Internet service providers	<input type="checkbox"/> Brewing companies
<input type="checkbox"/> Hangar sales and leasing centers	<input type="checkbox"/> Engineering consultants	<input type="checkbox"/> Plastics manufacturing
<input type="checkbox"/> Aerospace manufacturing	<input type="checkbox"/> Pharmaceutical companies	<input type="checkbox"/> Construction products manufacturing
<input type="checkbox"/> Car rentals	<input type="checkbox"/> Business administration	<input type="checkbox"/> Automotive racing schools
<input type="checkbox"/> Taxi service	<input type="checkbox"/> Corporate headquarters	<input type="checkbox"/> Fertilizer manufacturing
<input type="checkbox"/> Mail/cargo freight forwarders (e.g., FedEx)	<input type="checkbox"/> High-tech industries	<input type="checkbox"/> Tanning
<input type="checkbox"/> Aircraft component suppliers fueling services	<input type="checkbox"/> Financial, accounting and engineering services	<input type="checkbox"/> Rubber mill
<input type="checkbox"/> Repair, maintenance, and restoration services	<input type="checkbox"/> Real estate services	<input type="checkbox"/> Fiber container production
<input type="checkbox"/> Aviation museums	<input type="checkbox"/> Electronics manufacturing	<input type="checkbox"/> Packaging manufacturing
<input type="checkbox"/> Passenger transportation (scheduled and non-scheduled)	<input type="checkbox"/> Silicone/polymer manufacturing	<input type="checkbox"/> Processed food manufacturing
<input type="checkbox"/> Hotels and motels	<input type="checkbox"/> Corporate offices	<input type="checkbox"/> Sports complexes
<input type="checkbox"/> Couriers	<input type="checkbox"/> Merchant wholesalers	<input type="checkbox"/> Public school warehouse and food service facilities
<input type="checkbox"/> Food service	<input type="checkbox"/> Ambulatory health care services	<input type="checkbox"/> Solar arrays
<input type="checkbox"/> Retail and restaurants	<input type="checkbox"/> Machinery manufacturing and maintenance	<input type="checkbox"/> Golf courses
<input type="checkbox"/> Other ground transportation to/from airport	<input type="checkbox"/> Electrical equipment and appliance manufacturing	
<input type="checkbox"/> Fuel vendors	<input type="checkbox"/> Truck transportation	
<input type="checkbox"/> Airport support activities	<input type="checkbox"/> Computer and electronic product manufacturing	
<input type="checkbox"/> Parking lots and garages	<input type="checkbox"/> Telecommunications	
	<input type="checkbox"/> Publishing industries (except Internet)	
	<input type="checkbox"/> Internet service providers	
	<input type="checkbox"/> Data processing	

6. Have non-aviation businesses located on or near the airport? Do you know why they decided to locate here? Was the airport a factor in their decision? *If none, skip to next question.*

Prompts: Try to find out about whether it is because there are an availability of utilities, the location is proximate to freeway connections, whether it is due to lack of NIMBYism, whether there are transit connections, or perhaps there is available land for development? Check off the following “reasons” why non-aviation dependent uses locate there and explain.

**Table D.2 Why Non-Aviation Businesses Locate at the Airport**

	Business Name and/or Type	Reasons to Locate at Airport
Amount of land available for non-aviation uses		
Availability of parking (e.g., lots, garages, park-n-ride)		
Cost of property		
Compatibility of surrounding land uses		
Proximity to existing communities		
Availability of utilities/infrastructure		
Proximity to highways and freeways		
Existing transit connections		
Lack of environmental constraints (e.g., noise, safety)		
Other:		

7. Have there been any proposals or interest in a business/industrial park around your airports? Do you think this is realistic? Why or why not?
8. What kind of businesses would you like to attract in the future? Do you have a strategy for doing so?
9. What kind of future do you see for your airport in 25 years time?
- Development Potential
10. Is there an airport specific business plan currently in use? If so, what year was it developed? What successes came of it?
11. Is there an airport specific marketing plan currently in use? If so, what year was it developed? What successes came of it?
12. What is the availability or likelihood for you to leverage (Federal, state or local) funding to provide complementary infrastructure to attract businesses?

13. Do you work with your economic development agency to promote business development?
14. **[ONLY AT RELEVANT AIRPORTS]** What is the potential for scheduled passenger service? What about for freight services? Other?

# E. Methodologies for Estimating Economic Potential of Role 1 and Role 2 Airports

## E.1 ROLE 1: POTENTIAL PRODUCTIVITY IMPACTS GENERATED BY SMART GROWTH POLICIES

### Background

The relationship between economic density and productivity is widely known<sup>61</sup>, with research tracing back well over a century. Fundamentally, increasing the scale and density of economic activity increases the size of markets, reduces shared costs, facilitates knowledge spillovers, and stimulates innovation—all of which can lead to increased productivity and growth. Yet, behind these broad outcomes lie a range of specific mechanisms that operate across a range of spatial and industrial scales.

With respect to the GA and small commercial airports in consideration in the present study, two distinct types of agglomeration are of particular importance. The first recognizes the airport as a transportation hub. Airports can provide rapid access to nearby and distant cities in California and other states. Distances enabled by connectivity provided by airports depend on sizes of runways, types of aircraft used and, for commercial service, the connectivity to hub airports. The second simply recognizes the airport as a locus of economic activity—a sub-metropolitan agglomeration of firms that, through co-location, can enjoy greater efficiency and productivity than if the firms were arranged in a more dispersed spatial arrangement.

It is important to emphasize that while these two categories can be (and indeed, will be) measured distinctly—the second is fundamentally related to the first through the processes of agglomeration (i.e., positive spatial feedback). This is best illustrated by an example. Assume that two firms (a warehouse and a small corporate headquarters) are attracted to an airport as a *transportation asset*. They may develop or expand warehousing and office space to specifically take advantage of the airport (for freight shipment and passenger travel,

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<sup>61</sup>See Weisbrod et al., 2012, <http://www.edrgroup.com/pdf/Alstadt-Weisbrod-Market%20Access-TRB-2012.pdf>.

respectively). Once these firms are there, other firms may subsequently be attracted to the site in order to be near the first two firms (for example, a trucking company or a sandwich shop). Note that this secondary attraction is not directly related to the airport itself, but might not exist were it not for the presence of the airport. Finally, the two initially airport-dependent firms may move or go out of business, and the buildings may become re-occupied by firms that have no interest in the airport at all, but are instead attracted by the clustered activity (including the trucking firm and sandwich shop). Again, the specific firms may not be directly related to the airport, but the airport remains a strong residual influencer of the agglomeration process.

In what follows below, for each airport, we attempt to identify how increasing airport density yields productivity in two distinct ways. The first is the additional productivity enjoyed by firms from being proximate to the airport as a transportation asset. The second is the additional productivity enjoyed by firms from being part of clustered economic activity.

## **Methodology**

Our general approach is summarized in the following steps:

1. For each airport presented in the case studies (Section 5), estimate gross employment changes by two-digit NAICS sector resulting from smart growth policy;
2. Estimate net employment changes for the State of California;
3. Use TREDIS to estimate net productivity change from the change in airport access; and
4. Develop and apply statistical relationships to determine productivity effects from increased employment density at zip-code level.

### *Determine Gross Employment Change in Airport Zip Codes*

For both impact types discussed above, a common starting point was to determine the gross change in employment that could be expected from applying smart growth policies to the four airports discussed in Section XX. As outlined there, smart growth policies could be expected to increase the floor-area-ratio (FAR) for different land uses that conform to general zoning guidelines - which in turn would accommodate more employment. These results are summarized in Table E.1.

**Table E.1 Summary of Estimated Employment Change by Land Use**

Land Use	Buchanan	Santa Monica	Fresno	Gillespie
Light Industrial	1,796	5,615	6,360	1,520
Warehousing	412	1,551	1,000	10
Office	7,430	0	6,800	7,301
Retail	573	0	0	0
<b>Total</b>	<b>10,211</b>	<b>7,166</b>	<b>14,160</b>	<b>8,831</b>

Note: Sources are discussed in Part 3 of this technical memorandum and in Section 5.1. The sources include ESRI, the National Association for Industrial and Office Properties, Google Maps, observations from site visits and interviews first with airport managers and subsequently with local economic development officials

The next step in determining the economic consequences of these land use changes is to estimate which NAICS industries would likely utilize the four different land uses. These breakouts are summarized in Table E.2. For the “Retail” land use, employment is assumed to be split evenly between “pure” retail sector (e.g., drug stores) and restaurants (the accommodations and food services sector). For the “Office” land use, employment mix is estimated based on observed mix among sectors 53 to 56 for all U.S. zip codes containing a GA or Reliever airport.<sup>62</sup> For the “Light Industrial” land use, employment mix is based on work conducted for SCAG.<sup>63</sup> Applying these splits to the employment changes in Table E.2 yields potential gross changes in employment by NAICS sector – as shown in Table E.3.

<sup>62</sup>The source of this data comes from a database from being developed as part of an ACRP project currently in progress (Landau, et. al., ACRP 03-28).

<sup>63</sup>Employment Density Study, prepared for Southern California Association of Governments by The Natelson Company, Inc., October 2001.

**Table E.2 Estimated Employment Mix by 2-digit NAICS Category for Each Land Use**

NAICS Sector	Land Use Type			
	Light Industrial	Warehousing	Office	Retail
11 Agriculture, Forestry, Fishing and Hunting				
21 Mining Quarrying and Oil and Gas Extraction				
22 Utilities				
23 Construction	22%			
31-33 Manufacturing	39%			
42 Wholesale Trade	20%			
44-45 Retail Trade	2%			50%
48-49 Transportation and Warehousing	2%	100%		
51 Information				
52 Finance and Insurance				
53 Real Estate and Rental and Leasing			11%	
54 Professional, Scientific, and Technical Services			38%	
55 Management of Companies and Enterprises			12%	
56 Administrative and Support and Waste Management and Remediation Services	5%		39%	
61 Educational Services				
62 Health Care and Social Assistance				
71 Arts, Entertainment, and Recreation				
72 Accommodation and Food Services	2%			50%
81 Other Services (except Public Administration)				
92 Public Administration	2%			
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

**Table E.3 Estimated Potential Employment Change by NAICS from Smart Growth Policy**

NAICS	Industry	Buchanan	Santa Monica	Fresno	Gillespie
11	Agriculture	0	0	0	0
21	Mining	0	0	0	0
22	Utilities	0	0	0	0
23	Construction	60	188	212	51
31-33	Manufacturing	1,008	3,150	3,569	853
42	Wholesale Trade	273	852	965	231
44-45	Retail Trade	375	199	225	54
48-49	Transportation & Warehousing	429	1,605	1,061	25
51	Information	0	0	0	0
52	Finance & Insurance	0	0	0	0
53	Real Estate & Leasing	254	0	233	250
54	Prof., Scientific, Tech. Services	3,866	408	3,881	3,781
55	Management of Companies	224	0	205	220
56	Administrative & Support Services	3,308	285	3,267	3,238
61	Educational Services	0	0	0	0
62	Health Care & Social Assistance	0	0	0	0
71	Arts, Entertainment, & Recreation	0	0	0	0
72	Accommodation & Food Services	315	167	189	45
81	Other Services	0	0	0	0
92	Government	100	311	353	84
	TOTAL - All Sectors	10,211	7,166	14,160	8,831

The next step is to use the results from Table E.4 to estimate the employment levels for each of the “no policy” and four “smart growth policy” scenarios (one for each case study airport). This step requires drawing on base-year employment data by zip code (obtainable from LEHD<sup>64</sup>) as well as statewide employment forecasts by two-digit NAICS sector (provided by Moody’s Analytics). For each California zip code, baseline 2040 employment forecasts are calculated by applying statewide growth rates to the base-year zip code employment figures.

