Center for Community Innovation

INDUSTRIAL LAND AND JOBS STUDY FOR THE SAN FRANCISCO BAY AREA

INDUSTRIAL LAND SUPPLY AND DEMAND

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INTRODUCTION

This Technical Memo is the first product from the Industrial Land and Jobs Study, which complements the 2015 MTC Goods Movement Needs Assessment. This study analyzes the demand for and supply of industrially zoned land in the nine-county region, both now and in the future.

CHARACTERIZING THE DEMAND FOR INDUSTRIAL LAND

The demand for industrial land has shifted dramatically as the economy has restructured from manufacturing to services. This section examines the trends in industrial land demand, based on both interviews with 12 experts in real estate and logistics, and a review of relevant literature. Trends in industrial space and logistics add up to a mixed picture in terms of the need for and location of industrial land. Changes in warehousing are generally leading to smaller spaces, except for the large warehouses on the periphery demanded by e-commerce giants. Yet, the overall demand for warehousing space is increasing dramatically due to the rise of just-in-time delivery. Likewise, trends in the maker movement, sustainability, technology, and productivity are also creating a demand for smaller spaces, mostly in the core, but to the extent that manufacturing firms are in-sourcing, impacts are likely to be in the periphery. At the same time, transportation needs are generally demanding more space in core areas, for both loading and parking.

INDUSTRIAL LANDS INVENTORY

The goal of the analysis in this section is to determine the supply of industrially zoned land in the nine-county Bay Area. The analysis found almost 98,000 acres of industrially zoned land located in the nine-county region (Figure A). Notable differences among sub-regions are the concentration of heavy industrial land in the East Bay, the reliance on mixed use-commercial zones in the Peninsula, and in general, the mixture of industrial and office uses (industrial-office) in both the Peninsula and the South Bay. Alameda County has the most industrial land, followed by Contra Costa, Santa Clara, and Solano. Yet, despite this concentration, market activity is largely concentrated in San Francisco and Santa Clara counties.

BUILDINGS ON INDUSTRIAL LAND

This section describes built space and occupancy patterns on industrial land based on private real estate data from CBRE that captures the amount of industrial space available and the value of those spaces. In sum, outside of San Francisco much of the Bay Area's industrial land is occupied at very low densities, perhaps to accommodate parking, loading, and other surface uses. Warehouses comprise half of the region's stock, with R&D comprising another 30% (Table A). Warehouse development dominates in every sub-region except the South Bay, where R&D is concentrated. New construction is occurring mostly in the East and North Bay. There is a significant amount of older stock, particularly in San Francisco, Alameda, San Mateo, and Marin counties. Rents are generally high and have recovered from the recession, particularly in San Francisco and the Peninsula, and for R&D (Figure B). Vacancy rates are now reaching historic lows, except for R&D (Figure C).

	Total Stock (sqft)	% R&D	% Warehouse	% Manufacturing	% Other
East Bay	247,027	20%	60%	19%	1%
South Bay	180,702	**53%**	29%	14%	4%
North Bay	54,189	7%	76%	16%	1%
Peninsula	50,220	26%	54%	15%	5%
San Francisco	30,444	23%	64%	7%	7%

Table A. Industrial Building Stock by Type (2015)
Source: CBRE

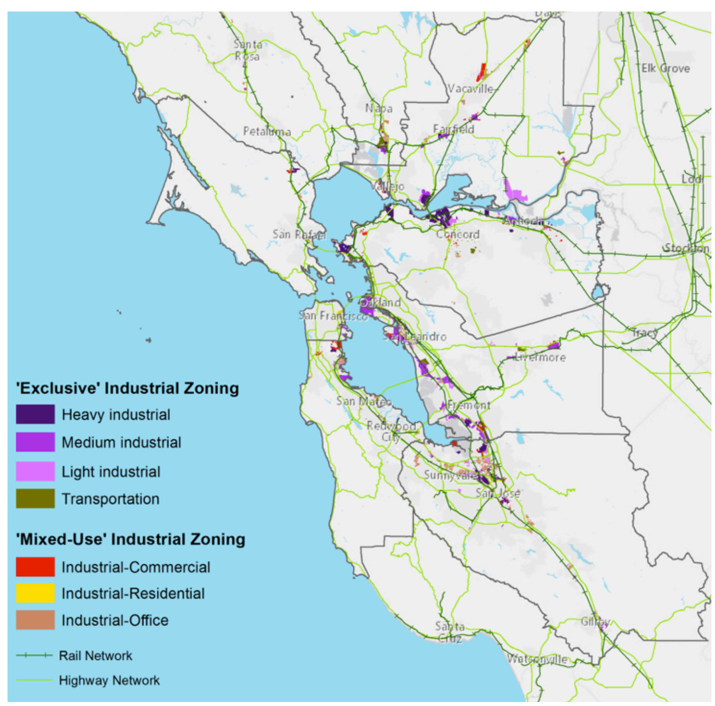


Figure A. Industrially zoned land in the San Francisco Bay Area (nine counties and inner Bay Area).

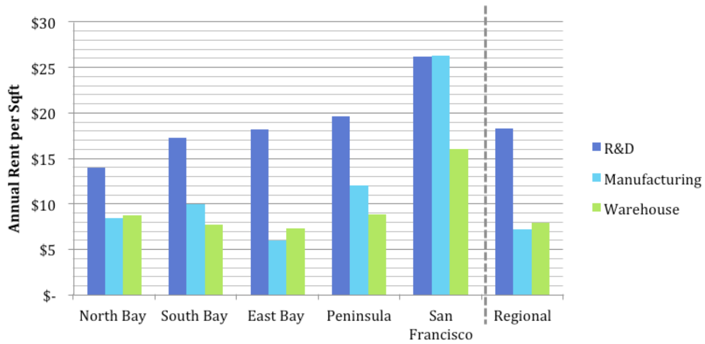


Figure B. 2014 Annual Industrial Rents[1]
Source: CBRE

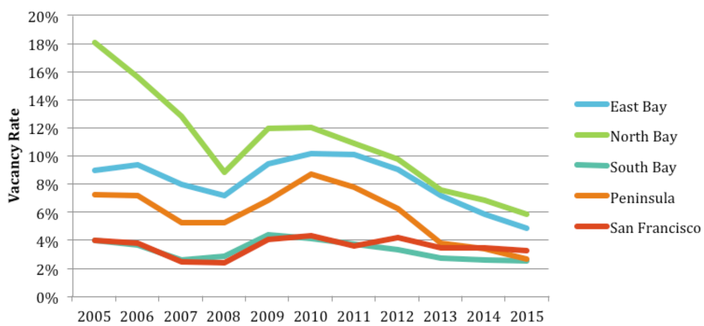


Figure C. Vacancy Rates, 2005 -2015
Source: CBRE

BUSINESS TRENDS ON INDUSTRIALLY ZONED LAND

Industrial businesses locate in many different zones. For instance, a small construction contractor might operate out of a home in a residential district. Larger contractors are more likely to be dependent on industrially zoned land. Likewise, auto repair shops can be found as readily in commercial zones as on industrial land. Tech businesses are found throughout all types of zones, depending on their size and production process (e.g., whether they are conducting manufacturing, software design, research and development, or some combination). At the same time, industrial land, whether exclusive or mixed-use, also houses many types of businesses. For instance, older retail establishments such as corner stores or diners may be grandfathered into industrial zones. Flexible zoning regulations on industrial land may permit a great variety of uses, from government offices to professional services.

For this analysis we examined the distribution of businesses across industrially zoned and other land in all nine counties, to determine what type of industries were concentrated on industrial land. We develop a typology based on the location quotient (LQ), which measures the concentration of industries in a particular area relative to the larger region within which it sits (the reference region).

This analysis differentiates between the industrial land-dependent industries that are located throughout the region, and the industrial land-dependent businesses that are actually located on industrially zoned land (Figure D). As this diagram illustrates, the industrial land-dependent businesses on industrial land are a subset of the industrial land-dependent businesses throughout the region. For our projections of industrial land demand, we analyze both trends in these businesses on industrial land and the larger set of industrial land-dependent businesses. This latter group of businesses may be considered the latent demand for industrially zoned land. Overall, our analysis found that in 2011, there were 205,561 jobs in industrial land-dependent industries actually located on industrially zoned land, and 600,824 industrial land-dependent jobs overall in the region.

Figure E maps the location of the industries identified as highly dependent on exclusive industrial

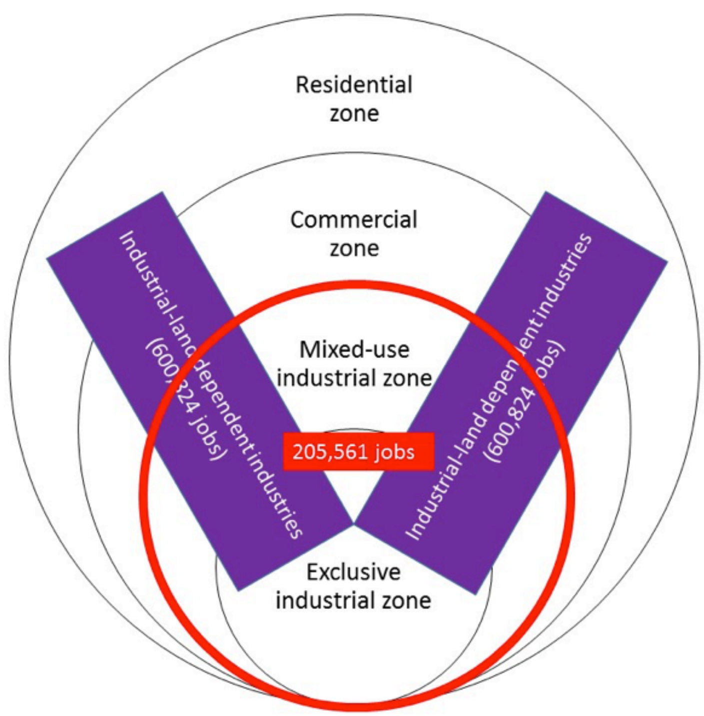


Figure D. Location of industrially zoned land and industrial land-dependent jobs.

zoning in the region (based on the location quotient, which measures the concentration of industries in a particular area relative to the larger region within which it sits, or the reference region). This map sums Dun & Bradstreet/NETS employment (for 2011) by block group. The greatest concentrations of industrial land-dependent employment occur in southern Alameda County (from San Leandro to Fremont) and northern Santa Clara County (primarily San Jose). Other concentrations occur near SFO, along the Northern Waterfront, and near Livermore. These concentrations suggest where the region might want to consider more stringent protections for industrial land in the future, in order to support regional economic growth.

About 9% of industrial-land dependent jobs move in an average year, with most moves occurring within the nine-county region. Cities experiencing the most churn include Santa Clara, San Jose, Fremont, Milpitas, and San Francisco. San Francisco industrial areas are more likely to experience move-outs than move-ins. Areas that are top job gainers and not losers include Hayward, SFO, Oakland, and Pleasanton. Figure F shows the net change in industrial land-dependent jobs due to moves in the Bay Area from 1990 to 2012.

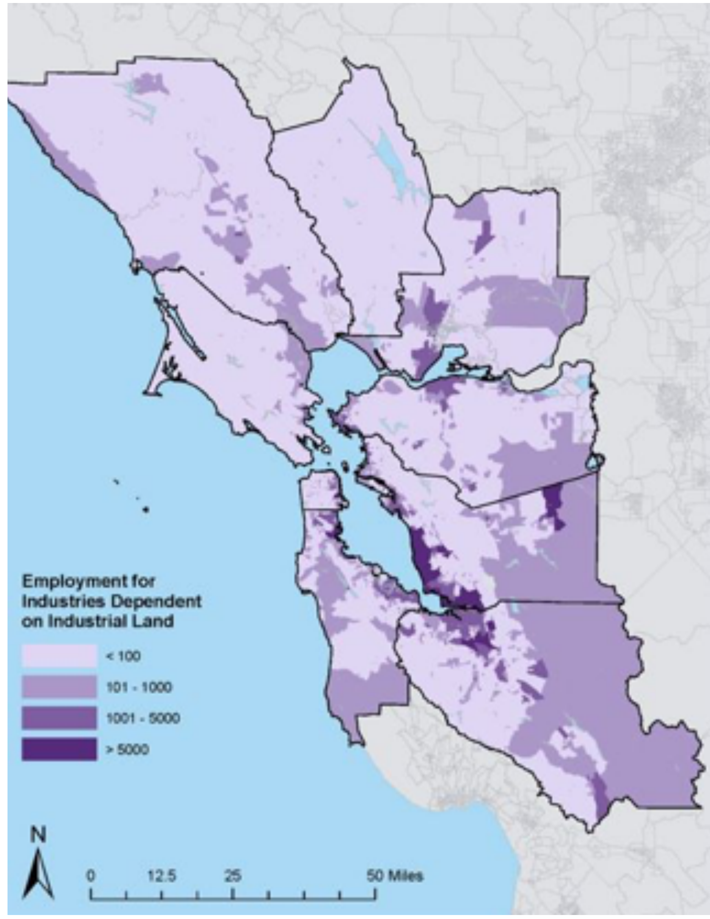


Figure E. Employment in Industries Dependent on Exclusive Industrial Land.

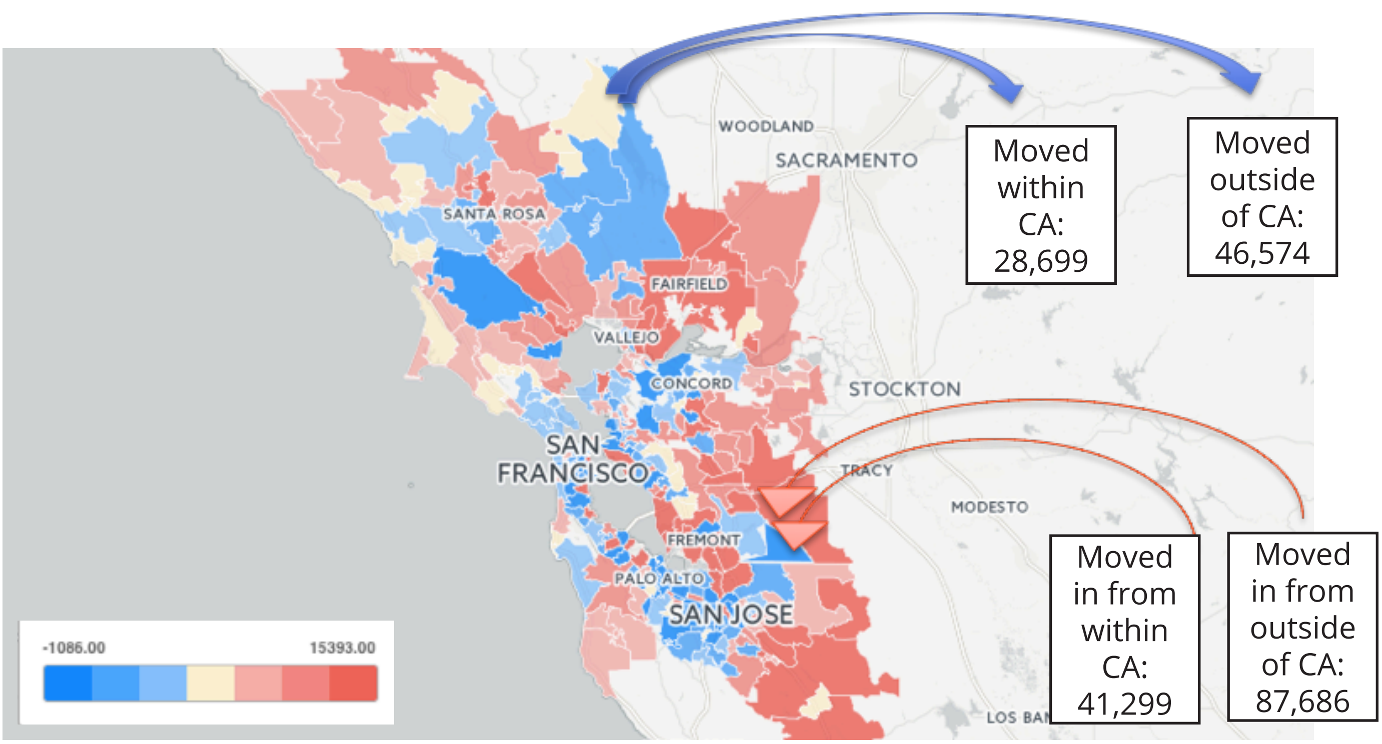
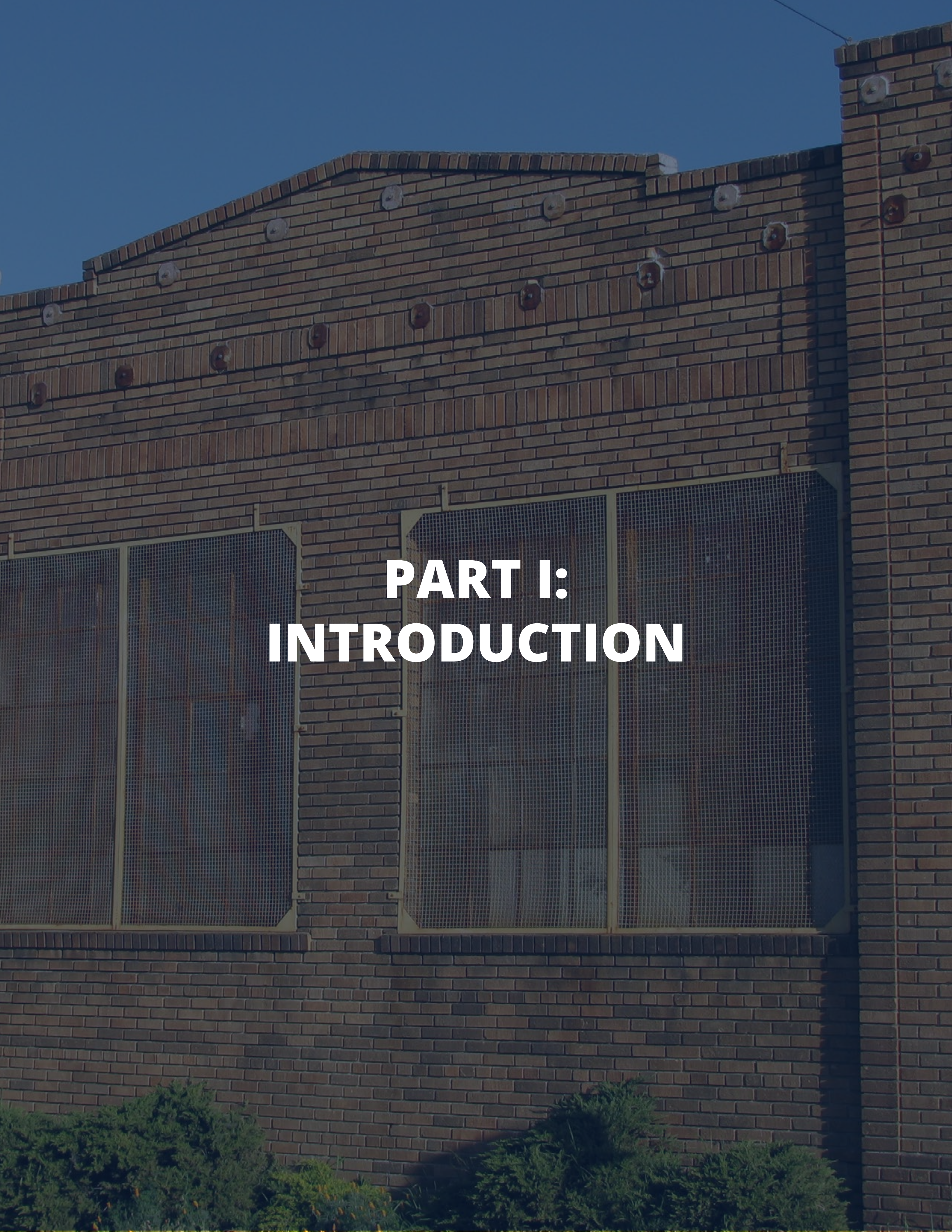


Figure F. Net industrial land-dependent jobs from moves, San Francisco Bay Area, 1990-2012

REPORT



PART I: INTRODUCTION

This Technical Memo is the first product from the Industrial Land and Jobs Study, which complements the 2015 MTC Goods Movement Needs Assessment. This study analyzes the demand for and supply of industrially zoned land in the nine-county region, both now and in the future.

The next section of this report describes the current and future demand for industrial land, and also provides a brief overview of the Bay Area economy. Section III provides the inventory of industrial land, describing its extent, type, and location throughout the nine-county region. Section IV then examines market trends, including both occupancy and new completions, for the built industrial stock in the region, most of which is located on industrial land. Section V examines the location and trends of businesses on industrial land, identifying what we call “industrial land-dependent” industries.

For this report, we have compiled the most up-to-date information available on industrial zones within the Bay Area’s 101 jurisdictions and unincorporated areas. Bay Area jurisdictions had the opportunity to review and correct the data, and about one-third offered minor corrections to the inventory.

PART II: CHARACTERIZING THE DEMAND FOR INDUSTRIAL LAND

The demand for industrial land has shifted dramatically as the economy has restructured from manufacturing to services. This section first examines the trends in industrial land demand, based on both interviews with 12 experts in real estate and logistics, and a review of relevant literature.[2] Then we examine economic trends specific to the Bay Area, using County Business Patterns from 1990 to 2012.

TRENDS SHAPING INDUSTRIAL LAND DEMAND

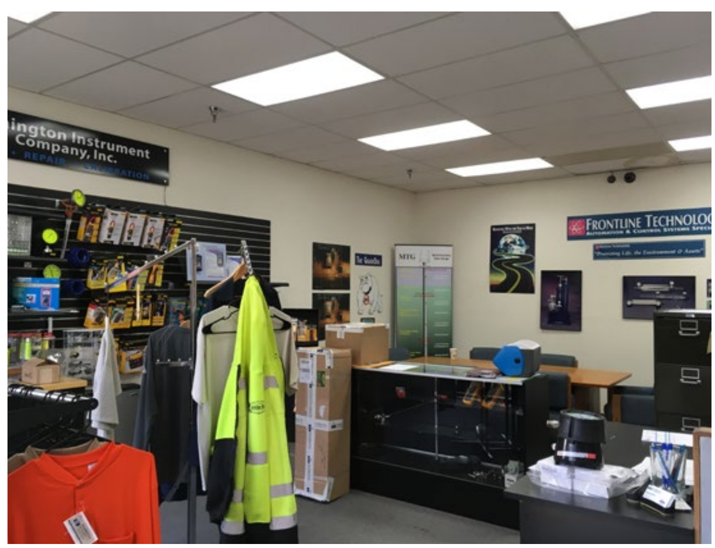
In this section we examine trends in the use of industrial land and space in order to determine how demand is shifting in both the region's core and its periphery. After providing an overview of the role of industrial land in the regional economy, we look at trends in both industrial space—specifically, warehousing and storage, manufacturing, and R&D—and freight logistics. Although some trends, particularly those reported by trade publications, might be more speculative than evidence-based, reporting them is useful to get a sense of what stakeholders in the field are thinking about today. We focus mainly on U.S. trends and hypothesize on what these trends imply for space and location of industrial uses in metropolitan regions.

Industrial Land

Zoning land for industrial use performs two different functions. Separating lower (agricultural, industrial) uses from higher (commercial, residential), prevents the negative externalities associated with production from impacting less noxious uses. Further, it signals the types of physical and legal improvements that will be appropriate to maximize the land's productive capacity—i.e., the land's highest and best use.[3]

Two types of industrial zones are common: exclusive and mixed. Exclusive zoning preserves industrial zoning by prohibiting higher uses despite market interest.[4] Exclusive zoning is particularly appropriate when (1) the industrial district is economically viable, functioning as a business incubator or housing businesses linked to other local clusters; or (2) negative externalities are an issue. Mixed use zoning allows higher uses, either commercial, residential, or both. Since higher uses pay higher rents, this can put pressure on industrial businesses, who may eventually need to leave for lower-cost locations.

Recent work highlights the contribution of industrial areas and their activities to the regional economy: as job generators; as providers of supplies and services, such as back-office functions or automobile repair, to businesses and households; and as reservoirs of low-cost space that can incubate startup businesses.[5] Industrially zoned land performs a role in the regional economy as a reserve of relatively low-cost land and large buildings with potentially flexible use: many industrial sites can accommodate not just production but also back-office functions, storage, loading, parking, and even research and development.[6] They can also be subdivided when firms decrease in size. In contrast to more modern office buildings, this type of space offers firms the flexibility they seek in today's economy, with the ability to shift between vertical and horizontal organization, and to easily add or shed employees.



Across the U.S., many municipalities and counties have recently undertaken studies of industrial land supply, typically in response to developer pressures to convert the land to residential, commercial, or mixed use. It is mostly the strong market regions that are re-evaluating how much industrial land they need. A 2010 review of over twenty such studies found three general concerns leading to industrial land preservation: the recognition that industrial businesses (or more broadly, production, distribution and repair firms) support both the residential sector and other businesses, that they need to be located close by their customers, and that the availability of affordable land is key to maintaining these businesses.[7] Just in the past couple of years, New York City, Washington DC, Montgomery County, MD, and the Puget Sound Region have produced updated industrial land studies.

Industrial Space

The market for industrial space in the Bay Area has evolved and matured considerably in the recent decades. Earlier real estate cycles saw the out-migration of many large-scale industrial users from San Francisco and the Peninsula to the outer areas of the region, mostly to the south and east (for instance, to the Livermore Valley area). This out-migration continues, but is increasingly likely to leapfrog out of the region into the Central Valley, with its abundant supply of developing land. At the same time, however, job growth in the core has created new demand for land in the region's core, close to the workforce. The largest segment of demand is for distribution space, since companies still prefer to locate their warehouse space within 15 miles of the corporate office. For instance, both Philz and Peet's coffee companies have recently acquired large warehouse spaces in Oakland.

Much of this market is seeking new generation space, warehouse buildings with high ceilings, in order to stack goods higher. Older industrial buildings in the core – even from as recently as the 1960s – do not work well for distribution functions, so this older stock tends to be torn down rather than converted. The market for this stock is largely companies like Apple or Tesla, who are willing to pay a premium for warehouse space in proximity to their headquarters or manufacturing, not so much to store finished products but rather supplies or even office furniture from their campuses. Because of the lack of land and challenges of dealing with existing buildings in the core, developers are building new industrial developments on spec, to the extent possible in desirable areas such as the 880 corridor, and if not, the Central Valley.

Interviewees suggested that the greatest pressure for the conversion of industrial land to housing or higher commercial uses will occur near transit. The areas experiencing most conversion are those that allow office construction alongside industrial; the differential in land prices often leads to the redevelopment of the industrial parcels for office. In some cases, cities also allow nonconforming uses, such as schools or churches, to be built in industrial areas, which changes the character of the area and sets the stage for future conversion.

Warehousing and Storage

Warehouse location is fundamental to transporting goods to consumers both in a competitive time frame and in a cost effective manner. Housing inventory in close proximity to the company's consumers reduces delivery costs and permits companies to store product mixes more appropriate for specialized market segments.[8]

E-commerce is expected to quadruple its share of retail trade in the next ten years, with 30% of all retail online by 2025.[9] The increase in e-commerce influences business decisions about optimal warehouse location, inventory management, and amount of warehouse space. Companies consider these factors in attempt to minimize travel time and shipping expenses, both to satisfy customers and to reduce the shipping cost absorbed by the company.

In general, companies are moving their inventory to smaller distribution centers close to their consumer base. Amazon Prime's Same Day delivery is an example of a delivery option that caters to consumers' desire for "instant delivery gratification."[10] As part of this effort, Amazon is leasing very large warehouse spaces on the periphery of the region, while also investing in the last mile

of delivery, in a modification of the traditional hub-and-spoke arrangement that involves smaller regionalized warehouses.[11] With regards to inventory management, companies such as Wal-Mart are opting to put more inventory in their distribution centers as opposed to their stores.[12]

Thus, the demand for just-in-time delivery is leading to a new kind of fulfillment center which is using predictive analytics to move goods closer to markets. Fulfillment facilities differ from traditional warehouses; often built to custom specifications, they allow faster processing of orders through technology, and tend to be located in higher population (and cost) areas than the larger distribution centers.

New warehouse buildings, particularly fulfillment centers for e-commerce, include more parking than in the past because of the "high touch" nature of e-commerce, which results in higher employment densities. The new generation of space has wider aisles; minimum 30 feet clear heights in order to stack higher; and high sprinkler capacity in order to be able to stack plastic, rubber, or flammable materials to the ceiling. Cross-dock facilities, which allow loading on two sides of the building, are increasingly in demand from users like Amazon, and many of the warehouses are flow-through facilities that require more truck bays. In general, these buildings utilize much more land for these transportation functions.

Yet, while the shift in consumer behavior has increased demand for warehousing space, the increase in supply is not comparable; the rise in demand for instant delivery has occurred more quickly than developers can build space in the core.[13] Moreover, the demand from e-commerce is putting pressure on warehouse space throughout the region: even areas like the North Bay report a lack of small, centralized warehouse spaces. Further, demand for traditional types of spaces remains strong, particularly storage yards and truck yards. Many businesses are also demanding hybrid spaces that combine office and warehouse, with perhaps some space for small-scale production. This type of space is particularly in demand in the South Bay.

A future trend to watch is shared space for warehousing. One company has created an internet market that connects warehouse space users in need of space with those in possession of excess capacity.[14] This should allow for higher occupancy rates and more efficient use of space.

Manufacturing and R&D

With a growing "maker movement", on-demand production, and the productivity increases made possible by the Internet of Things (IoT), or what some are calling the 4th Industrial Revolution, the role of manufacturing in cities today looks quite different from the way it did just a few decades ago. In 2006, the first Maker Faire, held in San Mateo, attracted around 20,000 people. This year, over 140,000 people attended the annual event, and the "maker movement" has gone international.[15] The more sustainable, locally-sourced and produced, highly customized products of today's manufacturing sector rely on industrial and mixed-use land in the region's core. This suggests the new viability of walkable, amenity-rich, urban industrial neighborhoods.[16]

This new movement, because of its smaller scale, does not have the negative environmental and traffic impacts of the older manufacturing sector. As Ilana Preuss, founder of Re-Cast City, writes, "The new definition of modern manufacturing can be done in close proximity to other uses. New urban manufacturers make better neighbors because their processes create less noise and fewer environmental impacts." At the same time, many are small: brokers report the greatest demand for spaces as small as 1,000 square feet, housing just a couple workers in a small office, plus a small warehouse space with a roll door. Subdividing buildings is expensive and landlords prefer to rent entire buildings, creating a shortage of such spaces. Due to high land costs, many of San Francisco's 600 makers conduct their actual production in cheaper areas in the East Bay while headquartered in the City. Subletting or sharing a lease is another approach commonly used.

More advanced technologies, like 3D printing, have also influenced the industry by removing some barriers to entry for firms who otherwise lacked access to financial capital. Many expect reliance on 3D printing to lead to new demand for industrial land within more urban areas.

Another industry trend is in-sourcing, or moving the production or warehousing process closer to the consumer because it reduces delivery costs and allows for more late-stage customized product variation. Many of these manufacturers are also selling direct to consumer. As one industrial real estate expert put it, "Domestic manufacturers today are a different breed than their predecessors, often working with low overhead and looking to sell small batches of product directly to consumers."[17] Reshoring of selective types of manufacturing (often machine-based) is often occurring through contract manufacturing, which allows companies to prototype products and protect intellectual capital while decreasing turnaround time relative to offshore operations.

In order to cut costs, some manufacturing firms are also experimenting with on-demand production. By keeping a very low inventory, smaller manufacturers can customize products without running into overstock issues and avoiding extra supply chain costs.[18] This additional value created through flexibility and on-demand production requires proximity to the market.

Productivity improvements made possible through the IoT also create what some call "mass craftsmanship."[19] This "smart manufacturing" uses embedded sensors and integrated software to collect plant operations and supply chain data, analyze that data and drive real-time improvements in production and procurement processes.[20] This allows for greater speed and flexibility, in what one supply chain professional calls "demand-driven on steroids."[21] It may also allow manufacturers to replace retiring workers with technology, reducing labor demand. Because this new manufacturing mode requires modernized infrastructure, and converting older buildings to modern manufacturing and distribution standards is prohibitively expensive, these high-tech businesses disproportionately tend to locate outside of the older core industrial areas. One way that cities stay competitive is through offering low power rates through independently owned utilities (as in Santa Clara, which is attracting data centers).

Historically, manufacturing space included 5-10% office space, e.g., for design and R&D. Now, more high tech companies are moving towards manufacturing close to larger office operations to enable quicker response time and more collaboration between design, production, and marketing.

Freight and logistics

Intermodal freight seems to be regaining importance in the United States, particularly on the West Coast.[22] According to the American Railroad Association, the domestic share of total U.S. rail intermodal traffic has increased in the last few years, with a portion of truck freight now being moved by a mix of both rail and truck.[23] Not only is increased cost-effectiveness generating new interest in freight hubs, but also new technologies are making rail freight more innovative; for instance, one company offers the possibility to store food on the train, with each train unit acting as mini-warehouses.[24,25]

Thus it seems that *intermodal hubs* – that is, spaces for merchandise-transfer from truck to rail, or from ship to rail – will gain importance in upcoming years.[26] Intermodal freight creates a need for more efficient coordination of transfers from one mode to another. For this reason, experts in the industry anticipate that intermodal hubs will focus their efforts on becoming logistics hubs as well.[27] This involves either making use of a third-party logistics firm (3PL), or integrating a transportation management system (TMS) to make shipping more efficient.[28]

We hypothesize that increased intermodal freight implies a need for *more space* for these transfers, as well as off-site storage, to occur, and that this would occur in urban cores due to railroad stations and ports that are usually already centrally located. However, this trend might also mean the consolidation of transportation and logistics spaces in fewer, more concentrated intermodal hubs. (And in fact, the Oakland port is already losing out to the Southern California ports as an intermodal hub.)