<sup>64</sup>Longitudinal Employer-Household Dynamics, a Census product (see <http://lehd.ces.census.gov/>).

Next, the increased employment shown in Table E.4 is added (separately) to each of the four airport zip codes (Table E.4). To determine the net effect of the land use change, we assume that *direct effect* of the smart growth policy would be limited to employment redistribution. That is, for all scenarios, total California employment (by NAICS code) is held constant.

All four airports share the same *baseline* spatial distribution, and the *smart growth* scenario for each airport has the effect of increasing employment within the airport zip code (according to Table E.4), while drawing from other California zip codes so that total California employment matched the baseline scenario. For simplicity, employment is assumed to be drawn proportional to 2011 levels. That is, if a (non-airport) zip code contained 0.5 percent of statewide retail employment in 2011, then 0.5 percent of the retail employment *attracted to* the airport smart growth area is assumed to be drawn from that zip code in 2040.

It should be noted that this “zero-sum” assumption is made in order to isolate the pure productivity gains associated with increased density near airports. In reality, the economy is not constrained to “zero-sum” growth. This fact is captured by the multiplier analysis (discussed below). That is, even though the *direct effect* of the smart growth policy is assumed to only change the location of employment (and not its statewide levels), the increased productivity from the new arrangement leads to increased productivity, which stimulates secondary (indirect and induced) effects that ultimately increase statewide employment levels (along with income and Gross State Product – GSP).

Furthermore, it should be noted that the choice of California as the control area is somewhat arbitrary. In reality, many sectors likely to be attracted to airports (notably Professional, Scientific, Technical Services and Management of Companies and Enterprises) are national in scale, such that individual firms attracted to the airport may come from large cities outside the state.

**Table E.4 Employment Scenarios for Four Case Study Airport Zip Codes**

Measure	Buchanan (94520)	Santa Monica (90405)	Fresno (93727)	Gillespie (92020)
2011 Baseline Employment Levels	39,161	16,250	19,737	28,047
2040 Baseline Employment Levels	51,228	20,852	23,671	32,149
2040 Smart Growth Employment Levels	61,439	28,018	37,831	40,980
2040 Smart Growth Employment Impact	10,211	7,166	14,160	8,831

### *Predict Airport Access Impacts*

The previous section outlined how implementing airport-specific smart growth policies may change the general pattern of employment location in the state. This section looks at how this change in access to airports translates to economic

productivity—independent of density effects (which are discussed in the next section).

The TREDIS Market Access model was used to estimate these impacts. This module estimates economic impacts from changes in transportation access and connectivity. One of the specific access variables used in the model calibration is “average access time to domestic airport,” which is defined as “average ground access time to the nearest commercial airport with scheduled operations, weighted by the scale of airport activity (takeoffs + landings).”<sup>65</sup> Based on the predicted change in employment location in the previous section, we are able to determine the net change in airport access—which has been calculated for each airport. However, the resulting access changes are quite small because 1) there are many airports throughout the state, 2) employment tends to be located in urban areas near hub airports (though generally not located as close to the hubs as the prospective smart growth areas adjacent to these four airports), and 3) the four airports in question are of moderate size.

As a result, the TREDIS model predicted net effects from employment relocation to be universally less than \$500,000 in 2040 Gross State Product (for all airports). Because of the small order of magnitude of these results (and in contrast to the significant impacts from “pure” economic density, discussed in the next section), these effects – though positive – are not “significant”. As such, the final results presented in Section 5.1 do not include airport accessibility effects and reflect impacts from agglomeration.

### *Predict Airport Density Impacts*

As discussed in the introduction, although the productivity impacts from airport access may be small, airports can still have a large residual impact on the process of industrial clustering. This section presents the methodology used to estimate this density effect. The overall approach used was to develop and apply statistical relationships between sector-specific employment density and income at the zip code level.

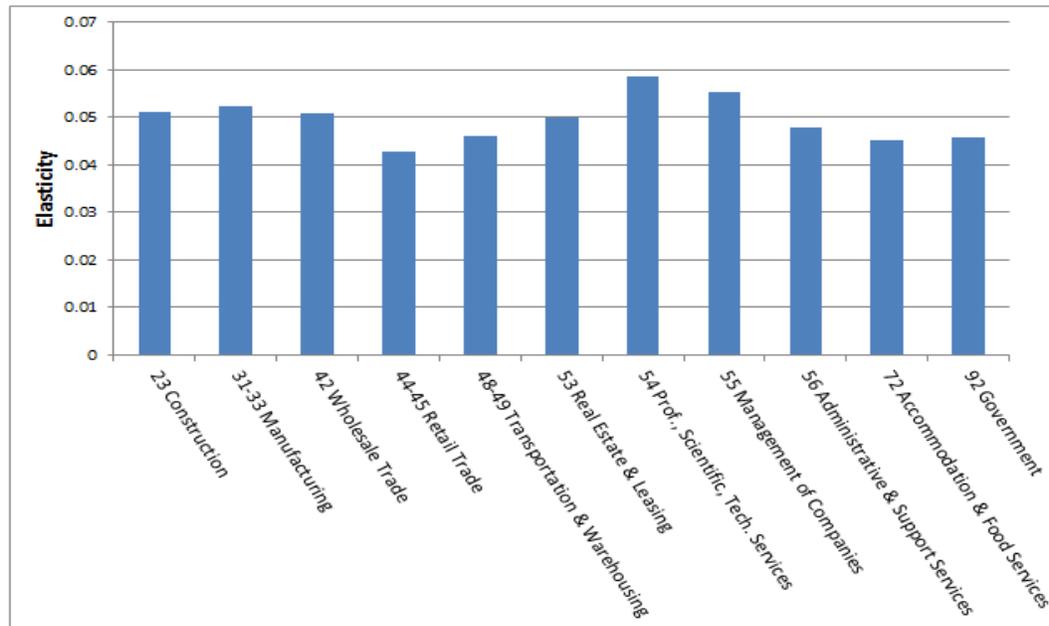
The model used to calibrate the effect is based entirely on 2011 California zip code data: two-digit NAICS employment data compiled from LEHD, average zip code income compiled from County Business Patterns, and zip code land area compiled from Census TIGER files. This yields a raw dataset of roughly 1,500 California zip codes. For each zip code, we calculate sector-specific employment density values (e.g., retail jobs per square mile), and form a series of log-linear regressions with total zip code income. Figure E.1 shows the results in terms of California’s average income elasticity with respect to each industry’s

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<sup>65</sup>Weisbrod et al., 2012, page 6 [<http://www.edrgroup.com/pdf/Alstadt-Weisbrod-Market%20Access-TRB-2012.pdf>].

employment density<sup>66</sup> (for those industries affected by the smart growth policy). Based on this analysis, elasticities range from roughly 0.4 to 0.6.

**Figure E.1 California Average Income Elasticity with Respect to Sector-Specific Employment Density**  
*Jobs per Square Mile*

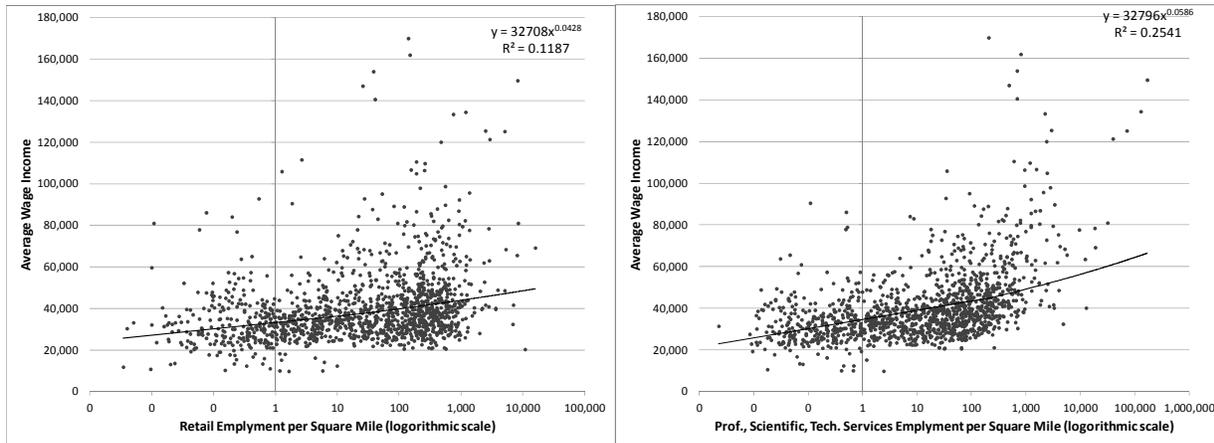


For comparison, Figure E.2 shows the regression lines for Retail Trade (left) and Professional, Scientific, Technical Services (right)—the least and most sensitive, respectively. Each graph shows the distribution of zip codes in terms of sector-specific employment density (the horizontal axis) and average annual wage income per worker (the vertical axis). Each point on the charts represents a single zip code, and the line indicates the best log-linear fit. These figures emphasize that employment density for Professional, Scientific, & Technical Services has stronger leverage on personal income than Retail employment density.

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<sup>66</sup>An elasticity predicts the percent change in one variable from the percent change in another. In the current analysis, each elasticity predicts the percent change in zip code average wage income based on a 1 percent change in sector-specific employment density (jobs per square mile).

Figure E.2 Comparison of Regression Results for Retail vs. Professional, Scientific, Technical Services



Next, the results of the zip code-level regressions are applied to the “baseline” and “smart growth” employment scenarios described above (Figure E.2) to determine the expected change in income for each zip code in California. The net income growth associated with these changes is summarized in Table E.5.

Table E.5 Summary of Employment Density Changes by Airport and Resulting Income Growth

	Buchanan	Santa Monica	Fresno	Gillespie
Zip Code	94520	90405	93727	92020
Zip Code Land Area (sq. mi.)	14.0	2.2	27.2	9.3
2011 Employment Density	2,796	7,247	727	3,027
2040 Baseline Employment Density	3,657	9,299	871	3,470
2040 Smart Growth Employment Density	4,386	12,495	1,393	4,423
California Direct Income Growth from Densification (mil.)	\$38.3	\$23.9	\$58.3	\$28.3

### Apply Multiplier Impacts

The final step in estimating the total economic impacts from smart growth policies is to calculate the secondary “multiplier” impacts resulting from the initial productivity gain. Multiplier impacts arise due to the increased output and income associated with the initial productivity gain. Those businesses that enjoy greater worker productivity end up purchasing more intermediate goods and services in the statewide economy. Further, the income gains bolster local economies through increased demand for consumer goods such as groceries and household services. Multiplier impacts, in this case, were calculated with a 2011 IMPLAN model of California. Total economic impacts (including direct and multiplier effects) from the smart growth policies are shown in Table E.6.

**Table E.6 Total Economic Impacts to California (2040)**

Airport	Employment	Output (Million Dollars)	Value Added (Million Dollars)	Income (Million Dollars)
Buchanan	1,225	\$242.94	\$151.90	\$104.61
Santa Monica	855	\$294.49	\$130.48	\$78.22
Fresno	2,009	\$584.68	\$285.58	\$178.75
Gillespie	921	\$211.00	\$121.26	\$80.04

Here, it is important to emphasize that the increased economic efficiency has the ultimate effect of increasing statewide employment (along with income and Gross State Product—GSP), even though the direct employment impacts of the smart growth policy are analytically constrained to be zero at the state level, through multiplier effects.