Relatedly, improving port management is a growing concern within the industry – not only to accommodate the demand for intermodal freight, but also to reduce port congestion.[29] In the Californian context, the Port of Los Angeles/Long Beach and the Port of Oakland have both recently looked into port management strategies, including implementation of off-peak programs and the extension of port hours, respectively.[30] We hypothesize that this will imply a plateau or a decreased need for port space in the urban core, as these strategies seek to optimize existing infrastructure and land.

In terms of air travel, airports are steadily expanding, often surrounded by related new industrial, commercial, and residential development.[31] Airports appear to be particularly strong candidates for expansion when they are situated in proximity to rail or major connecting highways, for instance in the case of Dallas-Fort Worth Airport.[32] Air cargo is increasingly demanding space, often from large delivery companies managing their own distribution facilities (e.g., FedEx and UPS). This would imply a need for more land. In most (though not all) cases, airports are located in the periphery of cities or of metropolitan regions, which would thus create higher demand for industrial land at the fringes rather than in the core.

Much speculation is occurring about the potential role of drones.[33] While it remains unclear how drone regulation and risk will be managed, several articles suggest drones' imminent importance for shipping and delivery.[34] By potentially altering the cost of transportation of goods, drones might have an impact on firms' logistics planning, as well as on the location and type of industrial space needed in urban cores. Currently, drones are being tested not just for delivery, but also replacing labor within fulfillment facilities. Nevertheless the implications still remain unclear, and new regulations will need to address routing and delivery.

It is worth touching again on same-day delivery trends (mentioned above). Possible implications of this tendency are, on the one hand, a decrease in the use of third-party delivery trucks for large providers, and on the other hand, an increase in use of third-party delivery trucks by small providers.[35] Innovations are also emerging to respond to this demand. For example some firms are thinking of using private transportation network companies for home delivery[36] or are looking to the addition of urban fulfillment centers in their supply chain, which means that "inventory-replenishment trucks, en-route to brick-and-mortar's stores from a distribution center can stop by a fulfillment center to pick up customers' online orders."[37] Overall, the increased efficiency of shipping and delivery is also linked to the "Internet of Things" (see above), as it allows for more demand-responsive, postponed freight and logistics planning.[38]

Conclusion

In sum, trends in industrial space and logistics add up to a mixed picture in terms of the need for and location of industrial land. As Table II.1 describes, changes in warehousing are generally leading to smaller spaces, except for the large warehouses on the periphery demanded by e-commerce giants. Yet, the overall demand for warehousing space is increasing dramatically due to the rise of just-in-time delivery. Likewise, trends in the maker movement, sustainability, technology, and productivity are also creating a demand for smaller spaces, mostly in the core, but to the extent that manufacturing firms are in-sourcing, impacts are likely to be in the periphery. At the same time, transportation needs are generally demanding more space in core areas, for both loading and parking.

Industrial sector	Business trends	Demand for space	Location of demand
Warehousing	Inventory management	--	Periphery
	E-commerce	++	Core/periphery
	Warehouse "sharing"	--	Core
Manufacturing	Maker movement	--	Core
	Sustainability	--	Core
	3D printing, DYI manufacturing	--	Core
	In-sourcing	++	Periphery
	On-demand	++	Core
	Productivity improvements	--	Periphery
Freight/logistics	Intermodal freight	++	Core
	Management of port space	--	Core
	Drones	??	Core
	Airports	++	Periphery

Table II.1: Business trends and their implications for industrial space in urban cores and peripheries

NAICS Code	Industry Title	Jobs	% Change 1990-2012	LQ 2012
423690	Other Electronic Parts and Equipment Merchant Wholesalers	53,101	239%	2.37
423430	Computer and Computer Peripheral Equipment and Software Merchant Wholesalers	20,964	-4%	2.03
334413	Semiconductor and Related Device Manufacturing	12,595	-70%	2.74
325412	Pharmaceutical Preparation Manufacturing	11,991	182%	2.13
334516	Analytical Laboratory Instrument Manufacturing	7,419	12%	2.70
336414	Guided Missile and Space Vehicle Manufacturing	6,989	-76%	3.25
334418	Printed Circuit Assembly (Electronic Assembly) Manufacturing	6,341	-26%	2.11
334515	Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals	5,445	-71%	2.39
333242	Semiconductor Machinery Manufacturing	4,095	18%	3.43
334412	Bare Printed Circuit Board Manufacturing	3,862	-56%	2.04

Table II.2. Top 10 Industrial Sectors by Employment – Bay Area, 2012

BUSINESS TRENDS IN THE BAY AREA

As discussed in ABAG's 2015 State of the Region report, the Bay Area is continuing its long-term restructuring, with steady growth in health, social services and education, and leisure and hospitality. Although more volatile, regional economic boom periods also see growth in professional services, business services, and information. Longer term, there are declines in manufacturing and financial services, particularly pronounced during economic busts. San Francisco is currently dominating in professional and technical job growth, while the information sector continues to grow in Santa Clara County. Distributed more evenly throughout the region is growth in health, social services, accommodation, and food.

Using data from the U.S. Census Bureau's County Business Patterns, we examined employment in the nine county Bay Area region at the most detailed industry category available (6-digit NAICS) from 1990 to 2012 , using the definition of industrial developed by San Francisco (production, distribution, and repair or PDR sectors). Overall, there were 1,176,770 jobs in PDR industries in 1990, and 1,047,441 in 2012, a decline of 11% in a region where the economy overall grew by 14%.

There are several large industries in the Bay Area with a location quotient greater than 2 that likely rely on industrial land—mainly wholesale and manufacturing industries. Many are also industries that show long-term growth trends from 1990 to 2012 as well as short-term growth trends from 2005 to 2012 (Table II.2). Other Electronic Parts and Equipment Merchant Wholesalers added over 16,000 jobs from 2005 to 2012, and Analytical Laboratory Instrument Manufacturing added more than 2,000 jobs.

There are many industries, particularly in manufacturing, that have declined since 1990. Those industries experiencing the largest long term declines are Guided Missile and Space Vehicle Propulsion Unit and Propulsion Unit Parts Manufacturing, which employed 1,700 people in 1990 and is nonexistent today; Boat Building, which employed 5,400 people in 1990 and only 24 people today; and Blank Magnetic and Optical Recording Media Manufacturing, which employed 6,100 people in 1990 and 57 people today. Among manufacturing industries, semiconductor, electrical instrument measuring, computer storage device, and electronic computer manufacturing are in decline. Drywall and installation contractors, commercial printing, specialty trade contractors, highway and bridge construction, and electric power distribution are also experiencing job losses. Growing industries are mostly in wholesaling, transportation, and logistics services, such as Other Electronic Parts and Equipment Merchant Wholesalers. Electronic shopping generates additional demand for logistics and transportation industries, while passenger air transportation is likely to add jobs as well. Part V of this report explores these trends in more detail.

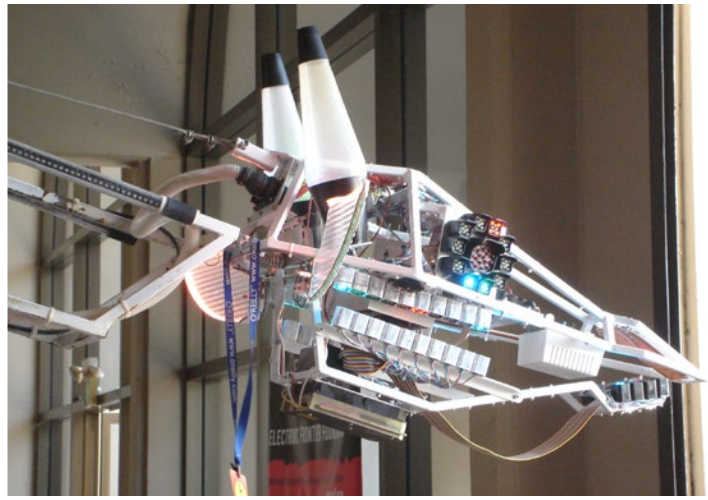
PART III: INDUSTRIAL LANDS INVENTORY

The goal of the analysis in this section is to determine the supply of industrially zoned land in the nine-county Bay Area. But because land use and zoning can differ despite requirements for them to align, and because much of the land identified may be undeveloped, these zoning numbers only provide a baseline understanding of where there is opportunity for industrial activity. Subsequent analysis (beginning with the information provided in Part IV) will look to understand the use and occupancy of this industrial land, as well as recent development activities.

The following begins with a description of our research approach, including the collection and analysis of primary and secondary data on zoning at the parcel level. The next section describes the amount and distribution of industrially zoned land across counties, looking specifically at seven categories that range from heavy industrial to mixed-use residential and industrial. Maps display the location of industrially zoned land in more detail. A final section examines recent sales transactions of industrial parcels.

METHODOLOGY AND DEFINITIONS

For this analysis we draw on 2014 county tax assessor parcel data for each of the nine counties, linked to shapefiles in ArcGIS.[39] From the assessor data, we obtained lot square footage, sales transactions, and select data about buildings, described in Part IV. Neither the county tax assessors nor the regional agencies (MTC/ABAG) had a reliable and current database of zoning by parcel that we could use, so we collected the most up-to-date zoning information available as of June 2015 from all cities and unincorporated areas in the nine-county region.[40] Some cities and areas were able to provide us with digital zoning files in ArcGIS format, while others only had zoning available in PDF format. For these, our research team had to enter the data manually into tables and GIS. Cities were given the opportunity to correct the zoning designations we collected and entered via the project website (www.bayareaindustrialland.com). In addition, we conducted fieldwork in all nine counties to verify the accuracy of the database (described more in Appendix II).



Common categorizations for industrial land were identified across different zoning codes. These commonalities were then used to create a regional classification of industrial lands for this analysis (Table III.1). Because this study seeks ultimately to determine where best to preserve and convert industrially zoned land, it is important to distinguish between industrial zones that are dedicated only to industrial uses—henceforth the “exclusive” industrial categories—and those that allow a mixture of uses and/or activities. The exclusive industrial designation typically is for industrial uses which could be incompatible with other uses, because of impacts of noise, traffic, or odor. It also encompasses light industrial uses such as light manufacturing, wholesale, and repair, which are not necessarily noxious, but are typically characterized by a different type of economic activity than in offices or stores. We also include special districts designated for transportation or utility in this category. Mixed-use categories include both designated mixed-use zones allowing industrial, commercial, and/or residential, and industrial zones that allow office buildings as of right (not as an ancillary use), without a quota or limit. Appendix I provides some sample zoning codes by category by way of illustration, and a full list of the zoning categorizations can be found at the project website.

EXCLUSIVE INDUSTRIAL CATEGORIES	
Heavy Industrial	The heavy industrial category refers to the highest impact uses in terms of noise, smells, traffic and emissions. They are the most incompatible with other uses and require the greatest amount of separation from residential areas. These uses include junkyards and recycling centers, wrecking, and refining.
Medium Industrial	The medium industrial category includes industrial uses that have a medium level of impact in terms of noise, traffic, and odor. These include truckyards, construction operations, machine shops; medium-high impact auto repair. Areas zoned medium industrial often allow light industrial uses as well. Some cities use the term 'heavy' industrial in their zoning code, but do not specifically allow for the most intensive uses; we classify these as 'medium' industrial.
Light Industrial	The light industrial category applies to industrial uses which are relatively low impact on their surrounding areas and do not require a large buffer with residential uses. This category encompasses light manufacturing, as well as the categories of light industrial referred to collectively as production, distribution and repair or PDR industrial. Light industrial also includes heavy commercial, commercial supporting industrial uses, bulk commercial, and service commercial. Wholesale and storage activities that are related to manufacturing or PDR fall into this category.
Transportation and utilities	The transportation category includes zoning designations that are exclusively related to transportation and utilities. Uses include bus or rail yards, power generation and other utilities, airport-related facilities, and related corridors. Corridors allow some industrial uses that will not conflict with future transportation and utility expansion.
MIXED USE INDUSTRIAL CATEGORIES	
Industrial-Office	This category captures the zones where offices, including business services, administrative activities, and research and development (R&D), could potential edge out higher impact industrial uses. In these zones, which may be either medium or light industrial, office is allowed as-of-right and is not considered an ancillary use
Mixed use industrial-residential	Residential uses in industrial areas are a special category of interest to this study. Converting industrial land to residential has become an attractive option for some cities to alleviate the housing shortages. In some cases, rehabilitating underutilized or polluted industrial land for housing has been a successful strategy. There are also successful cases of industrial land preservation. This category quantifies the industrial land that allows non ancillary housing uses. This includes live work units and other residential housing types.
Mixed use industrial-commercial	This category includes zones that allow industrial uses as well as commercial. Commercial uses include restaurants, hotels, and big box retail.

Table III.1. Regional Zoning Classifications and Descriptions
Note that agricultural designations are not included. See Appendix II for more details

	Total (Acres)	Total IL (Acres)	Percent IL of Total
East Bay			
Alameda	476,064	24,192	5.1%
Contra Costa	477,745	20,206	4.2%
Peninsula			
San Mateo	291,520	10,845	3.7%
South Bay			
Santa Clara	830,787	18,501	2.2%
North Bay			
Solano	543,426	14,432	2.7%
Napa	504,137	3,931	0.8%
Sonoma	1,016,546	1,996	0.2%
Marin	337,158	1,750	0.5%
San Francisco			
San Francisco	30,427	1,971	6.5%
Total	**4,507,811**	**97,823**	**2.2%**

Table III.2. Amount and Distribution of Industrial Land*
Source: County Assessors' DataQuick Database; See Appendix II for methodological notes on how total acreage was calculated

* Calculations based on gross regional land area.

AMOUNT AND DISTRIBUTION OF INDUSTRIAL LANDS

The gradual urbanization and industrialization of the Bay Area, particularly since 1850, has led to a distinct pattern of industrial land location. Initially, industrial uses were confined to the core city and port areas, mostly in San Francisco and the East Bay. In the early to mid-20th century, industrial uses expanded into the South Bay. Most recently, parts of the North Bay have industrialized as well, typically on large lots with convenient highway access. Meanwhile, some of the older industrial land in the core has undergone conversion to commercial and residential use.

Given these waves of industrialization, the amount of industrial land is not evenly distributed across counties (Figure III.1). While some of this distribution may be attributed to the overall size of each county, several counties that have a significantly higher share of land zoned for industrial use (e.g. 4.2% of land in Contra Costa County has industrial zoning—see Table III.2). The share of land zoned for industrial use corresponds roughly to goods movement patterns: as discussed in the MTC Regional Goods Movement Plan Task 2C Technical Memorandum (2015), the leading counties in terms of output of goods movement dependent industries are Santa Clara, Contra Costa, Alameda, and Solano counties. Meanwhile, in many of the North Bay counties less than 1% of land is zoned for industrial uses —this may be partially attributed to the regional zoning classifications excluding agricultural uses for methodological purposes (see Appendix II).

TYPE OF INDUSTRIAL LANDS

The type of industrial land also varies from county to county (Figure III.2). East Bay counties have significant land zoned for heavy and medium industrial uses that could potentially conflict with their surroundings. For example, in Contra Costa County the City of Antioch's M-2 Heavy Industrial allows for: "production of and extraction of metals or chemical products from raw materials, steel works and finishing mills, chemical or fertilizer plants, petroleum and gas refiners, paper mills, lumber mills, asphalt, concrete and hot mix batch plants, power generation plants, glassworks, textile mills, concrete products manufacturing and similar uses."[41]

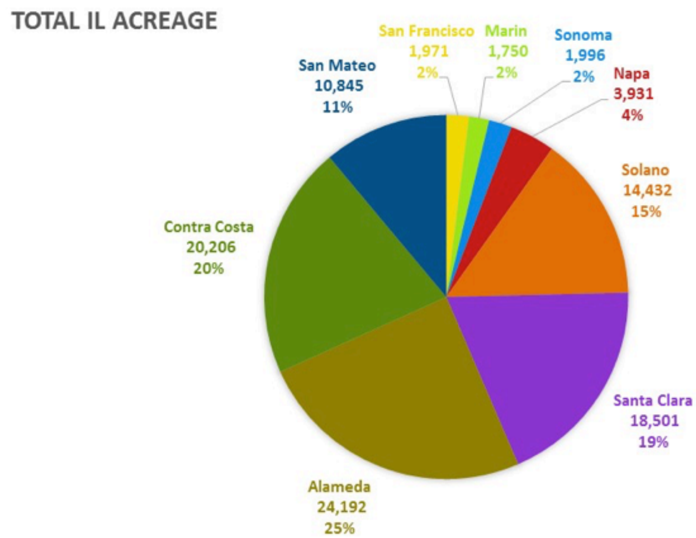


Figure III.2. Distribution of Industrial Land Categories
Source: County Assessors' DataQuick Database

North Bay counties have a large share of land for transportation, which includes land zoned for bus or rail yards, power generation and other utilities, airport-related facilities, and related corridors. For example, in Solano County, the City of Rio Vista's zoning C-2A Airport Commercial District was included in this total. The C-2A zoning designation is intended to "supply a complete range of airport related services at the airport."[42]

Combining the seven categories above into the broader classifications described in Table III.1 (Exclusive and Mixed-Use) we see additional patterns of how industrial land is distributed. In Figure III.3 the Exclusive Industrial classification is zoned for more intense industrial activities while the Mixed-Use zoning provides the potential for multiple kinds of activities on the land. A table that includes these numbers by individual counties can be found in the Appendix III.