### Detailed Results

In the following tables, the “direct” impact to California is based on the predicted net change in statewide income from the 1) increased employment density at each airport location, and 2) the relationships between zip code income and sector-specific employment density. The direct income change is converted to Value added and Output based on 2011 ratios, and multiplier impacts are estimated based on the resulting change in output<sup>67</sup>. Note that the direct employment effect is zero due to the assumption that the increased employment density at the four airport locations would be accounted for from other parts of the state, but that multiplier impacts include positive employment impacts.

<sup>67</sup>Source: 2011 IMPLAN model of the state of California.

Table E.7 Economic Impacts to California from Buchanan Airport, by Sector

NAICS Sector	Direct Impacts to California				Multiplier Effects to California				Total Impacts to California			
	Employment	Output (\$mil)	Value Added (\$mil)	Income (\$mil)	Employment	Output (\$mil)	Value Added (\$mil)	Income (\$mil)	Employment	Output (\$mil)	Value Added (\$mil)	Income (\$mil)
11 Agriculture	0	0.00	0.00	0.00	6	0.90	0.44	0.33	6	0.90	0.44	0.33
21 Mining	0	0.00	0.00	0.00	2	0.73	0.40	0.12	2	0.73	0.40	0.12
22 Utilities	0	0.00	0.00	0.00	1	1.35	0.65	0.21	1	1.35	0.65	0.21
23 Construction	0	0.46	0.28	0.24	11	1.45	0.86	0.76	11	1.91	1.14	1.00
31-33 Manufacturing	0	14.61	4.41	2.08	43	26.67	8.05	3.81	43	41.28	12.46	5.89
42 Wholesale Trade	0	1.47	1.08	0.62	25	4.54	3.34	1.93	25	6.01	4.43	2.55
44-45 Retail Trade	0	2.59	1.94	1.24	91	7.14	5.34	3.40	91	9.74	7.28	4.64
48-49 Transportation & Warehousing	0	1.65	0.90	0.71	34	4.58	2.50	1.97	34	6.23	3.40	2.68
51 Information	0	0.00	0.00	0.00	14	5.46	3.22	1.79	14	5.46	3.22	1.79
52 Finance & Insurance	0	0.00	0.00	0.00	39	9.24	5.28	2.72	39	9.24	5.28	2.72
53 Real Estate & Leasing	0	7.25	5.54	0.83	68	13.18	10.07	1.51	68	20.43	15.61	2.34
54 Prof., Scientific, Tech. Services	0	29.13	21.23	17.24	253	36.43	26.55	21.56	253	65.55	47.78	38.80
55 Management of Companies	0	1.31	0.82	0.71	14	2.82	1.76	1.53	14	4.12	2.57	2.23
56 Administrative & Support Services	0	23.90	16.36	13.83	428	28.23	19.32	16.34	428	52.14	35.68	30.17
61 Educational Services	0	0.00	0.00	0.00	12	0.82	0.54	0.48	12	0.82	0.54	0.48
62 Health Care & Social Assistance	0	0.00	0.00	0.00	56	5.73	3.85	3.38	56	5.73	3.85	3.38
71 Arts, Entertainment, & Recreation	0	0.00	0.00	0.00	13	1.12	0.76	0.48	13	1.12	0.76	0.48
72 Accommodation & Food Services	0	1.92	1.11	0.75	75	5.02	2.91	1.96	75	6.94	4.02	2.71
81 Other Services	0	0.00	0.00	0.00	32	2.42	1.61	1.41	32	2.42	1.61	1.41
92 Government	0	0.09	0.08	0.07	7	0.73	0.71	0.61	7	0.82	0.79	0.68
<b>Total</b>	<b>0.00</b>	<b>84.39</b>	<b>53.75</b>	<b>38.33</b>	<b>1,225</b>	<b>158.56</b>	<b>98.15</b>	<b>66.28</b>	<b>1,225</b>	<b>242.94</b>	<b>151.90</b>	<b>104.61</b>

Table E.8 Economic Impacts to California from Santa Monica Airport, by Sector

NAICS Sector	Direct Impacts to California				Multiplier Effects to California				Total Impacts to California			
	Employment	Output (\$mil)	Value Added (\$mil)	Income (\$mil)	Employment	Output (\$mil)	Value Added (\$mil)	Income (\$mil)	Employment	Output (\$mil)	Value Added (\$mil)	Income (\$mil)
11 Agriculture	0	0.00	0.00	0.00	16	2.22	1.08	0.82	16	2.22	1.08	0.82
21 Mining	0	0.00	0.00	0.00	5	2.05	1.11	0.34	5	2.05	1.11	0.34
22 Utilities	0	0.00	0.00	0.00	2	1.78	0.85	0.28	2	1.78	0.85	0.28
23 Construction	0	1.42	0.84	0.74	20	2.61	1.55	1.36	20	4.02	2.39	2.10
31-33 Manufacturing	0	74.97	22.64	10.70	157	98.58	29.76	14.07	157	173.54	52.40	24.76
42 Wholesale Trade	0	6.99	5.15	2.97	67	12.23	9.01	5.19	67	19.23	14.16	8.16
44-45 Retail Trade	0	1.02	0.76	0.49	63	4.93	3.69	2.35	63	5.95	4.45	2.83
48-49 Transportation & Warehousing	0	10.65	5.82	4.59	113	15.21	8.30	6.55	113	25.86	14.12	11.14
51 Information	0	0.00	0.00	0.00	13	5.06	2.98	1.66	13	5.06	2.98	1.66
52 Finance & Insurance	0	0.00	0.00	0.00	33	7.68	4.39	2.26	33	7.68	4.39	2.26
53 Real Estate & Leasing	0	0.00	0.00	0.00	26	5.03	3.84	0.58	26	5.03	3.84	0.58
54 Prof., Scientific, Tech. Services	0	4.59	3.34	2.71	85	12.23	8.91	7.24	85	16.82	12.26	9.95
55 Management of Companies	0	0.00	0.00	0.00	16	3.39	2.11	1.83	16	3.39	2.11	1.83
56 Administrative & Support Services	0	1.34	0.92	0.77	71	4.71	3.22	2.73	71	6.05	4.14	3.50
61 Educational Services	0	0.00	0.00	0.00	10	0.67	0.44	0.39	10	0.67	0.44	0.39
62 Health Care & Social Assistance	0	0.00	0.00	0.00	46	4.69	3.15	2.77	46	4.69	3.15	2.77
71 Arts, Entertainment, & Recreation	0	0.00	0.00	0.00	10	0.87	0.59	0.37	10	0.87	0.59	0.37
72 Accommodation & Food Services	0	2.18	1.26	0.85	68	4.54	2.63	1.77	68	6.72	3.89	2.62
81 Other Services	0	0.00	0.00	0.00	28	2.12	1.40	1.23	28	2.12	1.40	1.23
92 Government	0	0.07	0.07	0.06	6	0.68	0.66	0.57	6	0.75	0.72	0.62
<b>Total</b>	<b>0</b>	<b>103.22</b>	<b>40.79</b>	<b>23.87</b>	<b>855</b>	<b>191.27</b>	<b>89.69</b>	<b>54.34</b>	<b>855</b>	<b>294.49</b>	<b>130.48</b>	<b>78.22</b>

Table E.9 Economic Impacts to California from Fresno Airport, by Sector

NAICS Sector	Direct Impacts to California				Multiplier Effects to California				Total Impacts to California			
	Employment	Output (\$mil)	Value Added (\$mil)	Income (\$mil)	Employment	Output (\$mil)	Value Added (\$mil)	Income (\$mil)	Employment	Output (\$mil)	Value Added (\$mil)	Income (\$mil)
11 Agriculture	0	0.00	0.00	0.00	27	3.86	1.88	1.43	27	3.86	1.88	1.43
21 Mining	0	0.00	0.00	0.00	8	3.51	1.90	0.58	8	3.51	1.90	0.58
22 Utilities	0	0.00	0.00	0.00	4	3.44	1.64	0.54	4	3.44	1.64	0.54
23 Construction	0	1.83	1.08	0.95	33	4.18	2.48	2.18	33	6.01	3.56	3.13
31-33 Manufacturing	0	123.13	37.18	17.57	264	165.28	49.91	23.59	264	288.41	87.08	41.16
42 Wholesale Trade	0	7.87	5.79	3.34	96	17.47	12.87	7.41	96	25.34	18.66	10.75
44-45 Retail Trade	0	1.01	0.75	0.48	121	9.49	7.09	4.52	121	10.49	7.85	4.99
48-49 Transportation & Warehousing	0	12.60	6.88	5.43	153	20.66	11.28	8.90	153	33.27	18.16	14.33
51 Information	0	0.00	0.00	0.00	28	10.92	6.44	3.58	28	10.92	6.44	3.58
52 Finance & Insurance	0	0.00	0.00	0.00	72	17.04	9.75	5.02	72	17.04	9.75	5.02
53 Real Estate & Leasing	0	7.11	5.43	0.82	94	18.08	13.82	2.07	94	25.19	19.25	2.89
54 Prof., Scientific, Tech. Services	0	25.57	18.64	15.13	289	41.54	30.27	24.58	289	67.11	48.91	39.72
55 Management of Companies	0	1.32	0.83	0.72	35	7.29	4.55	3.94	35	8.61	5.37	4.66
56 Administrative & Support Services	0	23.29	15.94	13.48	471	31.07	21.26	17.98	471	54.36	37.20	31.46
61 Educational Services	0	0.00	0.00	0.00	22	1.48	0.98	0.86	22	1.48	0.98	0.86
62 Health Care & Social Assistance	0	0.00	0.00	0.00	101	10.40	6.98	6.13	101	10.40	6.98	6.13
71 Arts, Entertainment, & Recreation	0	0.00	0.00	0.00	23	1.97	1.34	0.83	23	1.97	1.34	0.83
72 Accommodation & Food Services	0	0.92	0.53	0.36	95	6.33	3.66	2.47	95	7.25	4.20	2.83
81 Other Services	0	0.00	0.00	0.00	61	4.60	3.05	2.67	61	4.60	3.05	2.67
92 Government	0	0.07	0.07	0.06	13	1.36	1.31	1.12	13	1.43	1.37	1.18
<b>Total</b>	<b>0</b>	<b>204.72</b>	<b>93.13</b>	<b>58.34</b>	<b>2,009</b>	<b>379.95</b>	<b>192.45</b>	<b>120.42</b>	<b>2,009</b>	<b>584.68</b>	<b>285.58</b>	<b>178.75</b>