These broader classifications give a sense of the different intensities of industrial land across the

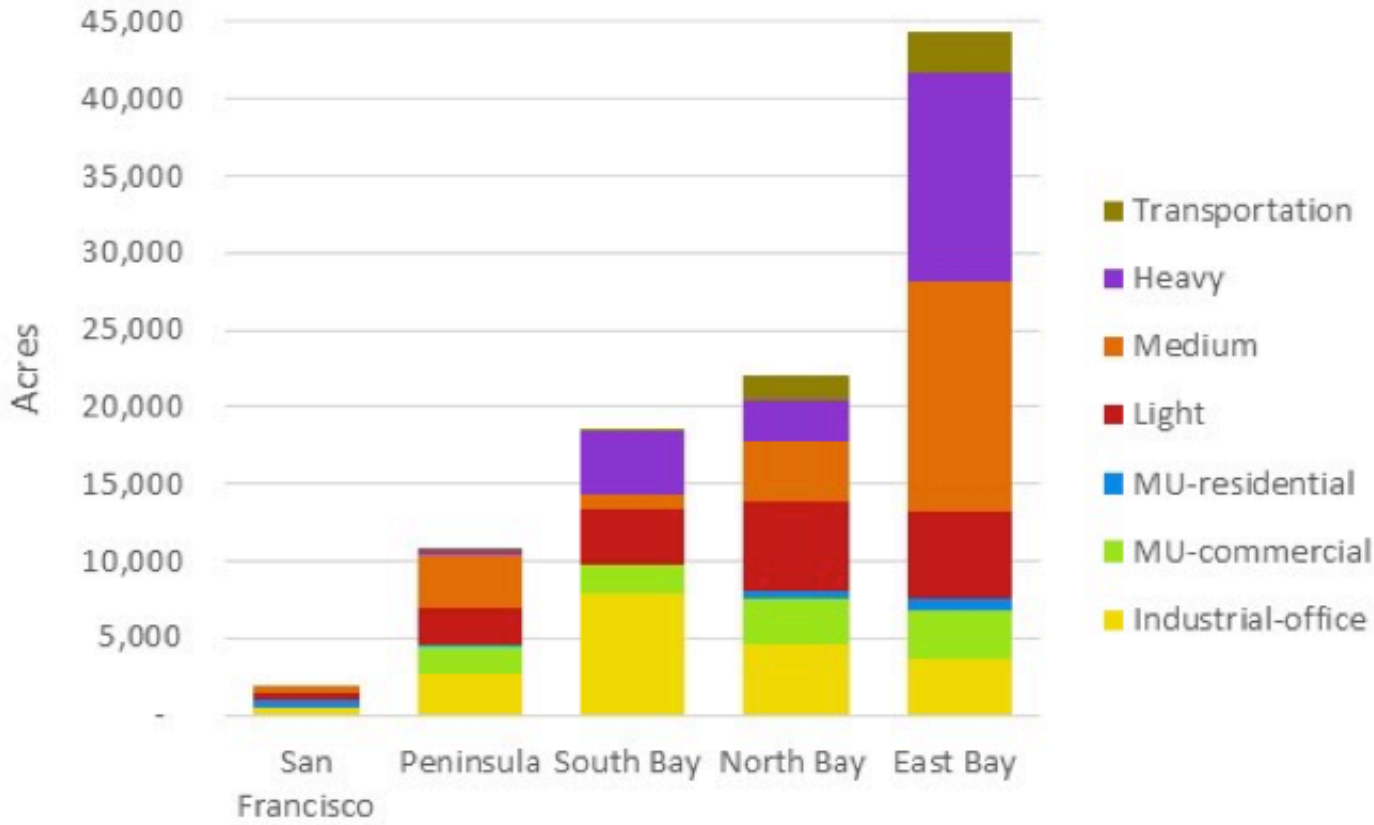


Figure III.2. Distribution of Industrial Land Categories[43]
Source: County Assessors' DataQuick Database

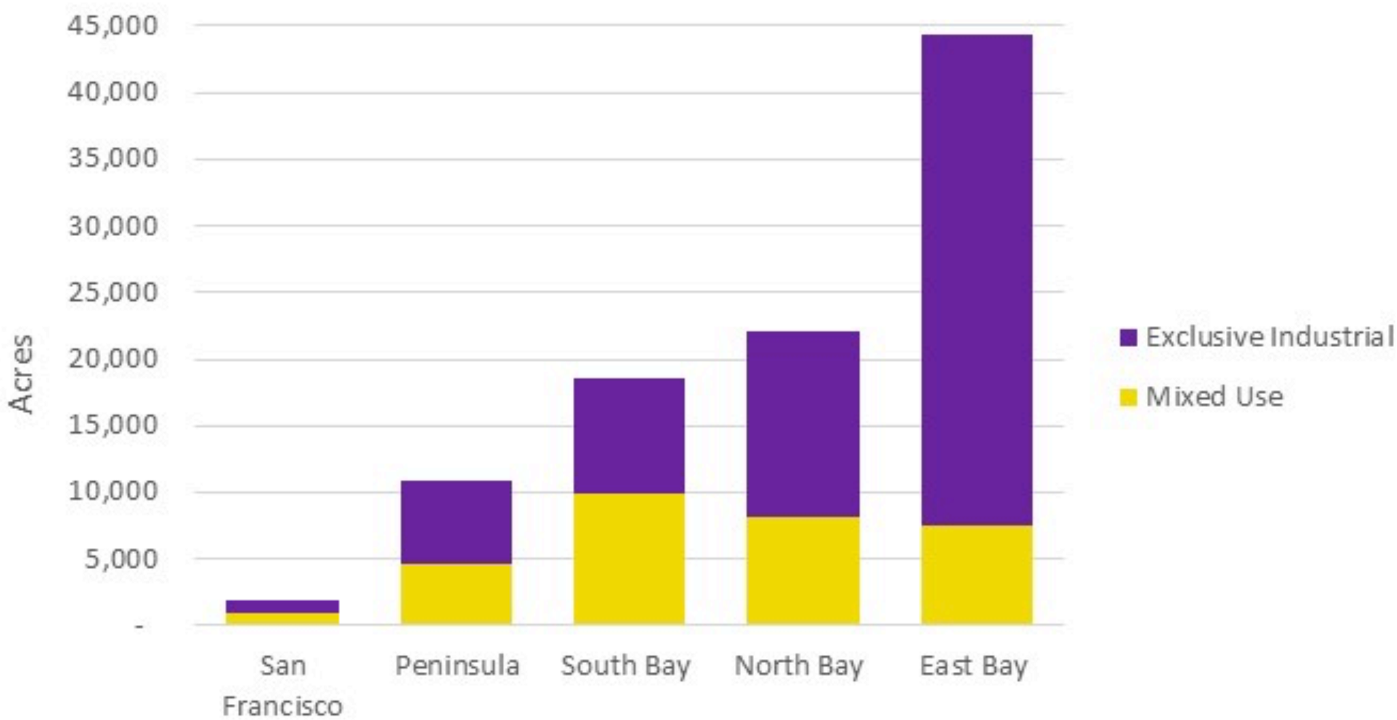


Figure III.3. Distribution of Consolidated Industrial Land Categories
Source: County Assessors' DataQuick Database

region and the kinds of activities that this land supports. For example East Bay counties have significantly more land zoned for exclusive industrial uses, while the South Bay has a more even balance of exclusive industrial and mixed-use. The zoning patterns seen in Figure III.2 and III.3 may be an indication of the kinds of industries that have already concentrated in different areas, and/or it may point to cities' efforts to attract new/additional businesses with specific industrial land use needs or position the land for non-industrial uses.

INDUSTRIAL LAND BY CITY

The assessors' data also allowed us to determine the amount of industrial land available in cities. Table III.3 shows the 'top ten' cities with the most land zoned for industrial activities. Appendix III provides a list of the top fifty cities.

Oakland and San Jose top the list, each with over 6,000 acres of industrially zoned land. Figures III.4-III.8 map the land in these areas (see Appendix IV for maps of the rest of the region). The majority of Oakland's industrial zoning allows for exclusive industrial uses (e.g. heavy, medium, or light industry), while San Jose has a higher proportion of mixed-use industrial zoning, or industrial zones where office uses are allowed.

County	City	Total IL Acres
Alameda	Oakland	6,999
Santa Clara	San Jose	6,410
Contra Costa	Martinez	4,956
Contra Costa	Richmond	4,919
Solano	Unincorporated Area	4,487
Alameda	Fremont*	4,180
Alameda	Hayward	3,610
San Mateo	Unincorporated Area	3,143
Contra Costa	Concord	2,722
Solano	Benicia	2,702

Table III.3. Cities with Highest Amount of Industrially Zoned Land
Source: County Assessors' DataQuick Database
* According to Fremont's own inventory of industrially zoned land, the total is slightly higher: 4,360 acres.

Oakland and San Jose top the list, each with over 6,000 acres of industrially zoned land. Figures III.4-III.8 map the land in these areas (see Appendix IV for maps of the rest of the region). The majority of Oakland's industrial zoning allows for exclusive industrial uses (e.g. heavy, medium, or light industry), while San Jose has a higher proportion of mixed-use industrial zoning, or industrial zones where office uses are allowed.

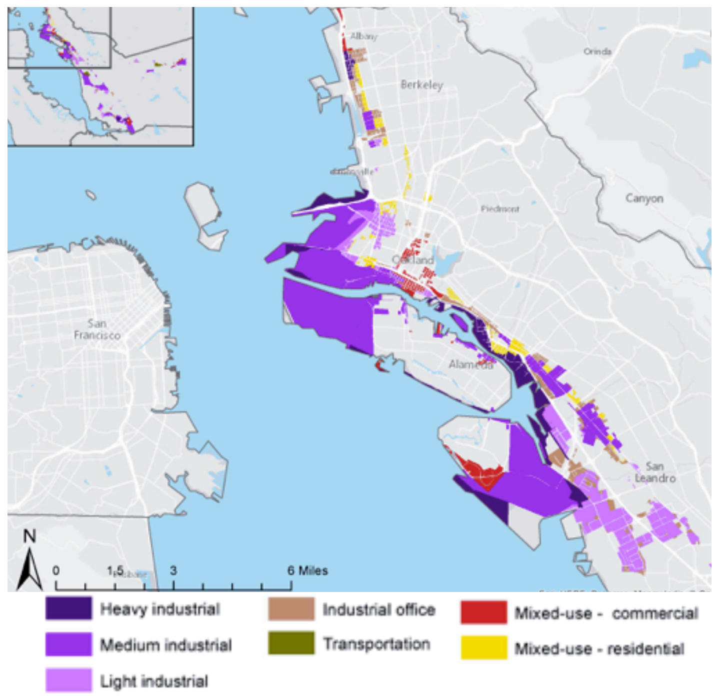


Figure III.4. Industrially Zoned Land in Oakland, Emeryville, Berkeley, Alameda, San Leandro

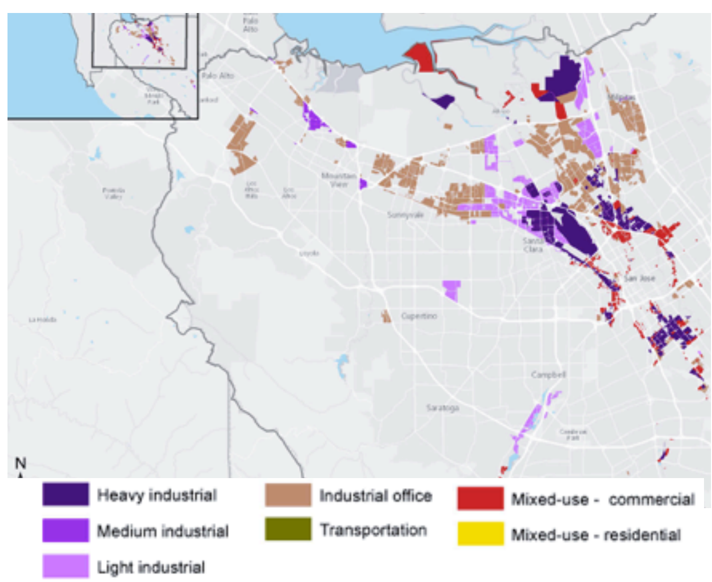


Figure III.5. Industrially Zoned Land in San Jose, Milpitas, Santa Clara, Sunnyvale, Mountain View, and nearby cities

With the exception of South San Francisco—where the majority of land is zoned for light industrial—the industrial land in San Mateo cities are also primarily zoned for mixed-use activities (Figure III.6). In contrast, most industrial land in Contra Costa County is zoned heavy industrial, as shown in Figure III.7. Solano County, with 16% of the region's industrial land, is mostly medium industrial and industrial-office.

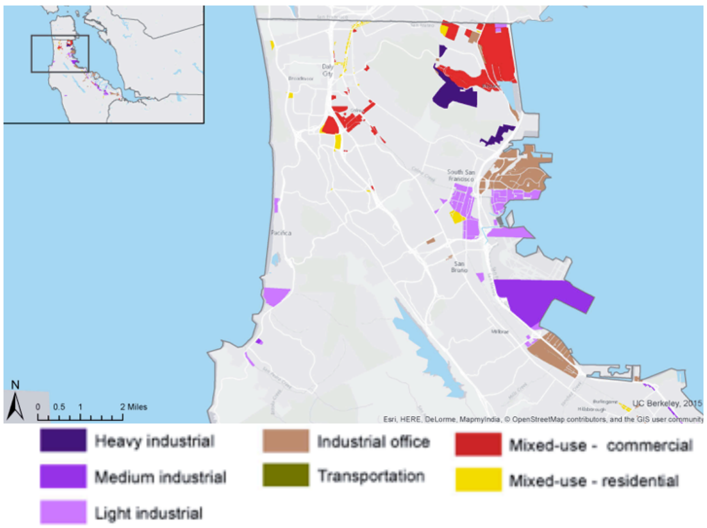


Figure III.6. Industrially Zoned Land in northern San Mateo County

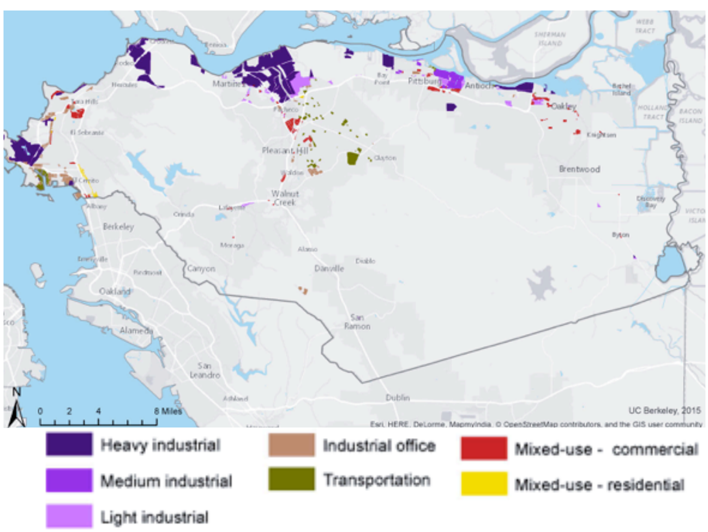


Figure III.7. Industrially Zoned Land in Contra Costa County

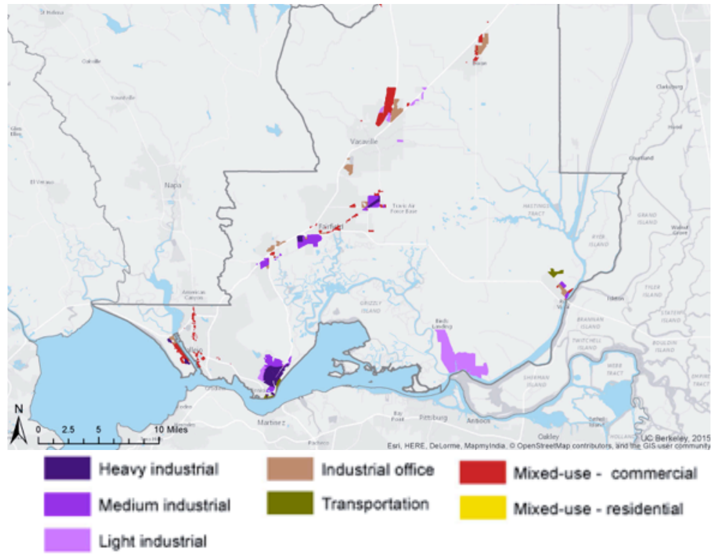


Figure III.8. Industrially Zoned Land in Solano County

SALES TRANSACTIONS

Another indicator of the market for industrial land is the frequency of sales transactions. Sales of industrial parcels may indicate strong business demand, or could be occurring because of intentions to convert the land to other uses. Based on an analysis of assessors' data, we found that over the last ten years the most active and volatile markets for industrial land were: Alameda, Santa Clara and San Francisco Counties. This is most likely due to the faster rate of urbanization in these areas. Of particular note is the high volume of transactions in San Francisco, given the relatively small amount of industrial land.