Table E.10 Economic Impacts to California from Gillespie Airport, by Sector

NAICS Sector	Direct Impacts to California				Multiplier Effects to California				Total Impacts to California			
	Employment	Output (\$mil)	Value Added (\$mil)	Income (\$mil)	Employment	Output (\$mil)	Value Added (\$mil)	Income (\$mil)	Employment	Output (\$mil)	Value Added (\$mil)	Income (\$mil)
11 Agriculture	0	0.00	0.00	0.00	7	1.03	0.50	0.38	7	1.03	0.50	0.38
21 Mining	0	0.00	0.00	0.00	2	0.87	0.47	0.14	2	0.87	0.47	0.14
22 Utilities	0	0.00	0.00	0.00	1	1.19	0.57	0.19	1	1.19	0.57	0.19
23 Construction	0	0.54	0.32	0.28	11	1.39	0.83	0.73	11	1.94	1.15	1.01
31-33 Manufacturing	0	26.02	7.86	3.71	61	38.09	11.50	5.44	61	64.11	19.36	9.15
42 Wholesale Trade	0	1.29	0.95	0.55	23	4.25	3.13	1.80	23	5.54	4.08	2.35
44-45 Retail Trade	0	0.36	0.27	0.17	50	3.93	2.94	1.87	50	4.29	3.21	2.04
48-49 Transportation & Warehousing	0	0.09	0.05	0.04	19	2.52	1.37	1.08	19	2.60	1.42	1.12
51 Information	0	0.00	0.00	0.00	11	4.42	2.61	1.45	11	4.42	2.61	1.45
52 Finance & Insurance	0	0.00	0.00	0.00	31	7.27	4.16	2.14	31	7.27	4.16	2.14
53 Real Estate & Leasing	0	6.45	4.93	0.74	58	11.12	8.50	1.28	58	17.57	13.43	2.02
54 Prof., Scientific, Tech. Services	0	21.07	15.36	12.47	189	27.23	19.85	16.12	189	48.30	35.21	28.59
55 Management of Companies	0	0.41	0.26	0.22	10	2.06	1.29	1.12	10	2.48	1.54	1.34
56 Administrative & Support Services	0	17.22	11.79	9.97	313	20.64	14.13	11.95	313	37.86	25.91	21.91
61 Educational Services	0	0.00	0.00	0.00	9	0.64	0.42	0.37	9	0.64	0.42	0.37
62 Health Care & Social Assistance	0	0.00	0.00	0.00	43	4.47	3.00	2.63	43	4.47	3.00	2.63
71 Arts, Entertainment, & Recreation	0	0.00	0.00	0.00	10	0.87	0.59	0.37	10	0.87	0.59	0.37
72 Accommodation & Food Services	0	0.26	0.15	0.10	40	2.67	1.55	1.04	40	2.93	1.70	1.14
81 Other Services	0	0.00	0.00	0.00	26	1.91	1.27	1.11	26	1.91	1.27	1.11
92 Government	0	0.09	0.09	0.08	6	0.61	0.58	0.50	6	0.70	0.67	0.58
<b>Total</b>	<b>0</b>	<b>73.81</b>	<b>42.02</b>	<b>28.33</b>	<b>921</b>	<b>137.19</b>	<b>79.25</b>	<b>51.71</b>	<b>921</b>	<b>211.00</b>	<b>121.26</b>	<b>80.04</b>

## E.2 ROLE 2. POTENTIAL PRODUCTIVITY IMPACTS GENERATED BY SMART GROWTH POLICIES

The purpose of a Role 2 airport area (smart growth support hub) is to retain companies that could leave California without supportive land use and incentive policies. The hypothesis of this analysis is that manufacturing and industrial service companies would disinvest from their current locations because of inadequate local support, including infrastructure, land available for expansion, and population densities that view such companies as undesirable neighbors.

This analysis looks at potential outcomes for counties by 2040 if jobs are saved in airport smart growth areas. Four airports were selected as examples of Role 2 airport smart growth areas. The airports and the counties in which they are located are listed in Table E.11. The four Role 2 airport smart growth areas are illustrated in Figures E.3 and E.4 below.

**Table E.11 Sample Role 2 Smart Growth Airport Areas**

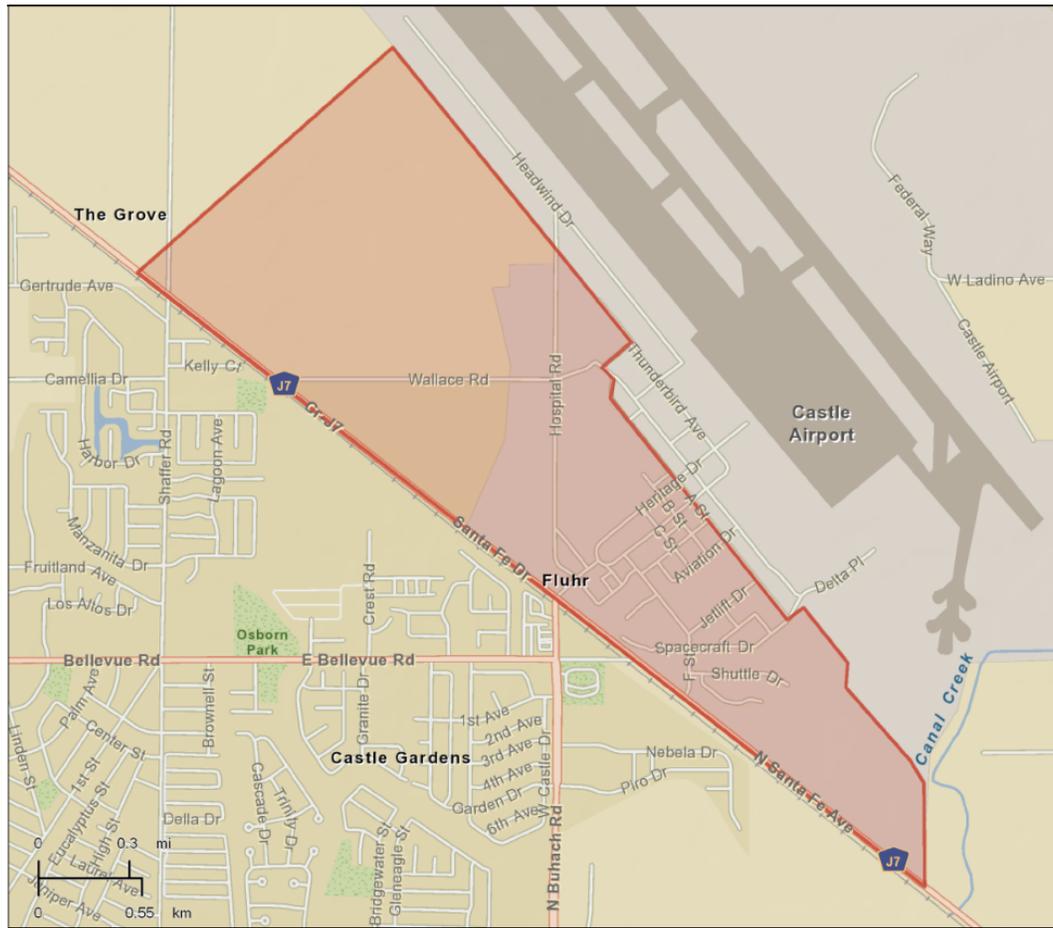
Airport	County
Castle Airport (Castle Air Base)	Merced
Santa Maria Public Airport	Santa Barbara
Sonoma County Airport	Sonoma
Yuba County Airport	Yuba

Current employment by industry and total acreage of each site were estimated through ESRI Business Analyst Online, which combines a GIS system with an industry and employment database. The consultant team traveled to each area and completed driving surveys of the four project areas. Notes were compiled about key businesses, vacant land areas, infill sites, roadways, open space and potential environmental constraints. Combining the site visit observations and the existing employment in each area, the ESRI employment data were converted into employment by building types, and sorted into four land use categories: commercial retail, light industrial and general commercial, office, business park & R&D flex space, and warehouse space.

Three further steps are employed to calculate densities in each smart growth area. First, the employment by land use types are calculated from ESRI Business Analyst and the site visits are converted into built space using “square feet per employee” data, using ratios from the National Association for Industrial and Office Properties (NAIOP). Second, detailed reviews of Google Maps complement the driving surveys and yield estimates of the total acres by land use. Lastly, Floor Area Ratio (FAR) ranges are calculated using the following formula:

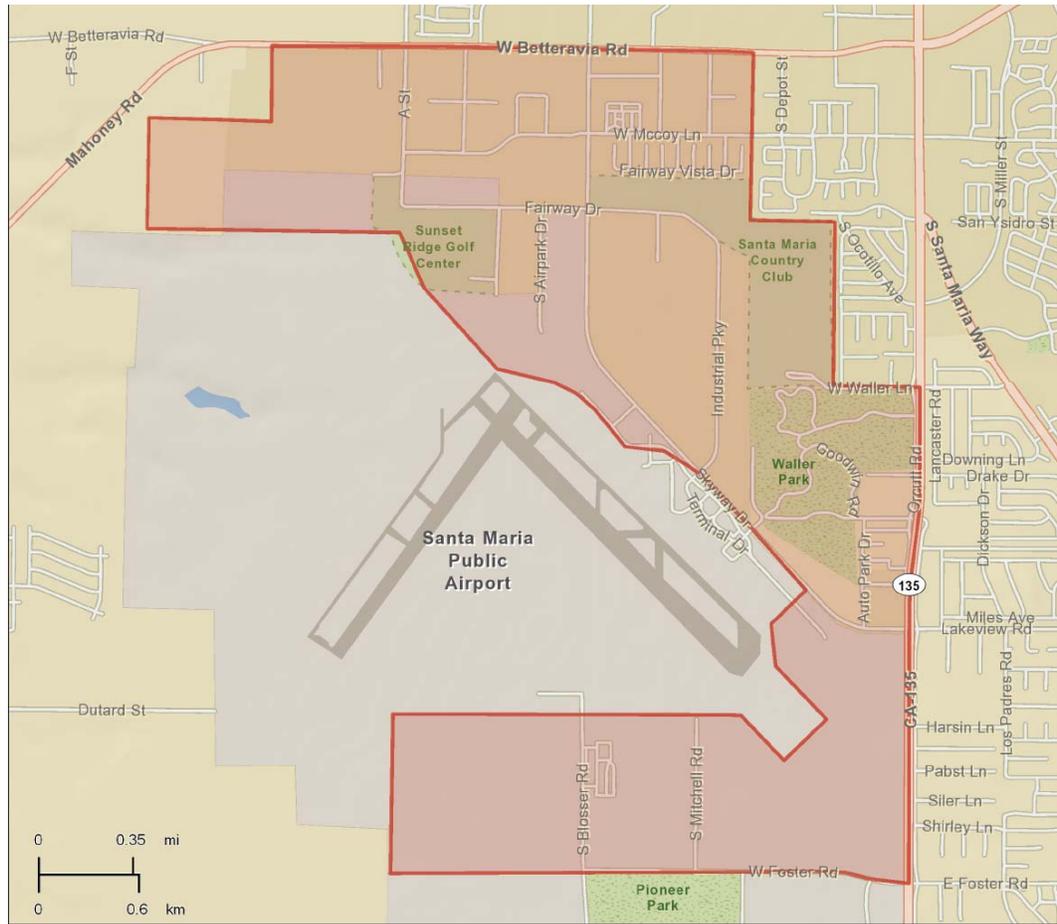
$$\text{Total Square Feet by Land Use} / (\text{Acreage by Land Use} * 43,560)$$

Figure E.3 Prospective Castle Airport Smart Growth Area



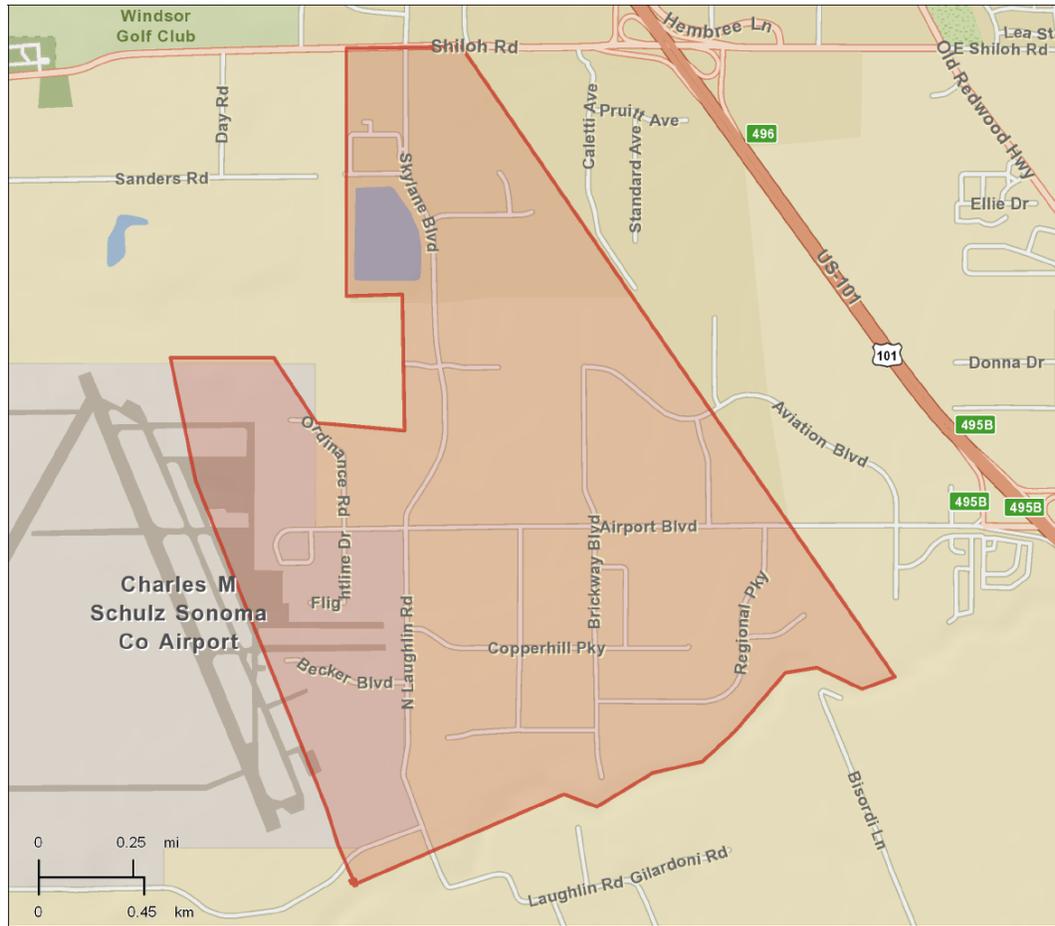
Source: ESRI Business Analyst Online.

Figure E.4 Prospective Santa Maria Public Airport Smart Growth Area



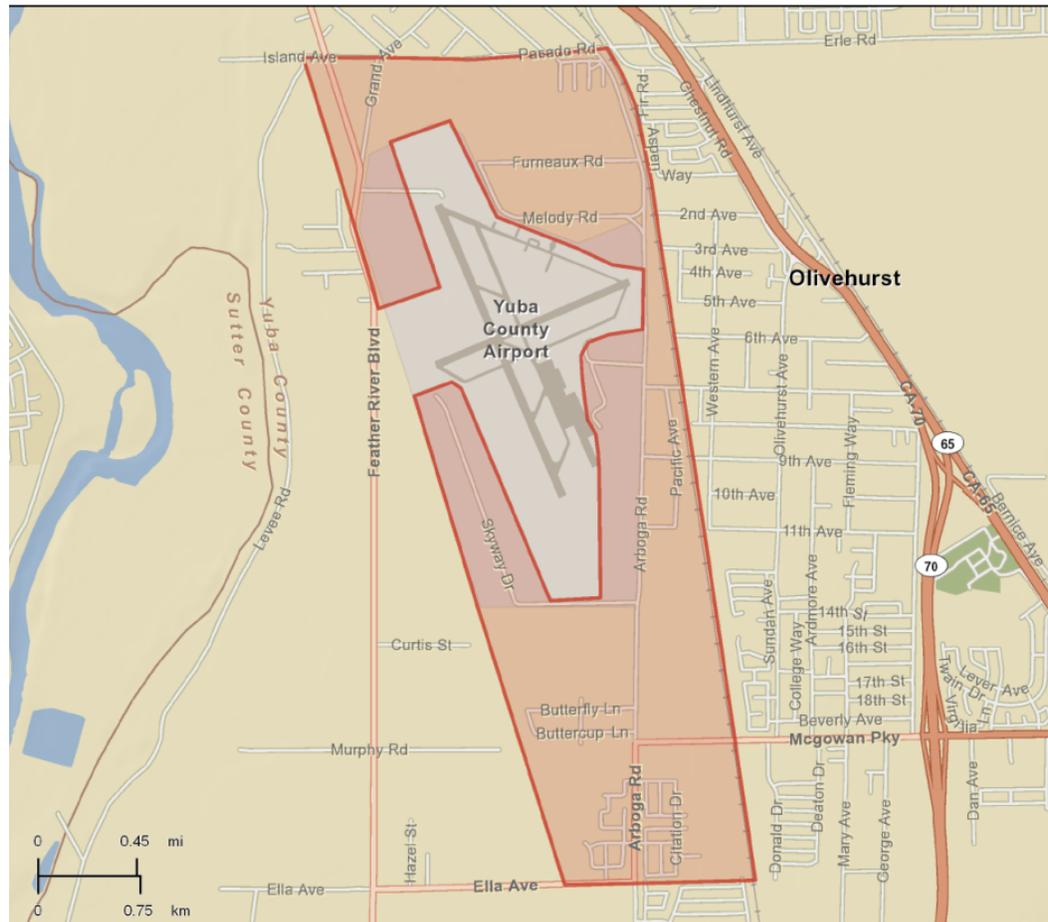
Source: ESRI Business Analyst Online.

Figure E.5 Prospective Sonoma County Airport Smart Growth Area



Source: ESRI Business Analyst Online

Figure E.6 Prospective Yuba County Airport Smart Growth Area



Source: ESRI Business Analyst Online.

Potential increases in development density for each smart growth area are calculated on the bases of: (1) increased floor to area ratio (FAR); and (2) allocation of currently vacant land for economic development. The levels of FAR increases and absorption of vacant land are based on reasonable assumptions based on site visits, current FAR (as estimated) and current land use. Note that the FAR used in this analysis is not as-of-right-zoning maximums, but are the effective building densities based on observation and research. Also, in all four cases, it was assumed that 62 percent to 85 percent of vacant land would remain vacant by 2040. Thus, much more development potential would remain in each smart growth area (see Table E.12)

As displayed in Table E.12 , a 50 percent increase in floor to area ratio is assumed for three of the four Role 2 airport smart growth areas to be in effect by 2040. The exception this is the Castle Airport smart growth area because the current effective FAR is exceptionally low, appearing significantly less than 0.1. Therefore, a future FAR of 0.3 is assumed for the Castle Airport area, which falls on the low end of the ranges of assumed future FARs shown for the other three airport areas.

**Table E.12 Density Changes Assumed for Smart Growth**

Airport Smart Growth Area	Change in FAR		Vacant Land Absorption	
	Percent	Range	Percent	Acres
Castle Airport (Castle Air Base)	N/A	.30	15%	78
Santa Maria Public Airport	50%	.24 - .76	25%	181
Sonoma County Airport	50%	.31 - .38	38%	157
Yuba County Airport	50%	.22 - .74	25%	108

### County Employment Base: 2013 to 2040

The approach used to estimate the potential role of these four Role 2 smart growth areas is based on county- and industry-specific projections to 2040 by Moody’s Analytics adapted to three digit NAICS code. Summing all industries in the county economies shows that that Moody’s Analytics projects the total job base in county that houses a designated Role 2 airport smart growth area will increase between 2013 and 2040. The net overall job growth is expected to be between 14,000 and 114,000 jobs per county (Table E.13).

These projections encompass all sectors of county economies absent of smart growth incentives or other policies. Although, the four counties are expected to experience net job growth by 2040, each of the counties is projected to lose of manufacturing, warehousing and trucking jobs by 2040. The specific sectors that are expected to experience job losses will vary by county. Only sectors that are projected to lose ten or more jobs were counted – to distinguish job losses due to layoffs or minor efficiency gains with business relocation.<sup>68</sup>

There is a possibility that, with incentives, a portion of non-industrial jobs may migrate to smart growth areas, but is also possible that the service and knowledge based industries will continue to expand in areas where they are now located<sup>69</sup>. In addition, the Project Team began this study by assuming that the Role 2 smart growth areas would be prime sites for big-box retail. However, after visiting each site and reviewing local retail patterns, the Project Team concludes that each of the four Role 2 smart growth areas is not suitable as a big-box location for various reasons, which are discussed in the individual area case studies in Section 5.2.

<sup>68</sup>This is admittedly a rough framework, which does not account for the churning of multiple companies in a single sector growing, shrinking or relocating.

<sup>69</sup>Note that these industries were at one time assumed to not migrate to the smart growth districts.

**Table E.13 Total Job Growth Projected by County**

County	Projected Job Increase
Merced	8,895
Santa Barbara	113,720
Sonoma	63,452
Yuba	14,422

Source: Moody's Analytics and EDR Group

Job migration to Role 2 smart growth areas are developed by the following steps. First projections by Moody's Analytics are used to identify sectors at the three-digit NAICS level under manufacturing, warehousing and truck transportation divisions per county that are projected to lose ten or more jobs from 2013 through 2040. These are assumed to be the jobs that could be saved if they could be absorbed in smart growth areas. Total jobs projected to be lost per county and by sector (limited to sectors with losses of ten or more jobs) are shown on Table E.14. As can be seen, the total job losses in these industrial sectors range from 120 jobs in Yuba County to almost 4,300 jobs in Sonoma County.

These jobs could fit into the assumed expanded capacities of the Role 2 smart growth areas for three of the four (Merced, Santa Barbara and Yuba counties), after presuming adjustments in FAR and the development of vacant land. For Sonoma County, however, the jobs projected to be lost exceed the capacity presumed for the airport smart growth area. Although, assumptions could be made to further utilize vacant land or further expand FAR, the Project Team decided to scale back potential job relocation to match the assumptions based on the site visit and the 50 percent change in FAR (Table E.15).

To summarize, the hypothesis presented is that the Role 2 airport smart growth areas will serve to absorb potential industrial-related job losses projected in the directs' host counties from 2013 to 2040. Job losses and company closings of course can stem from multiple causes, including: poor management, searches for dramatically lower wages, and loss of market shares. There is little that smart growth policies can do to mitigate these factors. However, if job dislocation is due to a lack of suitable land, or residential communities that do not want associated social/environmental impacts associated with industrial establishments, then smart growth areas may be an outlet to allow the counties to retain these jobs. For the purposes of this assessment, it is assumed that the development of the areas will be a means for job retention. The job levels assumed to be retained in 2040 due to these areas are shown in Table E.15.