Yet, while the number of transactions (depicted above) is about equal in Santa Clara and San Francisco, Santa Clara outpaces all counties in terms of the total acreage of industrial land transacted over the last five years (Table III.4). Solano County in the North Bay saw a small number of transactions, but a relatively high amount of square footage as a result of several larger transactions (ranging from 25-300 acres) in the cities of Fairfield, Rio Vista, and unincorporated areas.

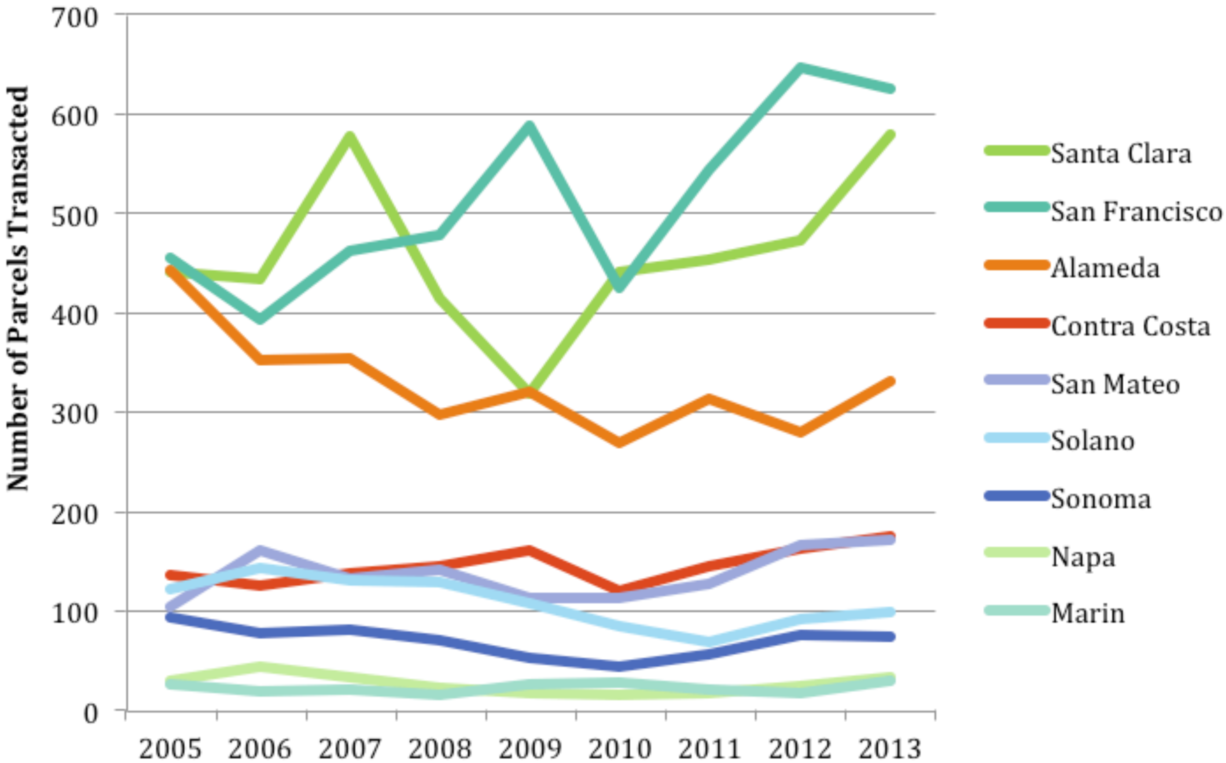


Figure III.9. Transactions of Industrially Zoned Parcels (by number of parcels)

County	Total Acreage
South Bay	
Santa Clara	4,037
North Bay	
Solano	2,940
Napa	800
Sonoma	330
Marin	98
East Bay	
Alameda	3,150
Contra Costa	1,349
Peninsula	
San Mateo	1,274
San Francisco	
San Francisco	146

Table III.4. Transaction of Industrially Zoned Land from 2010-2014[44]
Source: County Assessors' Dataquick Database

CONCLUSION

In sum, the analysis found almost 98,000 acres of industrially zoned land located in the nine-county region. Notable differences among sub-regions are the concentration of heavy industrial land in the East Bay, the reliance on mixed use-commercial zones in the Peninsula, and in general, the mixture of industrial and office uses (industrial-office) in both the Peninsula and the South Bay. Alameda County has the most industrial land, followed by Contra Costa, Santa Clara, and Solano. Yet, despite this concentration, market activity is largely concentrated in San Francisco and Santa Clara counties.

PART IV: BUILDINGS ON INDUSTRIAL LAND

BACKGROUND, METHODOLOGY AND DEFINITIONS

To accompany the zoning analysis in Part III that identifies the opportunities under existing regulations for industrial activity, this research also sought to understand occupancy patterns.

As an initial step towards understanding the built space and its utilization, we used private real estate data from CBRE that captures the amount of industrial space available and the value of those spaces.[45] We relied on the following CBRE data points addressing the questions of space and value:

- **Stock**: The total amount of competitive single-tenant and multi-tenant space (in square feet) (also known as net rentable area, or NRA)
- **Completions**: The amount of new space open for occupancy (in square feet) during a period. The figure includes both single and multi-tenant completions.
- **Asking Rents**: Average gross or net asking rents weighted by the number of square feet available for lease.
- **Vacancy Rate**: The total vacant space available for lease divided by the total stock.[46]

The CBRE data also segment industrial spaces by several different use types. This allowed us to develop a deeper understanding of the actual supply and demand for industrial land in the nine-county region using the following categories:

- **Manufacturing**: Industrial buildings with less than 3 stories and a parking ratio less than 2.5:1 for which less than 25% of the NRA is demised or planned as office space.
- **Warehouse/Distribution**: Industrial buildings with the same criteria as Manufacturing buildings and for which at least 50% of “non-office” space has a clear height of 18 feet or greater.
- **Research & Development**: Industrial buildings with one to three stories for which at least 25% but less than 75% of the NRA is demised or planned as office space or highly improved, and have a parking ratio greater than or equal to 2.5:1. Flex space is included in this category.[47]

Note that this dataset does not include some older, multi-story industrial buildings. Also, CBRE does not track industrial real estate in Sonoma and Marin Counties. We sought an alternative data source for these counties from Colliers International, but they also do not track this data. A representative from Colliers explained that there is not sufficient commercial real estate in Sonoma and Marin for them to comprehensively track industrial activity in these counties. Thus, these counties are excluded from this analysis.

AVAILABLE INDUSTRIAL SPACE

The CBRE database found 562,582,000 square feet (12,915 acres) of industrial stock in the nine-county region. This is significantly less than the 97,823 acres of industrially zoned land found in Part III (repeated in Table IV.1). This difference occurs because the Assessors' data includes total land area, while CBRE only calculates the square footage. Thus the industrial space calculations exclude vacant land, parking, loading areas, trailers, older industrial buildings, and so forth.[48]

	Industrial Building Stock in Acres (CBRE)	Acres Zoned Industrial (Assessors)	Industrial Building Stock per Land Available
San Francisco	699	1,971	35%
South Bay	4,148	18,501	22%
East Bay	5,671	44,398	13%
Peninsula	1,153	10,845	11%
North Bay	1,244	22,109	6%
Total	**12,915**	**97,823**	**14%**

Table IV.1. Comparison of Zoning with Actual Stock
Source: County Assessors' DataQuick Database and CBRE

Regionally we see that the East Bay has both the highest amount of industrial building stock and acres zoned for industrially uses, while San Francisco has the least (Figure IV.1). With these calculations, it should also be noted that the North Bay excludes Marin and Sonoma Counties, but there is likely limited industrial activity occurring there.

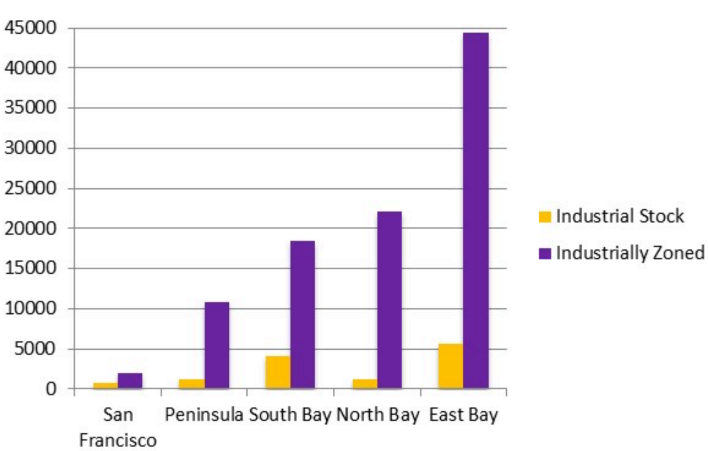


Figure IV.1. Regional Total Industrial Stock, 2015[49]
Source: County Assessors' DataQuick Database and CBRE

BUILDING COVERAGE

Another way to assess the intensity of development is to look at floor area ratios, or building coverage. For this calculation, we returned to the Assessors' data collected on building square footage, excluding vacant lots and potential industrial activity on other, unidentified parcels. The building coverage calculations in Table IV.2 are the result of dividing the building square footage by the total lot size of parcels where development has occurred. Over 100% suggests a high floor area ratio because of multi-story buildings. In Sonoma and Marin, ratios are very low, probably due to parking or other surface uses.

Solano County in the North Bay had the highest intensity developments on industrial lands (138% of the developed land covered by buildings). Yet the standard deviation was very high, indicating that some buildings on industrial lands are multiple stories, while others are much less dense. In addition to showing the large range in intensity for industrial buildings, these coverage calculations may be an indication that industrial land is being developed for other non-industrial uses that lends itself to denser building types.

	Average Building Coverage	Standard Deviation	IL Parcels Counted	Total IL Parcels
North Bay				
Solano	138%	662%	698	2493
Napa	51%	43%	306	818
Sonoma	38%	35%	585	1554
Marin	31%	16%	32	843
San Francisco				
San Francisco	110%	282%	9608	10563
Peninsula				
San Mateo	55%	64%	664	3882
East Bay				
Alameda	52%	51%	5019	9297
Contra Costa	44%	46%	2326	4043
South Bay				
Santa Clara	50%	50%	5727	9029

Table IV.2. Percent of IL Covered by a Building[50]
Source: County Assessors' DataQuick Database

Solano County in the North Bay had the highest intensity developments on industrial lands (138% of the developed land covered by buildings). Yet the standard deviation was very high, indicating that some buildings on industrial lands are mul-

tiple stories, while others are much less dense. In addition to showing the large range in intensity for industrial buildings, these coverage calculations may be an indication that industrial land is being developed for other non-industrial uses that lends itself to denser building types.

TYPE OF INDUSTRIAL USES

Real estate databases can give us a sense of the type of space available. Regionally, warehouse space takes up the most land area at 51% of all industrial stock. Manufacturing demands the least space at 16% of the total stock (Figure IV.2). The 'Other' category includes special use and space that is non-classifiable.

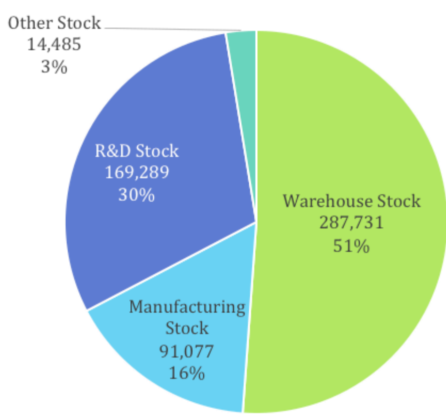


Figure IV.2. 2015 Total Regional Stock (SFx1000)
Source: CBRE

In most counties, warehouse space comprises 50%-75% of the total industrial stock. The exception is the South Bay where R&D is the dominant industrial uses (Table IV.3).

	Total Stock (sqft)	% R&D	% Warehouse	% Manufacturing	% Other
East Bay	247,027	20%	60%	19%	1%
South Bay	180,702	**53%**	29%	14%	4%
North Bay	54,189	7%	76%	16%	1%
Peninsula	50,220	26%	54%	15%	5%
San Francisco	30,444	23%	64%	7%	7%

Table IV.3. Industrial Building Stock by Type (2015)
Source: CBRE

CONSTRUCTION ACTIVITY

In general, construction activity of industrial space has slowed over the last ten years. The exceptions are in the Peninsula from 2005-2009 and San Francisco from 2010- 2015 (Table IV.4). This decrease in construction is likely the result of the recession, and a lag time over the last five years in real estate cycles as new construction is still in the process of coming online now that the market has recovered.

Solano County in the North Bay had the highest intensity developments on industrial lands (138% of the developed land covered by buildings). Yet the standard deviation was very high, indicating that some buildings on industrial lands are multiple stories, while others are much less dense. In addition to showing the large range in intensity for industrial buildings, these coverage calculations may be an indication that industrial land is being developed for other non-industrial uses that lends itself to denser building types.

	2000-2004	2005-2009	% Change	2010-2015	% Change
Peninsula	1,029	1,170	14%	327	-72%
North Bay	5,975	5,131	-14%	1,436	-72%
East Bay	12,365	4,601	-63%	3,682	-20%
South Bay	10,769	923	-91%	880	-5%
San Francisco	1,096	63	-94%	110	75%
Total Completions (SF x 1000)	31,234	11,888	-62%	6,435	-46%

Table IV.4. Total Industrial Completions (SF x 1000)
Source: CBRE

Despite this slowdown, over the last ten years the largest amount of new industrial square footage has been constructed in the East Bay (8,283,000 square feet completed). The North Bay has also seen a significant amount of industrial construction.

In the East Bay the largest share of new construction is for warehouse use (Table IV.5). Yet the high amount of R&D construction from 2005-2009 and the increase in manufacturing completions may point to a new demand for 'flex' and 'maker' spaces. The majority of East Bay R&D and manufacturing completions occurred along the 880 corridor, which includes the cities of Hayward, Union City, and Fremont. More than a third (545,000 sqft) of the East Bay R&D space completed from 2005-2009 was along the 880 corridor, while all of the East Bay manufacturing space was completed along 880 from 2010-2015. Warehouse completions were more evenly distributed across the East Bay.

In the North Bay, the construction activity appears to be driven primarily by demand for warehouse space (Table IV.6). This activity was evenly distributed across Solano and Napa counties (Marin and Sonoma counties are not included by CBRE).

Year	Warehouse	Manufacturing	R&D	Other	Total
2005-2009	2,617	223	1,566	195	4,601
2010-2015	2,006	892	509	275	3,682

Table IV.5. East Bay Completions by Building Type (SF x 1000)
Source: CBRE

Year	Warehouse	Manufacturing	R&D	Other	Total
2005-2009	4,715	99	252	65	5,131
2010-2015	1,064	330	42	0	1,436

Table IV.6. North Bay Completions by Building Type (SFx1000)
Source: CBRE

BUILDING AGE

In addition to completion data from CBRE, the Assessors' data allowed us to look at the average age for all building stock located on industrially zoned land. For those buildings that the Assessor had data, the averages for each county are shown in Table IV.7. An interesting trend to observe is the concentration of older buildings in the core (particularly San Francisco and Alameda), due most likely to the urbanization of these counties earlier in the region's development. In Napa and Solano counties, buildings tend to be much newer.