**Table E.14 Manufacturing, Wholesale Trade and Truck Transportation Jobs Projected to be Lost by County**

NAICS Code and Sector	Counties			
	Merced	Santa Barbara	Sonoma	Yuba
311: Food Manufacturing	(756)	(128)	(593)	
312: Beverage & Tobacco Product Mfg	(21)	(347)	(1,000)	(11)
313: Textile Mills			(10)	
314: Textile Products Mfg		(27)	(47)	
315: Apparel Mfg	(13)	(32)	(64)	
316: Leather & Allied Product Mfg				
321: Wood Product Mfg		(19)	(25)	(30)
322: Paper Mfg	(23)		(11)	
323: Printing & Related Support Activities	(199)	(127)	(141)	
324: Petroleum and Coal Products Mfg		(25)		
325: Chemical Mfg		(148)	(73)	
326: Plastics & Rubber Products Mfg		(29)	(139)	
327: Nonmetal Mineral Product Mfg			(38)	
331: Primary Metal Mfg	(11)	(64)		
332: Fabricated Metal Mfg	(45)	(108)	(204)	(19)
333: Machinery Mfg		(25)	(323)	
334: Computer and Electronic Mfg		(270)		
335: Electrical Equipment & Appliance Mfg	(11)			
336: Transportation Equipment Mfg	(219)	(979)	(66)	(20)
337: Furniture and Home Furnishings Mfg		(53)	(163)	(14)
339: Miscellaneous Mfg	(63)	(690)	(789)	
420: Wholesale Trade		(713)	(594)	(26)
484: Truck Transportation	(384)	(375)		
<b>Totals</b>	<b>(1,743)</b>	<b>(4,156)</b>	<b>(4,280)</b>	<b>(120)</b>

Source: Moody's Analytics and EDR Group.

**Table E.15 Adjusted Estimates to Accommodate Additional Capacity of Sonoma County Airport Smart Growth Area**

NAICS Code and Sector	Sonoma County Adjusted Projected Job Losses
311: Food Manufacturing	(593)
312: Beverage & Tobacco Product Mfg	(1,000)
313: Textile Mills	
314: Textile Products Mfg	
315: Apparel Mfg	
316: Leather & Allied Product Mfg	
321: Wood Product Mfg	
322: Paper Mfg	
323: Printing & Related Support Activities	(141)
324: Petroleum and Coal Products Mfg	
325: Chemical Mfg	
326: Plastics & Rubber Products Mfg	(139)
327: Nonmetal Mineral Product Mfg	
331: Primary Metal Mfg	
332: Fabricated Metal Mfg	(204)
333: Machinery Mfg	(323)
334: Computer and Electronic Mfg	
335: Electrical Equipment & Appliance Mfg	
336: Transportation Equipment Mfg	
337: Furniture and Home Furnishings Mfg	(163)
339: Miscellaneous Mfg	(338)
420: Wholesale Trade	(126)
484: Truck Transportation	
<b>Total</b>	<b>(3,026)</b>

Source: Moody's Analytics and EDR Group.

### **Econometric Analysis**

Once the jobs and industries were identified, the Project Team employed the IMPLAN modeling package. IMPLAN was first used to estimate direct effects for personal income, value added and total output (equivalent to business sales/business revenues) that would be saved if businesses perceive the advantage of relocating to the airport smart growth areas by 2040 as opposed to leaving their 2013 county locations, and perhaps California. Secondly the “multiplier impacts” were calculated, which would be the retained economic

activity in the each respective county generated by: (1) directly affected companies using a portion of its business revenue to purchase supplies and services (indirect impacts); and (2) spending of the wages earned by workers due to direct and indirect activities (induced impacts).

Impacts by county are presented in Table E.16, below, which represent the potential retention of jobs, personal income earned by workers, value added (contribution to gross state product) and economic output. The overarching assumption is that the companies represented by these projected job losses to the counties end up not leaving the counties because of the outlet provided by the airport smart growth areas located in the respective four counties, and thus continue to employ local workers and purchase business supplies and services in the respective county economies.

Direct impacts represent the industrial job losses projected by Moody’s Analytics per county from 2013 to 2040, and the dollars (in 2013 value) associated with those jobs in terms of personal income, value added to the economy and output (which is the business revenue that supports the jobs and includes personal income and value added). The multipliers embody the penetration of these direct activities in all sectors of the county economies. As an illustration of the breadth of these impacts, employment by three digit NAICS (North American Industrial Classification Sectors) are presented in Table E.17.

**Table E.16 Direct, Indirect and Induced and Total Impacts by County Due to Jobs Saved in Airport Smart Growth Areas**

County	Impact Type	Jobs	Labor Income	Value Added	Output
			Dollars in \$ Millions, 2013 Value		
Merced	Direct	1,743	\$86	\$123	\$607
	Indirect & Induced	1,259	\$52	\$95	\$165
	<i>Total</i>	<i>3,004</i>	<i>\$138</i>	<i>\$218</i>	<i>\$772</i>
Santa Barbara	Direct	4,159	\$326	\$549	\$1,541
	Indirect & Induced	4,288	\$230	\$370	\$578
	<i>Total</i>	<i>8,447</i>	<i>\$556</i>	<i>\$919</i>	<i>\$2,119</i>
Sonoma	Direct	3,026	\$232	\$357	\$1,098
	Indirect & Induced	3,907	\$188	\$321	\$563
	<i>Total</i>	<i>6,934</i>	<i>\$419</i>	<i>\$678</i>	<i>\$1,661</i>
Yuba	Direct	120	\$8	\$12	\$35
	Indirect & Induced	45	\$2	\$4	\$6
	<i>Total</i>	<i>165</i>	<i>\$11</i>	<i>\$16</i>	<i>\$41</i>

Sources: Moody’s Analytics, IMPLAN, LLC and EDR Group.

Note: Columns may not add due to rounding.

Table E.17 Potential Total Jobs by Sector Saved Per County in Role 2 Smart Growth Areas

Smart Growth Area	Castle Airport (Castle Air Base)				Santa Maria Public Airport				Sonoma County Airport				Yuba County Airport			
County	Merced				Satan Barbara				Sonoma				Yuba			
Impact Type	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
NAICS Code & Description																
111 Crop Farming	0	12	1	12	0	39	5	44	0	205	6	210	0	0	0	0
112 Livestock	0	26	0	27	0	6	0	6	0	150	2	152	0	0	0	0
113 Forestry & Logging	0	3	0	3	0	0	0	0	0	1	0	1	0	0	0	0
114 Fishing- Hunting & Trapping	0	1	0	1	0	0	0	0	0	1	0	1	0	0	0	0
115 Ag & Forestry Services	0	11	1	12	0	15	3	18	0	120	4	124	0	0	0	0
211 Oil & gas extraction	0	0	0	0	0	30	1	31	0	1	0	1	0	0	0	0
212 Mining	0	0	0	0	0	4	0	4	0	1	0	1	0	0	0	0
213 Mining services	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0
221 Utilities	0	5	1	6	0	5	3	8	0	5	2	8	0	0	0	0
230 Construction	0	29	4	33	0	65	18	83	0	48	16	64	0	2	0	2
311 Food products	756	8	0	764	128	1	1	130	593	66	6	664	0	0	0	0
312 Beverage & Tobacco	21	0	0	21	347	3	2	352	1,000	22	5	1,027	11	0	0	11
313 Textile Mills	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
314 Textile Products	13	0	0	13	59	0	0	59	0	0	0	0	0	0	0	0
316 Leather & Allied	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
321 Wood Products	0	0	0	0	19	0	0	20	0	6	1	6	30	0	0	30
322 Paper Manufacturing	23	0	0	23	0	0	0	0	0	0	0	0	0	0	0	0
323 Printing & Related	199	7	1	207	127	2	1	130	141	2	1	144	0	0	0	0
324 Petroleum & coal prod	0	0	0	0	25	1	0	26	0	0	0	0	0	0	0	0
325 Chemical Manufacturing	0	0	0	0	148	6	1	154	0	2	0	3	0	0	0	0
326 Plastics & rubber prod	0	0	0	0	29	0	0	29	139	4	0	143	0	0	0	0
327 Nonmetal mineral prod	0	0	0	0	0	5	0	5	0	11	1	11	0	0	0	0

Smart Growth Area	Castle Airport (Castle Air Base)				Santa Maria Public Airport				Sonoma County Airport				Yuba County Airport			
County	Merced				Satan Barbara				Sonoma				Yuba			
Impact Type	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
NAICS Code & Description																
331 Primary metal mfg	11	0	0	11	64	1	0	66	0	0	0	0	0	0	0	0
332 Fabricated metal prod	45	1	0	46	108	2	0	110	204	4	0	208	19	0	0	19
333 Machinery Mfg	0	0	0	0	25	0	0	25	323	1	0	324	0	0	0	0
334 Computer & other electronics	0	0	0	0	270	2	0	272	0	1	0	1	0	0	0	0
335 Electrical equipment & appliances	11	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0
336 Transportation equipment	219	0	0	219	979	1	0	980	0	0	0	0	20	0	0	20
337 Furniture & related prod	0	0	0	0	53	0	0	53	163	0	0	163	14	0	0	14
339 Miscellaneous mfg	63	0	0	63	690	2	0	692	338	1	1	340	0	0	0	0
42 Wholesale Trade	0	39	8	47	713	98	34	846	126	140	48	314	26	2	1	29
441 Motor vehicle & parts dealers	0	2	12	14	0	6	39	45	0	4	34	38	0	0	0	0
442 Furniture & home furnishings	0	0	2	2	0	2	13	15	0	1	10	11	0	0	0	0
443 Electronics & appliances stores	0	0	3	3	0	2	13	15	0	2	10	11	0	0	0	0
444 Bldg materials & garden dealers	0	2	8	10	0	5	20	25	0	4	20	24	0	0	0	0
445 food & beverage stores	0	4	25	29	0	14	77	91	0	10	65	75	0	0	1	1
446 Health & personal care stores	0	1	7	8	0	6	30	36	0	3	20	23	0	0	0	0
447 Gasoline stations	0	0	5	5	0	1	12	13	0	1	11	12	0	0	0	0
448 Clothing & accessories stores	0	1	8	9	0	7	41	48	0	5	33	38	0	0	0	0
451 Sports- hobby- book & music stores	0	1	4	5	0	4	21	25	0	3	19	21	0	0	0	0
452 General merchandise stores	0	5	29	34	0	12	66	77	0	7	48	55	0	0	1	1
453 Misc retailers	0	1	9	11	0	8	42	50	0	6	37	43	0	0	0	0
454 Non-store retailers	0	1	10	11	0	4	32	36	0	4	35	38	0	0	0	0
481 Air transportation	0	0	0	0	0	2	2	4	0	2	3	5	0	0	0	0

Smart Growth Area	Castle Airport (Castle Air Base)				Santa Maria Public Airport				Sonoma County Airport				Yuba County Airport			
County	Merced				Satan Barbara				Sonoma				Yuba			
Impact Type	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
NAICS Code & Description																
482 Rail Transportation	0	2	0	2	0	3	0	4	0	0	0	0	0	0	0	0
483 Water transportation	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0
484 Truck transportation	384	126	6	516	375	59	9	443	0	99	11	110	0	3	0	3
485 Transit & ground passengers	0	2	3	5	0	3	5	7	0	5	10	15	0	0	0	0
486 Pipeline transportation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
487 Sightseeing transportation	0	4	0	5	0	20	4	24	0	33	7	40	0	1	0	1
492 Couriers & messengers	0	5	0	6	0	28	4	32	0	17	7	24	0	0	0	0
493 Warehousing & storage	0	19	1	21	0	40	5	45	0	10	2	12	0	0	0	0
511 Publishing industries	0	1	0	1	0	13	3	17	0	4	2	6	0	0	0	0
512 Motion picture & sound recording	0	0	1	1	0	1	5	6	0	1	4	5	0	0	0	0
515 Broadcasting	0	2	1	3	0	9	2	11	0	6	2	8	0	0	0	0
516 Internet publishing and broadcasting	0	0	0	0	0	2	1	3	0	1	0	1	0	0	0	0
517 Telecommunications	0	9	5	14	0	7	5	12	0	10	8	18	0	0	0	0
518 Internet & data process services	0	0	0	0	0	1	2	3	0	0	1	1	0	0	0	0
519 Other information services	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
521 Monetary authorities	0	9	5	14	0	25	28	53	0	27	24	51	0	0	0	1
522 Credit inmediation & related	0	2	1	3	0	4	5	10	0	9	11	20	0	0	0	0
523 Securities & other financial	0	7	4	11	0	54	53	106	0	57	62	119	0	1	0	1
524 Insurance carriers & related	0	2	3	6	0	8	22	31	0	6	26	32	0	0	0	0
525 Funds- trusts & other finance	0	0	0	0	0	0	16	16	0	0	9	9	0	0	0	0

Smart Growth Area	Castle Airport (Castle Air Base)				Santa Maria Public Airport				Sonoma County Airport				Yuba County Airport			
County	Merced				Satan Barbara				Sonoma				Yuba			
Impact Type	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
NAICS Code & Description																
531 Real estate	0	9	24	33	0	48	192	239	0	49	156	205	0	0	1	1
532 Rental & leasing services	0	8	2	9	0	16	7	23	0	14	6	20	0	0	0	0
533 Lessor of nonfinance intangible assets	0	1	0	1	0	3	0	4	0	2	0	2	0	0	0	0
541 Professional- scientific & tech services	0	87	15	102	0	472	101	572	0	345	101	446	0	5	1	5
551 Management of companies	0	58	1	59	0	150	6	156	0	85	4	89	0	2	0	2
561 Admin support services	0	111	16	127	0	406	113	519	0	188	77	265	0	4	1	4
562 Waste mgmt & remediation services	0	4	1	6	0	7	5	12	0	7	5	12	0	0	0	0
611 Educational services	0	0	5	5	0	1	78	79	0	1	58	59	0	0	0	0
621 Ambulatory health care	0	0	44	44	0	0	191	191	0	0	132	132	0	0	1	1
622 Hospitals	0	0	17	17	0	0	95	95	0	0	58	58	0	0	2	2
623 Nursing & residential care	0	0	20	20	0	0	75	75	0	0	59	59	0	0	1	1
624 Social assistance	0	0	33	33	0	0	79	79	0	0	84	84	0	0	1	1
712 Performing arts & spectator sports	0	6	6	12	0	14	20	34	0	21	33	54	0	0	0	0
712 Museums & similar	0	0	0	0	0	0	4	4	0	0	2	2	0	0	0	0
713 Amusement- gambling & recreation	0	1	10	11	0	5	48	53	0	4	41	45	0	0	0	0
721 Accommodations	0	0	0	0	0	1	3	4	0	1	2	3	0	0	0	0
722 Food services & drinking places	0	26	57	83	0	78	255	333	0	61	205	267	0	1	2	3
811 Repair & maintenance	0	28	10	39	0	51	33	85	0	42	30	72	0	1	0	1

Smart Growth Area	Castle Airport (Castle Air Base)				Santa Maria Public Airport				Sonoma County Airport				Yuba County Airport			
County	Merced				Satan Barbara				Sonoma				Yuba			
Impact Type	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
NAICS Code & Description																
812 Personal & laundry services	0	1	8	9	0	6	48	54	0	3	44	47	0	0	0	0
813 Religious- grantmaking- & similar orgs	0	4	14	18	0	15	76	91	0	11	55	66	0	0	1	1
814 Private households	0	0	12	12	0	0	25	25	0	0	23	23	0	0	1	1
92 Government & non NAICs	0	79	21	100	0	208	70	279	0	97	53	149	0	3	1	5
<b>Totals</b>	<b>1,743</b>	<b>774</b>	<b>486</b>	<b>3,004</b>	<b>4,159</b>	<b>2,120</b>	<b>2,168</b>	<b>8,447</b>	<b>3,026</b>	<b>2,061</b>	<b>1,846</b>	<b>6,934</b>	<b>120</b>	<b>27</b>	<b>19</b>	<b>165</b>

Sources: Moody's Analytics, IMPLAN, LLC and EDR Group.

Note: Columns may not add due to rounding.

## Site Visits and Interviews

The consultant team traveled to and drove through the project area for all eight airports included in the smart growth study. Photographs were taken and notes were compiled on the existing land uses, the business types in place and the conditions of vacant sites and land areas. Key people contacted via email or phones were asked questions about economic development, land use policies and their opinions about each project area’s smart growth potential. The persons interviewed listed in Table E.18 below, sorted by their airport location.

**Table E.18 List of Persons Interviewed, by Airport Location**

Buchanan Field	Carol Johnson <i>City of Concord Planning Manager</i>
	John Montagh <i>City of Concord Economic Development Director</i>
Gillespie Field	Marie Jo Diamond <i>San Diego East County Economic Development Council</i>
	Melanie Kush <i>City of Santee Planning and Zoning Manager</i>
	Dana Quittner <i>San Diego County Planning Department</i>
	Manjeet Ranu <i>City of El Cajon Planning Manager</i>
Santa Monica	David Martin <i>City of Santa Monica Planning Manager</i>
Fresno-Yosemite Airport	Sophia Pagoulatos <i>City of Fresno Supervising Planner</i>
	Jennifer Clark <i>City of Fresno Department of Development &amp; Resource Management Director</i>
	Dwight Kroll <i>City of Clovis Planning Director</i>

# F. Rating and Categorizing Airports

This memorandum describes how we categorized the remaining airports for study by Smart Growth role and recommends a set for quantitative economic analysis and a set for qualitative analysis.

The 20 remaining airports for study are listed in Table F.1.

## F.1 SMART GROWTH ROLES

Previously, we identified four possible roles airports could play in supporting Smart Growth. These are:

1. **Smart Growth Node:** A limited number of airports are potential sites for Smart Growth. These airports have some competitive advantages compared to the surrounding region to attract Smart Growth. Given airport noise will be problematic for residential development, these airports will likely attract commercial and industrial Smart Growth.
2. **Retainer and Attractor of Non-Smart Growth:** Some airports have the potential to accommodate commercial or industrial development that does not conform to Smart Growth policies. In these situations, the retention and attraction of non-Smart Growth development at the airport would allow other parts of the region to pursue Smart Growth.
3. **Transit Hub:** Some airports may be located where a new or expanded transit or park-n-ride hub would encourage regional transit usage.
4. **Land Banking:** Some airports could serve as a land bank that would provide capacity for future Smart Growth.

**Table F.1 Remaining Airports for Study**

<b>Airport Name</b>	<b>County</b>	<b>Type</b>
Gillespie Field	San Diego	Regional
Fresno Yosemite Int'l	Fresno	Commercial/Primary
Concord-Buchanan Field	Contra Costa	Metropolitan
Santa Maria	Santa Barbara	Commercial/Primary
Castle	Merced	Community
Yuba County	Yuba	Regional
Sonoma County	Sonoma	Commercial/Primary
Livermore Municipal	Alameda	Metropolitan
Napa County	Napa	Regional
Auburn	Placer	Community
Gravelly Valley	Lake	Limited Use
Dinsmore	Humboldt	Limited Use
Hollister	San Benito	Regional
Redding Municipal	Shasta	Commercial/Primary
Santa Monica	Los Angeles	Metropolitan
Van Nuys	Los Angeles	Metropolitan
San Diego Int'l	San Diego	Commercial/Primary
Hayward Executive	Alameda	Metropolitan
Cameron	El Dorado	Community
Blue Canyon	Placer	Limited Use

### **Characteristics Supporting Smart Growth**

Previously (see Appendix B), we identified 11 characteristics supportive of Smart Growth:

1. Surrounding population density
2. Surrounding employment density
3. Good supporting multimodal transportation infrastructure
4. Permanence of transportation infrastructure
5. Easy to walk around.
6. Potential for supportive parking environment
7. Amenities within ½ mile

8. Availability of land on or off airport for development
9. Suitability of land for development
10. Proximity to service infrastructure (e.g., water, sewer, fire, police)
11. Community stance on developing the surrounding area

## Rating the Airports

Using research on each of the airports and interviews conducted with each of the airports, we rated each airport on each of the 11 characteristics. The ratings are shown in Table F.2.

For more details on the definitions of each of the ratings, see Table 3.

## Categorizing the Airports

We used weighted scoring to identify airports for the four Smart Growth roles. The scores were developed by:

- Assigning a numerical score to each of the ratings (see Table 4); and then
- Assigning a weight to each of the 11 characteristics (see Table 5).

A score of -100 is assigned to the None rating, which is only used for the availability of land for development and suitability of land for development characteristics. This is because an airport with no available and suitable land for development (or redevelopment) is not a viable candidate for either of the two Smart Growth roles using these two characteristics.

**Table F.2 Assignment of Scores to Ratings**

Rating	Score
None	-100
n/a	0
Unknown	0
Poor	0
Potential	1
Redevelop	2
Modest	2
Good	3
Very Good	4

For Role 1 (Smart Growth Node), all 11 characteristics come into play. The availability and suitability of land for development (or redevelopment) and the surrounding employment density are the most important, followed by the surrounding population density.

For Role 2 (Retainer and Attractor of Non-Smart Growth), six of the 11 characteristics come into play (i.e., the characteristics with non-zero weights in Table 5). Again, the availability and suitability of land for development (or redevelopment) are the most important. Surrounding population density and surrounding employment density play a role, but are not as critical as for Role 1. Many of the other characteristics do not come into play for Role 2 because they are not necessary for non-Smart Growth. For example, it is not important to have multimodal transportation infrastructure or nearby amenities to have non-Smart Growth.

For Role 3 (Transit Hub), the two multimodal transportation related characteristics come into play.

The resulting weighted scores for role 1 (Smart Growth Node) are shown in Table 6. The top eight airports in this table show potential to be a Smart Growth node. The four airports with the highest score (highlighted in light red) are recommended for quantitative economic analysis. The next four highest scores (highlighted in light green) are recommended for qualitative analysis.

The resulting weighted scores for Role 2 (Retainer and Attractor of Non-Smart Growth) are shown in Table F.7. The airports recommended for Role 1 quantitative economic analysis are greyed out. The top seven remaining airports in this table show potential to be a retainer and attractor of non-Smart Growth development. The four airports with the highest score (highlighted in light red) are recommended for quantitative economic analysis. The next three highest scores (highlighted in light green) are recommended for qualitative analysis.

The resulting weighted scores for Role 3 (Transit Hub) are shown in Table 8. The top four airports in this table show potential to be transit hubs. The four airports with the highest score (highlighted in light green) are recommended for qualitative analysis. We do not plan to conduct quantitative analysis for Role 3 airports.

The remaining airports (i.e., not highlighted in Tables 6, 7, or 8) are Role 4 (Land Bank) airports.