	Years
San Francisco	
San Francisco	72.3
East Bay	
Alameda	60.6
Contra Costa	45.6
North Bay	
Marin	49.2
Sonoma	41.8
Solano	38.4
Napa	28.1
Peninsula	
San Mateo	48.0
South Bay	
Santa Clara	40.2

Table IV.7. Average Building Age
Source: County Assessors' DataQuick Database

INDUSTRIAL RENT

Gross rents for all industrial spaces in San Francisco and the Peninsula are higher than regional averages (Figure IV.3). Rents at the core of San Francisco are of particular note: in SOMA the current average gross industrial rents are $41.53/sqft/year and North of Market gross rents are $40.34/sqft/year. Because these rent numbers only include space that is currently available for lease, however, these rent numbers don't factor in industrial tenants with long-term leases at lower rates.

The smaller total land areas of San Francisco and the northern Peninsula likely plays an important role in restricting the supply of industrial lands and raising the demand/willingness to pay. A supplemental explanation may be the higher proportion of mixed-use zoning in these areas, identified in Part III (Figure III.3), which allows a greater variety of uses and thus attracts a larger market.

Rents for available R&D space in the North, South, and East Bays are below the regional average. For manufacturing space, the East Bay is the only area in the region where rents are below the regional average ($7.22/sqft/year regionally, $6.01/sqft/year in the East Bay). Warehouse rents appear to be the most consistent across the region (Figure IV.3). This consistency of rent may be one reason that over half of the regional industrial stock (seen in Figure IV.2) is warehouse space.

Over the last ten years industrial rents have remained relatively stable—decreasing during the recession, but making a steady comeback since 2012 (Figure IV.4). Rents for R&D have risen the most.

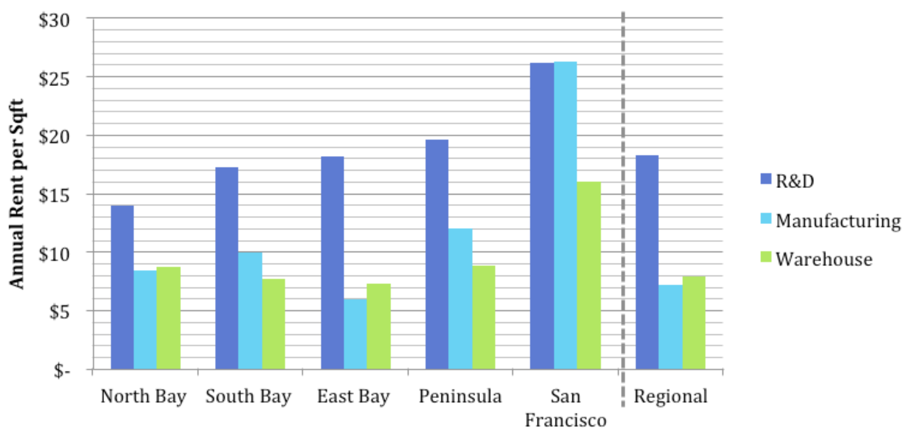


Figure IV.3. 2014 Annual Industrial Rents[51]
Source: CBRE

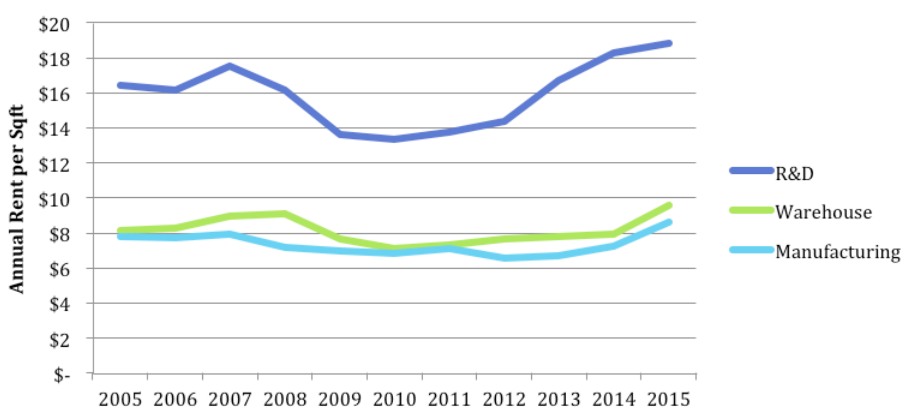


Figure IV.4. Annual Industrial Rents, 2005-2015
Source: CBRE

OCCUPANCY TRENDS

Similar to historic rent trends, industrial vacancy rates have been steadily recovering post-recession (Figure IV.5). Vacancy rates in the South Bay, the Peninsula, and San Francisco are all approximately 3% for data collected in 2015. For the East and North Bay, vacancy rates in 2015 are slightly higher (4% and 5% respectively). In San Francisco, vacancy rates are still slightly higher than in the 2007 peak, but all other regions are currently experiencing lower vacancy.

While warehouse and manufacturing vacancy rates are similar to aggregate trends depicted in Figure IV.5, R&D vacancy rates in the East and North Bay have been significantly higher over the last ten years (Figure IV.6). R&D vacancy rates are currently dropping regionally, but are still quite high in the East and North Bay at approximately 10% in both areas.

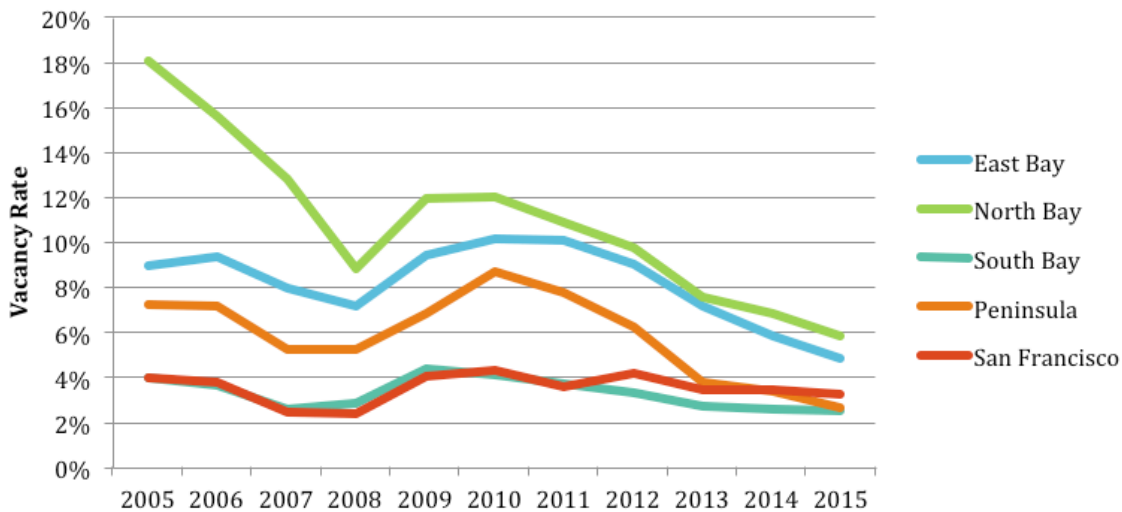


Figure IV.5. Vacancy Rates, 2005 -2015
Source: CBRE

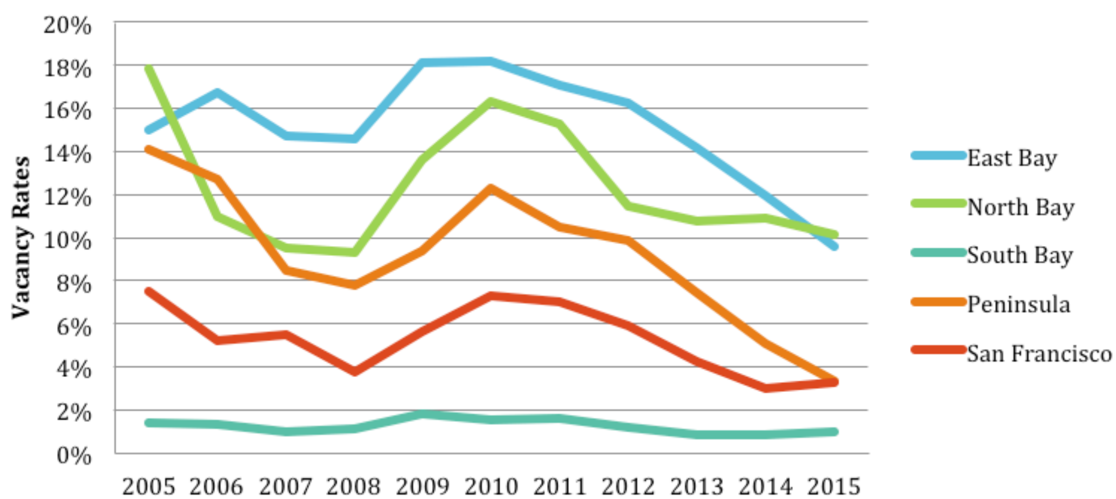


Figure IV.6. R&D Vacancy Rates, 2005-2015
Source: CBRE

CONCLUSION

In sum, outside of San Francisco, much of the Bay Area's industrial land is occupied at very low densities, perhaps to accommodate parking, loading, and other surface uses. Warehouses comprise half of the region's stock, with R&D comprising another 30%. Warehouse development dominates in every sub-region except the South Bay, where R&D is concentrated. New construction is occurring mostly in the East and North Bay. There is a significant amount of older stock, particularly in San Francisco, Alameda, San Mateo, and Marin counties. Rents are generally high and have recovered from the recession, particularly in San Francisco and the Peninsula, and for R&D. Vacancy rates are now reaching historic lows, except for R&D.

PART V:
BUSINESS TRENDS ON INDUSTRIALLY ZONED LAND

For this analysis we examined the distribution of businesses across industrially zoned and other land in all nine counties, to determine what type of industries were concentrated on industrial land. We develop a typology based on the location quotient (LQ), which measures the concentration of industries in a particular area relative to the larger region within which it sits (the reference region). If an LQ is greater than 1, it is considered relatively concentrated; if it is less than 1, then it is underrepresented.

We are particularly interested in determining which industries are actually dependent on industrially zoned land, in other words, that seem to avoid locating in other types of zones. For a conservative estimation of such industries, we use a LQ of greater than 2. By using this threshold, we were able to exclude a number of industries that seemed to be locating on industrial land more out of convenience than necessity (e.g., professional service firms, which do not have much impact in terms of noise, traffic, and odor and thus are not incompatible with other uses).

We linked Dun and Bradstreet employment data (from the National Establishment Time Series data) for businesses by address to county assessor data at the parcel level for all nine counties in order to determine which industries in each county are thus heavily dependent on industrially zoned land. For each county, we summed the jobs in each industry by zoning type. Then we created two final groupings: Exclusive Industrial Land and Mixed-Use Industrial Land. Exclusive industrial land includes light, medium, heavy, and transportation zones. Mixed-use (MU) industrial land includes light-office, heavy-office, mixed-use residential, and mixed-use commercial.

Industrial businesses locate in many different zones. For instance, a small construction contractor might operate out of a home in a residential district. Larger contractors are more likely to be dependent on industrially zoned land. Likewise, auto repair shops can be found as readily in commercial zones as on industrial land. Tech businesses are found throughout all types of zones, depending on their size and production process (e.g., whether they are conducting manufacturing, software design, research and development, or some combination). At the same time, industrial land, whether exclusive or mixed-use, also houses many types of businesses. For instance, older retail establishments such as corner stores or diners may be grandfathered into industrial zones. Flexible zoning regulations on industrial land may permit a great variety of uses, from government offices to professional services.

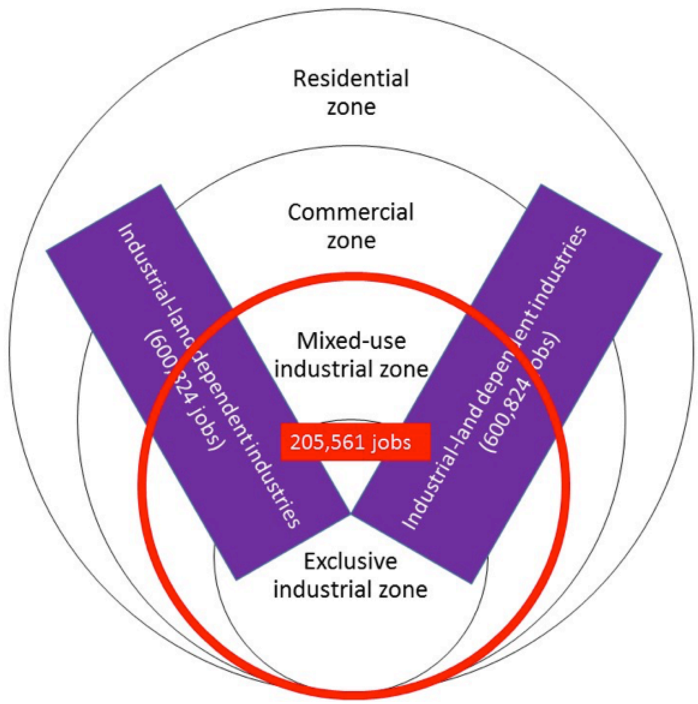


Figure V.1. Location of industrially zoned land and industrial land-dependent jobs.

Thus, this analysis differentiates between the industrial land-dependent industries through the LQ method that are located throughout the region, and the industrial land-dependent businesses that are actually located on industrially zoned land (Figure V.1). As this diagram illustrates, the industrial land-dependent businesses on industrial land are a subset of the industrial land-dependent businesses throughout the region. For our projections of industrial land demand, we analyze both trends in these businesses on industrial land and the larger set of industrial land-dependent businesses. This latter group of businesses may be considered the latent demand for industrially zoned land. Overall, our analysis found that in 2011, there were 205,561 jobs in industrial land-dependent industries actually located on industrially zoned land, and 600,824 industrial land-dependent jobs overall in the region.

LOCATION OF INDUSTRIES DEPENDENT ON INDUSTRIAL LAND

Figure V.2 maps the location of the industries identified as highly dependent on exclusive industrial zoning in the region (more detailed maps are in Appendix V). This map sums Dun & Bradstreet/NETS employment (for 2011) by block group. The greatest concentrations of industrial land-dependent employment occur in southern Alameda County (from San Leandro to Fremont) and northern Santa Clara County (primarily San Jose). Other concentrations occur near SFO, along the Northern Waterfront, and near Livermore. These concentrations suggest where the region might want to consider more stringent protections for industrial land in the future, in order to support regional economic growth.

The following first examines the top 30 industries by employment among those dependent on exclusive industrial land for each of the nine counties. We then provide an overview of the industries dependent on mixed-use industrial land in the following section.

INDUSTRIES DEPENDENT ON INDUSTRIAL LAND

Within Santa Clara, about half the industries dependent on industrial land experienced growth from 1990 to 2012. The largest industry dependent on exclusive industrial land is circuit board manufacturing. There are seven industries, a larger share than other counties, that are dependent on both exclusive and MU industrial land in Santa Clara including Electrical Contractors and Other Wiring Installation Contractors and Plumbing, Heating, and Air-Conditioning Contractors, which combined provide nearly 11,000 jobs. Two of the somewhat unexpected industries that made it to this list are Executive Offices and Other General Government Support. Interviewees noted that public facilities such as these are often built on industrial land out of expediency; thus these uses most likely do not need to be separated on industrial land.

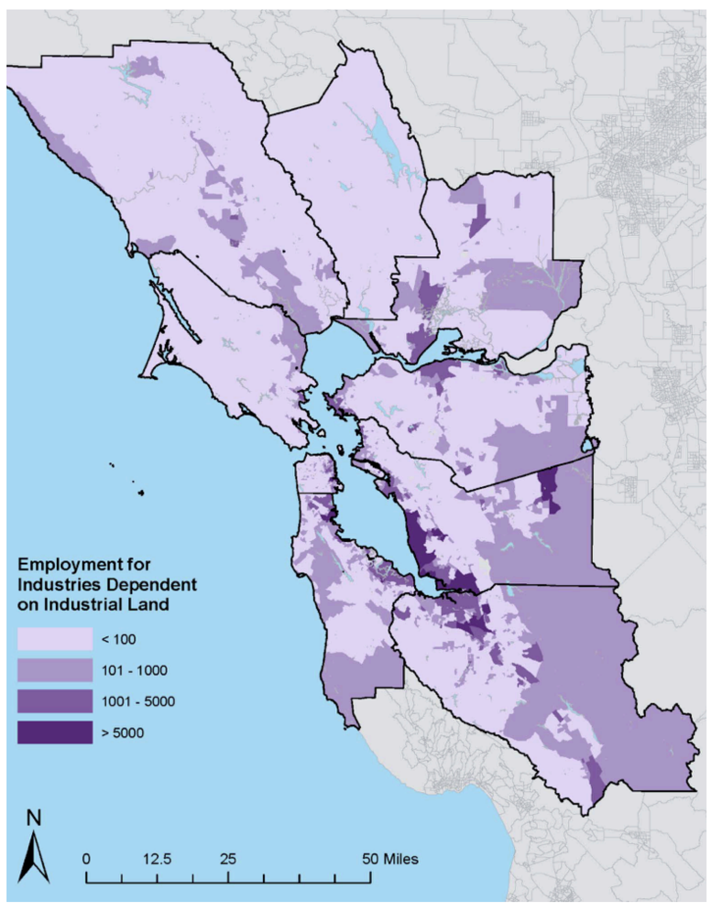


Figure V.2. Employment in Industries Dependent on Exclusive Industrial Land.

MOBILITY OF INDUSTRIES DEPENDENT ON INDUSTRIAL LAND

Moves section

An important indicator of demand for industrial land is the mobility of firms. If more firms and jobs are moving out of industrial areas than are moving in, demand may be declining. More in-moves suggests increasing demand.

Previous research has shown that overall, only about 10% of firms move during their lifetime. Industrial firms, particularly manufacturing, are more likely to move than other types of industries. Looking only at industrial land-dependent jobs, we find that they move in and out in approximately equal numbers, with a slightly greatly share of jobs moving into the Bay Area from the rest of California and the United States than move out.

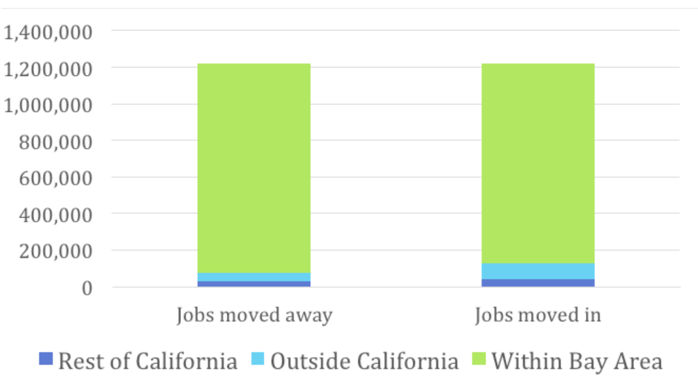


Figure V.3. Moves of industrial land-dependent jobs into and out of the Bay Area, 1990-2012.

In terms of absolute numbers of jobs, the most mobile industries are in just four sectors: high-tech manufacturing, construction, transportation, and wholesale (Table V.2). Again, the vast majority of these moves (80-90%) occur within the Bay Area.

The industrial areas from which jobs move are, for the most part, the same areas as those receiving jobs (Table V.1). Cities experiencing the most churn include Santa Clara, San Jose, Fremont, Milpitas, and San Francisco. San Francisco industrial areas are more likely to experience move-outs than move-ins. Areas that are top job gainers and not losers include Hayward, SFO, Oakland, and Pleasanton. Figure V.4 shows the net change in industrial land-dependent jobs due to moves, from 1990 to 2012.

Areas with most move-outs		Areas with most move-ins	
Zip	**City**	**Zip**	**City**
95054	Santa Clara	95054	Santa Clara
95131	San Jose	94538	Fremont
94043	Mountain View	95134	San Jose
94538	Fremont	95035	Milpitas
95035	Milpitas	95131	San Jose
94103	San Francisco	94105	San Francisco
94105	San Francisco	94103	San Francisco
95112	San Jose	94111	San Francisco
94111	San Francisco	95112	San Jose
94107	San Francisco	94545	Hayward
95134	San Jose	94089	Sunnyvale
94089	Sunnyvale	94128	SFO
94086	Sunnyvale	94043	Mountain View
94080	South San Francisco	94539	Fremont
94101	San Francisco	94107	San Francisco
94577	San Leandro	94612	Oakland
94545	Hayward	95110	San Jose
94102	San Francisco	94080	South San Francisco
94104	San Francisco	94086	Sunnyvale
95050	Santa Clara	94588	Pleasanton

Table V.1. Zip codes with the most industrial land-dependent jobs moving in and out, 1990-2012.

NAICS	Industry description	Total jobs moved, 1990-2012
3344	Semiconductor and Other Electronic Component Manufacturing	74,974
3341	Computer and Peripheral Equipment Manufacturing	50,415
2382	Building Equipment Contractors	41,436
3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	37,593
3342	Communications Equipment Manufacturing	35,594
5617	Services to Buildings and Dwellings	34,487
4237	Hardware, and Plumbing and Heating Equipment and Supplies Merchant Wholesalers	27,386
5182	Data Processing, Hosting, and Related Services	21,492
2383	Building Finishing Contractors	19,255
2362	Nonresidential Building Construction	17,951
4881	Support Activities for Air Transportation	17,920
3231	Printing and Related Support Activities	16,267
3254	Pharmaceutical and Medicine Manufacturing	15,868
3333	Commercial and Service Industry Machinery Manufacturing	14,319
4841	General Freight Trucking	11,912
5417	Scientific Research and Development Services	11,240
4238	Machinery, Equipment, and Supplies Merchant Wholesalers	11,104
4235	Metal and Mineral (except Petroleum) Merchant Wholesalers	10,362
4885	Freight Transportation Arrangement	10,020
2381	Foundation, Structure, and Building Exterior Contractors	9,838

Table V.2. Bay Area's 20 most mobile industries (1990-2012) that are dependent on industrial land

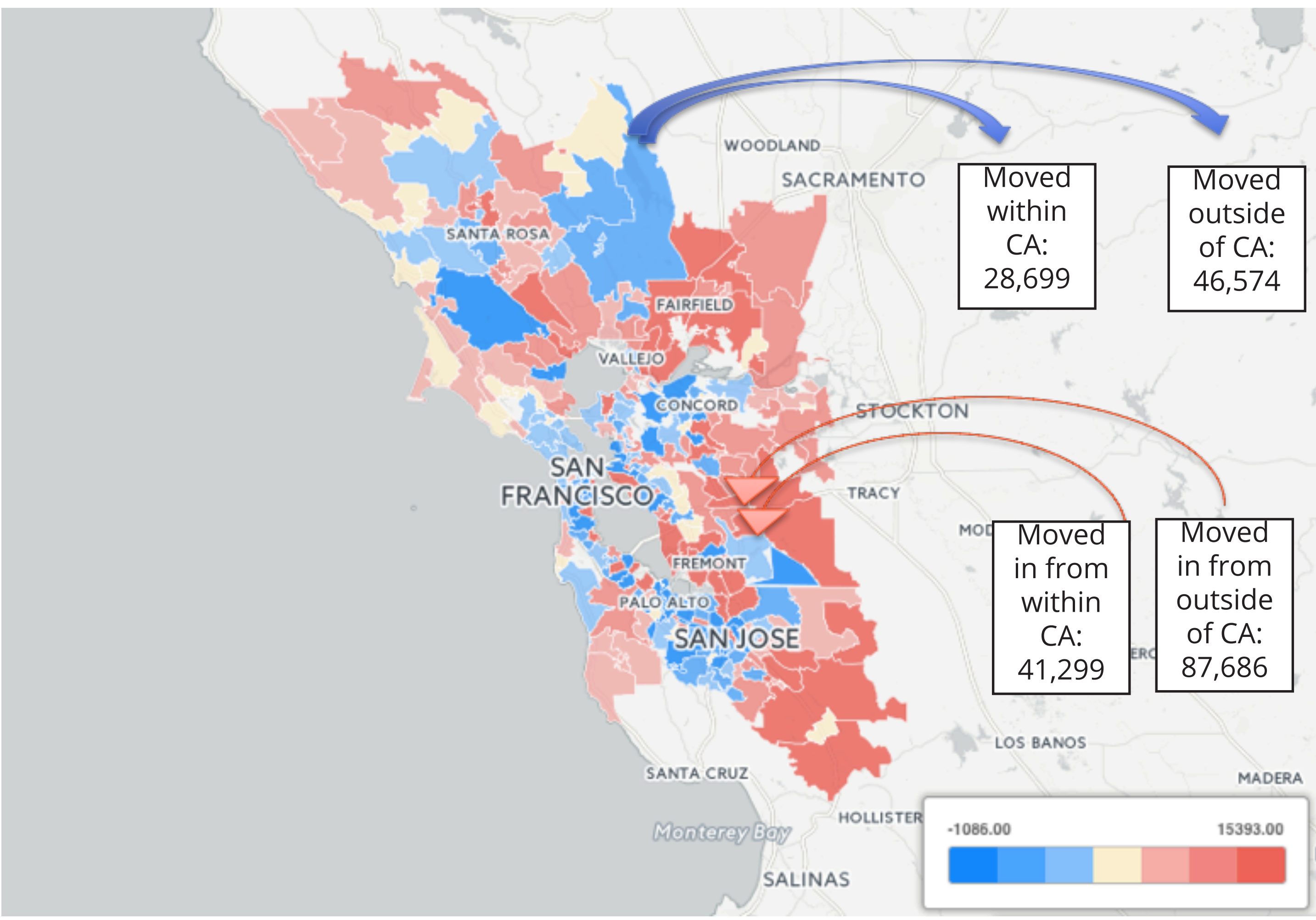


Figure V.4. Net industrial land-dependent jobs from moves, San Francisco Bay Area, 1990-2012.

Zooming in to specific industrial districts reveals distinct mobility patterns. For instance, South of Market in San Francisco saw a net loss of about 4,400 jobs from 1990 to 2012: 24,531 jobs moved out, and 20,102 jobs moved in. But as shown in Figure V.5, jobs moving out of SOMA typically head to other neighborhoods in the south of San Francisco or San Mateo County, while jobs moving into SOMA come from the entire region.

In Fremont, near the future Warm Springs BART station, jobs moving out head almost exclusively to the 580 corridor in the Livermore Valley and Silicon Valley, while jobs move in from much of Silicon Valley (Figure V.6). Overall, the area has experienced a net gain of almost 4,400 jobs, with 12,400 jobs moving out and 16,800 jobs in firms moving in.

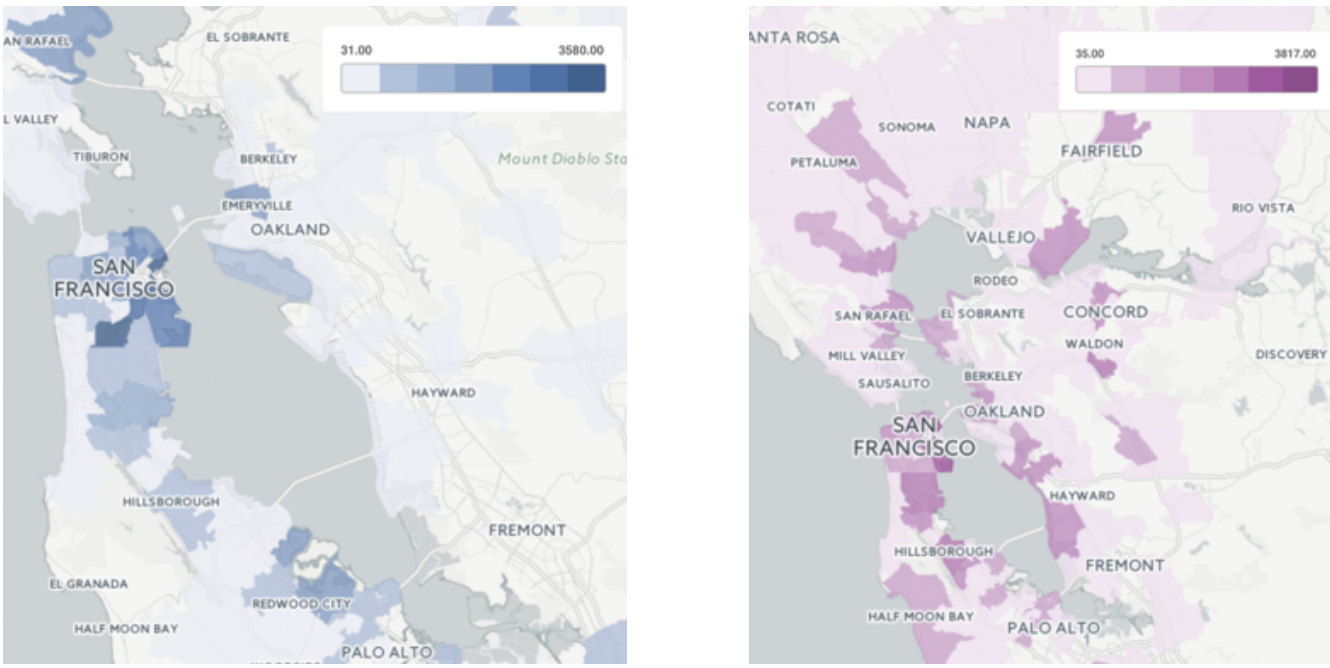


Figure V.5. Destination of jobs moving out of SOMA (left), and origin of jobs moving into SOMA (right), 1990-2012.

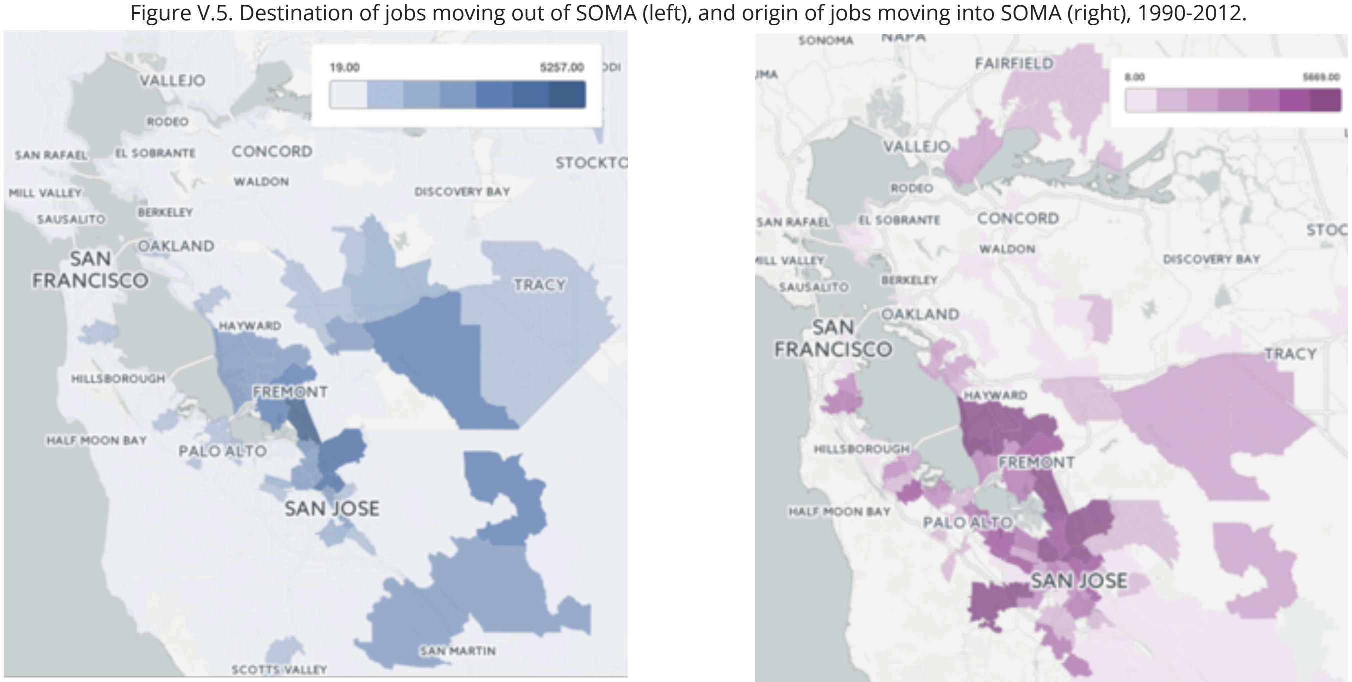


Figure V.6. Destination of jobs moving out of Warm Springs (left), and origin of jobs moving into Warm Springs (right)

The story in West Oakland is more mixed, with a net loss of 2,300 jobs from firm moves (Figure V.7). When firms leave, they go to a variety of locations mostly in the East Bay and Solano County. The firms that move in bring their jobs primarily from San Francisco and the inner East Bay.