Appendix 1. Characteristics Rating and Categorizing Tables

**Table 2 Rating Airports by Smart Growth Supportive Characteristics**

Airport Name	Surrounding population density	Surrounding employment density	Supporting multi-modal transportation infrastructure (auto, transit, bicycle, walking)	Permanence of multi-modal transportation infrastructure	Easy to walk around (e.g., block length, continuous sidewalks, lighting, street width)	Potential for supportive parking environment	Amenities within ½ mile	Availability of land on or off airport for development	Suitability of land for development (e.g., not steep slope, floodplain, stream)	Proximity to service infrastructure (e.g., water, sewer, fire, police)	Community stance on developing surrounding area
Blue Canyon	Poor	Poor	Poor	n/a	Poor	Poor	Poor	None	None	Poor	Poor
Castle	Modest	Modest	Poor	n/a	Modest	Potential	Poor	Very Good	Good	Modest	Modest
Concord-Buchanan Field	Good	Good	Potential	n/a	Poor	Potential	Good	Good	Good	Good	Good
Gravelly Valley	Poor	Poor	Poor	n/a	Poor	Potential	Poor	Very Good	Good	Poor	Good
Livermore Municipal	Modest	Modest	Potential	n/a	Poor	Potential	Modest	Good	Good	Good	Modest
San Diego Int'l	Good	Good	Good	Poor	Poor	Potential	Good	Redevelop	Good	Good	Unknown
Santa Monica	Good	Good	Good	Poor	Modest	Potential	Good	Redevelop	Good	Good	Unknown
Van Nuys	Good	Good	Modest	Poor	Modest	Potential	Good	Redevelop	Good	Good	Unknown
Yuba County	Modest	Modest	Poor	n/a	Poor	Potential	Modest	Very Good	Good	Modest	Modest
Cameron	Modest	Poor	Poor	n/a	Poor	Potential	Poor	None	None	Modest	Poor
Dinsmore	Poor	Poor	Poor	n/a	Poor	Potential	Poor	Very Good	Good	Poor	Good
Hayward Executive	Good	Good	Poor	n/a	Modest	Potential	Good	Redevelop	Good	Good	Unknown
Hollister	Poor	Poor	Poor	n/a	Poor	Potential	Poor	Very Good	Good	Poor	Good
Napa County	Poor	Modest	Poor	n/a	Poor	Potential	Poor	Very Good	Good	Modest	Good
Redding Municipal	Poor	Poor	Poor	n/a	Poor	Potential	Poor	Very Good	Good	Poor	Good
Sonoma County	Poor	Good	Poor	n/a	Poor	Potential	Poor	Very Good	Good	Good	Good
Fresno Yosemite Int'l	Modest	Good	Good	Poor	Modest	Potential	Modest	Good	Good	Good	Good
Gillespie Field	Modest	Good	Good	Good	Modest	Potential	Modest	Good	Good	Good	Poor
Auburn	Modest	Modest	Poor	n/a	Poor	Potential	Poor	Good	Good	Modest	Good
Santa Maria	Modest	Modest	Modest	Poor	Poor	Potential	Modest	Very Good	Good	Modest	Good

Table 3 Definition of Ratings

Rating	Surrounding population density	Surrounding employment density	Supporting multimodal transportation infrastructure	Permanence of multimodal transportation infrastructure	Easy to walk around	Potential for supportive parking environment	Amenities within ½ mile	Availability of land for development	Suitability of land for development	Proximity to service infrastructure	Community stance on developing surrounding area
None								No to little land available for development	Not applicable because no or little land available for development		
n/a				Not applicable because no or little existing multimodal capability							
Poor	No or little population in vicinity	No or little employment in vicinity	Currently no or little multimodal capability	Existing multimodal transportation provided by buses, which are not	Few positive walking environment features	Obstacles prevent development of supportive parking	No to little amenities within 1/2 mile			No to little service infrastructure nearby	High resistance to development in surrounding area
Potential			Currently no or little multimodal capability, but has potential			Potential to develop supporting parking environment					
Revelop								Possible, but requires redevelopment of existing uses			
Modest	Some population in vicinity	Some businesses in vicinity	Existing bus service		Some positive walking environment features		Some amenities within 1/2 mile			Modest service infrastructure nearby	Some community concerns with development
Good	High population in vicinity	High businesses in vicinity	Frequent existing bus or rail service	Existing multimodal transportation provided by rail, which is			Several amenities within 1/2 mile	Land available for development	Land suitable for development	Service infrastructure nearby	Little or no resistance to development nearby
Very Good								Considerable land available for development			

**Table 5 Weighting of Smart Growth Characteristics**

Smart Growth Role	Surrounding population density	Surrounding employment density	Supporting multimodal transportation infrastructure	Permanence of multimodal transportation infrastructure	Easy to walk around	Potential for supportive parking environment	Amenities within ½ mile	Availability of land for development	Suitability of land for development	Proximity to service infrastructure	Community stance on developing surrounding area
Role 1 (Smart Growth Node)	3	4	1	1	1	1	1	4	4	1	1
Role 2 (Retain, Attract Non-Smart Growth)	2	3						4	4	1	1
Role 3 (Transit Hub)			1	1							

**Table 6 Identifying Airports for Role 1 (Smart Growth Node)**

Airport Name	Surrounding population density	Surrounding employment density	Supporting multimodal transportation infrastructure	Permanence of multimodal transportation infrastructure	Easy to walk around	Potential for supportive parking environment	Amenities within ½ mile	Availability of land on or off airport for development	Suitability of land for development	Proximity to service infrastructure	Community stance on developing surrounding area	Role 1 Score
Concord-Buchanan Field	Good	Good	Potential	n/a	Poor	Potential	Good	Good	Good	Good	Good	56
Fresno Yosemite Int'l	Modest	Good	Good	Poor	Modest	Potential	Modest	Good	Good	Good	Good	56
Gillespie Field	Modest	Good	Good	Good	Modest	Potential	Modest	Good	Good	Good	Poor	56
Santa Monica	Good	Good	Good	Poor	Modest	Potential	Good	Redevelop	Good	Good	Unknown	53
Van Nuys	Good	Good	Modest	Poor	Modest	Potential	Good	Redevelop	Good	Good	Unknown	52
San Diego Int'l	Good	Good	Good	Poor	Poor	Potential	Good	Redevelop	Good	Good	Unknown	51
Hayward Executive	Good	Good	Poor	n/a	Modest	Potential	Good	Redevelop	Good	Good	Unknown	50
Santa Maria	Modest	Modest	Modest	Poor	Poor	Potential	Modest	Modest	Good	Modest	Good	49
Castle	Modest	Modest	Poor	n/a	Modest	Potential	Poor	Very Good	Good	Modest	Modest	49
Yuba County	Modest	Modest	Poor	n/a	Poor	Potential	Modest	Very Good	Good	Modest	Modest	49
Livermore Municipal	Modest	Modest	Potential	n/a	Poor	Potential	Modest	Good	Good	Good	Modest	47
Sonoma County	Poor	Good	Poor	n/a	Poor	Potential	Poor	Very Good	Good	Good	Good	47
Auburn	Modest	Modest	Poor	n/a	Poor	Potential	Poor	Good	Good	Modest	Good	44
Napa County	Poor	Modest	Poor	n/a	Poor	Potential	Poor	Very Good	Good	Modest	Good	42
Gravelly Valley	Poor	Poor	Poor	n/a	Poor	Potential	Poor	Very Good	Good	Poor	Good	32
Dinsmore	Poor	Poor	Poor	n/a	Poor	Potential	Poor	Very Good	Good	Poor	Good	32
Hollister	Poor	Poor	Poor	n/a	Poor	Potential	Poor	Very Good	Good	Poor	Good	32
Redding Municipal	Poor	Poor	Poor	n/a	Poor	Potential	Poor	Very Good	Good	Poor	Good	32
Cameron	Modest	Poor	Poor	n/a	Poor	Potential	Poor	None	None	Modest	Poor	-791
Blue Canyon	Poor	Poor	Poor	n/a	Poor	Poor	Poor	None	None	Poor	Poor	-800
<b>Maximum Score</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Modest</b>	<b>Potential</b>	<b>Good</b>	<b>Very Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>67</b>

**Table 7 Identifying Airports for Role 2 (Retain, Attract Non-Smart Growth)**

Airport Name	Surrounding population density	Surrounding employment density	Availability of land on or off airport for development	Suitability of land for development	Proximity to service infrastructure	Community stance on developing surrounding area	Role 2 Score
Concord-Buchanan Field	Good	Good	Good	Good	Good	Good	45
Sonoma County	Poor	Good	Very Good	Good	Good	Good	43
Fresno Yosemite Int'l	Modest	Good	Good	Good	Good	Good	43
Santa Maria	Modest	Modest	Very Good	Good	Modest	Good	43
Castle	Modest	Modest	Very Good	Good	Modest	Modest	42
Yuba County	Modest	Modest	Very Good	Good	Modest	Modest	42
Gillespie Field	Modest	Good	Good	Good	Good	Poor	40
Livermore Municipal	Modest	Modest	Good	Good	Good	Modest	39
Napa County	Poor	Modest	Very Good	Good	Modest	Good	39
Auburn	Modest	Modest	Good	Good	Modest	Good	39
Redding Municipal	Poor	Modest	Very Good	Good	Good	Good	37
San Diego Int'l	Good	Good	Redevelop	Good	Good	Unknown	38
Santa Monica	Good	Good	Redevelop	Good	Good	Unknown	38
Van Nuys	Good	Good	Redevelop	Good	Good	Unknown	38
Hayward Executive	Good	Good	Redevelop	Good	Good	Unknown	38
Gravelly Valley	Poor	Poor	Very Good	Good	Poor	Good	31
Dinsmore	Poor	Poor	Very Good	Good	Poor	Good	31
Hollister	Poor	Poor	Very Good	Good	Poor	Good	31
Cameron	Modest	Poor	None	None	Modest	Poor	-794
Blue Canyon	Poor	Poor	None	None	Poor	Poor	-800
<b>Maximum Score</b>	<b>Good</b>	<b>Good</b>	<b>Very Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>49</b>

Note: Grey text denotes airports selected for Role 1.

**Table 8 Identifying Airports for Role 3 (Transit Hub)**

Airport Name	Supporting multimodal transportation infrastructure	Permanence of multimodal transportation infrastructure	Role 3 Score
Gillespie Field	Good	Good	6
San Diego Int'l	Good	Poor	3
Santa Monica	Good	Poor	3
Fresno Yosemite Int'l	Good	Poor	3
Sonoma County	Poor	n/a	3
Van Nuys	Modest	Poor	2
Santa Maria	Modest	Poor	2
Concord-Buchanan Field	Potential	n/a	1
Livermore Municipal	Potential	n/a	1
Blue Canyon	Poor	n/a	0
Castle	Poor	n/a	0
Gravelly Valley	Poor	n/a	0
Yuba County	Poor	n/a	0
Cameron	Poor	n/a	0
Dinsmore	Poor	n/a	0
Hayward Executive	Poor	n/a	0
Hollister	Poor	n/a	0
Napa County	Poor	n/a	0
Redding Municipal	Poor	n/a	0
Auburn	Poor	n/a	0
<b>Maximum Score</b>	<b>Good</b>	<b>Good</b>	<b>6</b>

*Appendix 2 : Multimodal Transportation at Airports*

The following are notes on multimodal transportation at the airports in Table 8 with score of two or greater.

Santa Monica	Big Blue Bus, fairly frequent
Van Nuys	FlyAway bus
Fresno Yosemite International	Two FAX routes, each every 30 min
McClellan-Palomar	Existing NCTD bus
Gillespie Field	Green Line LRT at the corner of airport, somewhat removed from existing development
Santa Maria	Existing SMAT bus