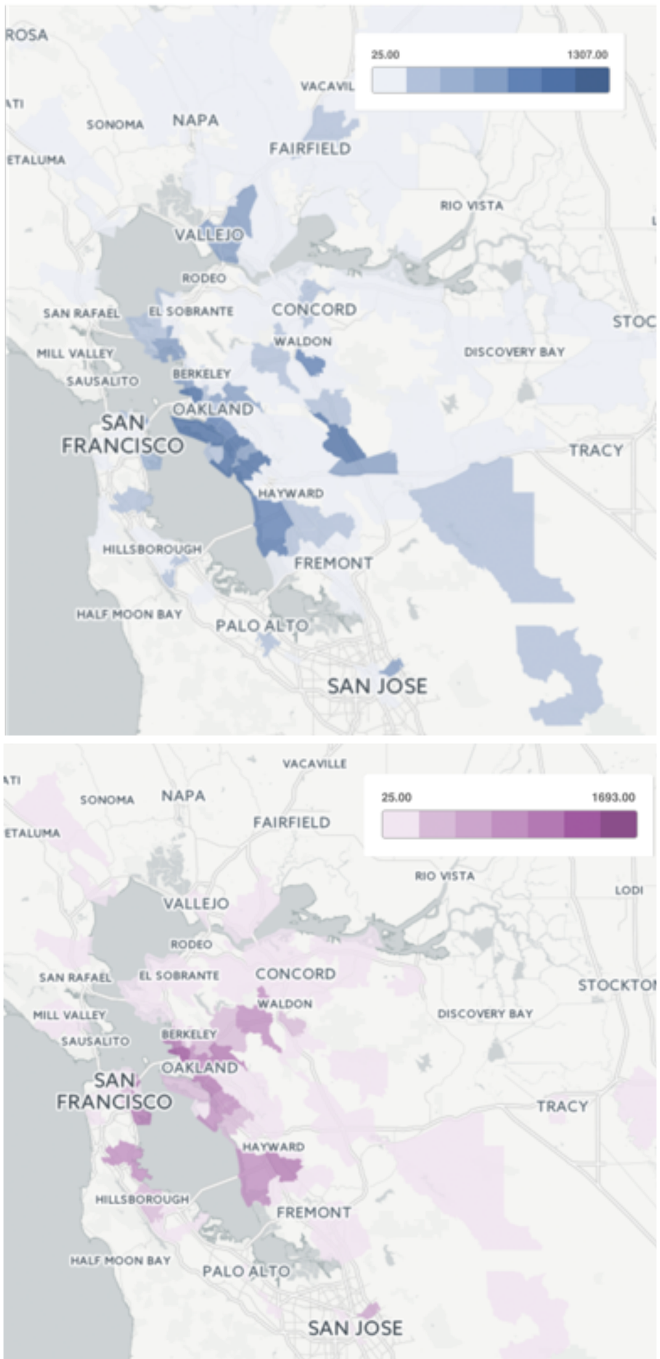


Figure V.7. Destination of jobs moving out of West Oakland (top), and origin of jobs moving into West Oakland (bottom).

INDUSTRIES DEPENDENT ON INDUSTRIAL LAND BY COUNTY

The following first examines the top 30 industries by employment among those dependent on exclusive industrial land for each of the nine counties. We then provide an overview of the industries dependent on mixed-use industrial land in the following section.

Within Santa Clara County, about half the industries dependent on industrial land experienced growth from 1990 to 2012. The largest industry dependent on exclusive industrial land is circuit board manufacturing. There are seven industries, a larger share than other counties, that are dependent on both exclusive and MU industrial land in Santa Clara including Electrical Contractors and Other Wiring Installation Contractors and Plumbing, Heating, and Air-Conditioning Contractors, which combined provide nearly 11,000 jobs. Two of the somewhat unexpected industries that made it to this list are Executive Offices and Other General Government Support. Interviewees noted that public facilities such as these are often built on industrial land out of expediency; thus these uses most likely do not need to be separated on industrial land.

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NAICS	Description	1990-2012 % change	Exclusive Jobs	LQ	Status	MU Jobs	LQ	Status
334412	Bare Printed Circuit Board Manufacturing	-55%	2,826	2.95	Dependent	5,157	2.03	Dependent
924110	Administration of Air and Water Resource and Solid Waste Management Programs	0%	2,118	8.17	Dependent	300	0.44	Occurring
238210	Electrical Contractors and Other Wiring Installation Contractors	53%	1,490	2.18	Dependent	4,895	2.70	Dependent
238220	Plumbing, Heating, and Air-Conditioning Contractors	12%	1,321	2.43	Dependent	3,235	2.24	Dependent
561720	Janitorial Services	137%	1,181	2.20	Dependent	2,110	1.48	Partial
238310	Drywall and Insulation Contractors	-52%	1,157	5.52	Dependent	310	0.56	Occurring
921110	Executive Offices	0%	1,116	4.10	Dependent	53	0.07	Occurring
332710	Machine Shops	6%	1,111	2.82	Dependent	3,054	2.92	Dependent
325412	Pharmaceutical Preparation Manufacturing	-97%	1,018	4.68	Dependent	614	1.06	Partial
334515	Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals	-65%	1,012	2.67	Dependent	2,057	2.04	Dependent
334112	Computer Storage Device Manufacturing	-82%	962	2.35	Dependent	862	0.79	Occurring
561730	Landscaping Services	85%	895	3.11	Dependent	795	1.04	Partial
334419	Other Electronic Component Manufacturing	-55%	787	2.42	Dependent	2,231	2.58	Dependent
238320	Painting and Wall Covering Contractors	49%	786	3.81	Dependent	291	0.53	Occurring
484121	General Freight Trucking, Long-Distance, Truckload	-64%	675	6.97	Dependent	258	1.00	Partial
237110	Water and Sewer Line and Related Structures Construction	52%	640	9.04	Dependent	222	1.18	Partial
492210	Local Messengers and Local Delivery	-21%	567	6.31	Dependent	144	0.60	Occurring
562111	Solid Waste Collection	360%	548	6.84	Dependent	162	0.76	Occurring
236220	Commercial and Institutional Building Construction	32%	545	2.37	Dependent	788	1.29	Partial
811121	Automotive Body, Paint, and Interior Repair and Maintenance	7%	537	3.70	Dependent	574	1.49	Partial
238330	Flooring Contractors	28%	527	7.55	Dependent	57	0.31	Occurring
811111	General Automotive Repair	13%	526	2.45	Dependent	497	0.87	Occurring
322211	Corrugated and Solid Fiber Box Manufacturing	-76%	506	8.46	Dependent	150	0.94	Occurring
332322	Sheet Metal Work Manufacturing	0%	463	2.95	Dependent	762	1.83	Partial
237310	Highway, Street, and Bridge Construction	-66%	456	5.19	Dependent	276	1.18	Partial
921190	Other General Government Support	0%	451	2.68	Dependent	215	0.48	Occurring
333314	Optical Instrument and Lens Manufacturing	-92%	436	2.04	Dependent	2,269	4.00	Dependent
236210	Industrial Building Construction	62%	434	5.87	Dependent	108	0.55	Occurring
484210	Used Household and Office Goods Moving	-26%	420	6.93	Dependent	24	0.15	Occurring
485999	All Other Transit and Ground Passenger Transportation	278%	408	8.44	Dependent	62	0.48	Occurring

Table V.3. Top 30 Industries Dependent on Exclusive IL - Santa Clara County

In Alameda County as well, half of the industrial land-dependent industries are experiencing growth, while the other half are in decline. Car transmission and shipping boxes manufacturing both provide over 2,000 jobs and are highly dependent on Exclusive IL. Moreover the top five industries in Alameda County dependent on light, medium, or heavy industrial land have relatively low employment numbers on MU IL, suggesting these industries are particularly reliant on exclusive industrial land. Only a few of the selected industries are dependent on both Exclusive and MU IL. These industries include: Industrial Machinery and Equipment Merchant Wholesalers, Electrical Apparatus and Equipment, Wiring Supplies, and Related Equipment Merchant Wholesalers, Highway, Street, and Bridge Construction, Poured Concrete Foundation and Structure Contractors, and Commercial Bakeries.

NAICS	Description	1990-2012 % change	Exclusive Jobs	LQ	Status	MU Jobs	LQ	Status
336350	Motor Vehicle Transmission and Power Train Parts Manufacturing	17%	2,405	9.31	Dependent	0	0.00	Occurring
322211	Corrugated and Solid Fiber Box Manufacturing	-35%	2,229	7.38	Dependent	4	0.03	Occurring
326199	All Other Plastics Product Manufacturing	15%	1,990	4.16	Dependent	32	0.17	Occurring
238220	Plumbing, Heating, and Air-Conditioning Contractors	16%	1,925	3.17	Dependent	182	0.76	Occurring
484121	General Freight Trucking, Long-Distance, Truckload	-67%	1,727	7.00	Dependent	59	0.60	Occurring
423830	Industrial Machinery and Equipment Merchant Wholesalers	-36%	1,251	4.37	Dependent	329	2.90	Dependent
492210	Local Messengers and Local Delivery	-42%	1,165	5.09	Dependent	17	0.19	Occurring
926120	Regulation and Administration of Transportation Programs	0%	1,060	2.42	Dependent	63	0.36	Occurring
424490	Other Grocery and Related Products Merchant Wholesalers	-6%	1,032	2.80	Dependent	229	1.56	Partial
488510	Freight Transportation Arrangement	207%	898	5.59	Dependent	43	0.67	Occurring
323119	Other Commercial Printing	#N/A	836	4.85	Dependent	28	0.41	Occurring
423610	Electrical Apparatus and Equipment, Wiring Supplies, and Related Equipment Merchant Wholesalers	69%	814	3.46	Dependent	235	2.52	Dependent
336211	Motor Vehicle Body Manufacturing	-21%	733	8.58	Dependent	3	0.09	Occurring
484110	General Freight Trucking, Local	10%	720	2.75	Dependent	82	0.79	Occurring
423510	Metal Service Centers and Other Metal Merchant Wholesalers	-29%	697	4.49	Dependent	7	0.11	Occurring
424430	Dairy Product (except Dried or Canned) Merchant Wholesalers	-61%	679	4.78	Dependent	62	1.10	Partial
423110	Automobile and Other Motor Vehicle Merchant Wholesalers	-71%	668	7.58	Dependent	1	0.03	Occurring
424820	Wine and Distilled Alcoholic Beverage Merchant Wholesalers	127%	654	5.64	Dependent	14	0.30	Occurring
237310	Highway, Street, and Bridge Construction	-2%	647	2.76	Dependent	200	2.15	Dependent
238110	Poured Concrete Foundation and Structure Contractors	-7%	644	3.50	Dependent	234	3.20	Dependent
311812	Commercial Bakeries	19%	576	3.06	Dependent	400	5.34	Dependent
238320	Painting and Wall Covering Contractors	54%	563	2.40	Dependent	69	0.74	Occurring
332312	Fabricated Structural Metal Manufacturing	-64%	551	3.92	Dependent	43	0.77	Occurring
331513	Steel Foundries (except Investment)	74%	550	9.31	Dependent	0	0.00	Occurring
541890	Other Services Related to Advertising	17%	527	6.14	Dependent	6	0.18	Occurring
562910	Remediation Services	171%	523	4.00	Dependent	90	1.73	Partial
326150	Urethane and Other Foam Product (except Polystyrene) Manufacturing	73%	512	6.69	Dependent	0	0.00	Occurring
423840	Industrial Supplies Merchant Wholesalers	-44%	502	3.55	Dependent	54	0.96	Occurring
336120	Heavy Duty Truck Manufacturing	133%	500	9.26	Dependent	0	0.00	Occurring
238310	Drywall and Insulation Contractors	-40%	489	2.79	Dependent	39	0.56	Occurring

Table V.4. Top 30 Industries Dependent on Exclusive IL - Alameda County

Contra Costa County has slightly more declining than growing industries, and the growing industries are considerably smaller than those in decline. Within Contra Costa County, Petroleum Refineries make up the largest share of employment among industries dependent on industrial land followed by handbag and purse manufacturing. Again, the top five industries have relatively low levels of employment on land zoned MU-industrial and only Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables, the Postal Service, and Other Scientific and Technical Consulting Services are dependent on both Exclusive and MU IL.

NAICS	Description	1990-2012 % change	Exclusive Jobs	LQ	Status	MU Jobs	LQ	Status
324110	Petroleum Refineries	-25%	1,545	6.98	Dependent	350	1.51	Partial
316992	Women's Handbag and Purse Manufacturing	0%	1,020	16.39	Dependent	0	0.00	Occurring
311312	Cane Sugar Refining	#N/A	950	16.41	Dependent	0	0.00	Occurring
331221	Rolled Steel Shape Manufacturing	-99%	750	16.41	Dependent	0	0.00	Occurring
238220	Plumbing, Heating, and Air-Conditioning Contractors	6%	553	3.15	Dependent	197	1.07	Partial
334513	Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables	-63%	533	9.76	Dependent	330	5.77	Dependent
238310	Drywall and Insulation Contractors	-73%	505	6.80	Dependent	39	0.50	Occurring
238910	Site Preparation Contractors	-2%	415	5.32	Dependent	22	0.27	Occurring
237310	Highway, Street, and Bridge Construction	-51%	408	5.76	Dependent	10	0.13	Occurring
491110	Postal Service	0%	400	2.61	Dependent	448	2.79	Dependent
923120	Administration of Public Health Programs	0%	371	3.34	Dependent	50	0.43	Occurring
541690	Other Scientific and Technical Consulting Services	177%	356	4.65	Dependent	174	2.17	Dependent
334519	Other Measuring and Controlling Device Manufacturing	118%	350	12.85	Dependent	20	0.70	Occurring
423930	Recyclable Material Merchant Wholesalers	-25%	263	9.94	Dependent	1	0.04	Occurring
488490	Other Support Activities for Road Transportation	-44%	251	16.03	Dependent	0	0.00	Occurring
236220	Commercial and Institutional Building Construction	36%	245	2.09	Dependent	73	0.59	Occurring
423220	Home Furnishing Merchant Wholesalers	-48%	223	6.65	Dependent	33	0.94	Occurring
337910	Mattress Manufacturing	28%	200	15.19	Dependent	0	0.00	Occurring
311812	Commercial Bakeries	63%	195	10.13	Dependent	2	0.10	Occurring
238990	All Other Specialty Trade Contractors	-62%	188	3.54	Dependent	67	1.20	Partial
518111	Internet Service Providers	#N/A	187	5.63	Dependent	5	0.14	Occurring
484110	General Freight Trucking, Local	-27%	183	2.84	Dependent	90	1.34	Partial
325188	All other basic inorganic chemical manufacturing	#N/A	177	10.41	Dependent	2	0.11	Occurring
811310	Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance	-23%	171	2.99	Dependent	68	1.14	Partial
325211	Plastics Material and Resin Manufacturing	208%	168	12.14	Dependent	7	0.48	Occurring
485113	Bus and Other Motor Vehicle Transit Systems	14135%	164	15.65	Dependent	8	0.73	Occurring
524114	Direct Health and Medical Insurance Carriers	146%	154	3.31	Dependent	74	1.52	Partial
424810	Beer and Ale Merchant Wholesalers	135%	152	16.41	Dependent	0	0.00	Occurring
561920	Convention and Trade Show Organizers	2%	150	13.60	Dependent	0	0.00	Occurring
562920	Materials Recovery Facilities	-61%	149	7.50	Dependent	7	0.34	Occurring

Table V.5. Top 30 Industries Dependent on Exclusive IL - Contra Costa County

In San Francisco County, there are almost twice as many declining industries than growing industries that are dependent on industrial land, and the growing industries are considerably smaller than those in decline. Many of the growing industries are in construction; surprisingly, several of the industries dependent on exclusive industrial land are services.

NAICS	Description	1990-2012 % change	Exclusive Jobs	LQ	Status	MU Jobs	LQ	Status
491110	Postal Service	0%	1,450	11.51	Dependent	0	0.00	Occurring
238210	Electrical Contractors and Other Wiring Installation Contractors	12%	967	5.82	Dependent	405	1.91	Partial
311615	Poultry Processing	0%	847	16.92	Dependent	0	0.00	Occurring
424480	Fresh Fruit and Vegetable Merchant Wholesalers	54%	584	15.23	Dependent	18	0.37	Occurring
315232	Women's and girls' cut and sew blouse and shirt manufacturing	#N/A	575	15.62	Dependent	0	0.00	Occurring
321911	Wood Window and Door Manufacturing	-57%	548	15.58	Dependent	0	0.00	Occurring
922120	Police Protection	0%	506	4.33	Dependent	0	0.00	Occurring
561720	Janitorial Services	69%	445	3.98	Dependent	311	2.18	Dependent
334220	Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing	-99%	424	11.94	Dependent	122	2.69	Dependent
238220	Plumbing, Heating, and Air-Conditioning Contractors	-45%	421	3.62	Dependent	182	1.23	Partial
452910	Warehouse Clubs and Supercenters	-76%	405	16.92	Dependent	0	0.00	Occurring
812331	Linen Supply	-81%	390	16.62	Dependent	0	0.00	Occurring
926120	Regulation and Administration of Transportation Programs	0%	350	2.73	Dependent	0	0.00	Occurring
236220	Commercial and Institutional Building Construction	26%	348	2.08	Dependent	623	2.92	Dependent
485310	Taxi Service	-7%	346	13.19	Dependent	2	0.06	Occurring
811111	General Automotive Repair	-23%	327	4.02	Dependent	276	2.66	Dependent
541613	Marketing Consulting Services	189%	324	2.42	Dependent	343	2.01	Dependent
238150	Glass and Glazing Contractors	-35%	317	13.61	Dependent	13	0.44	Occurring
424490	Other Grocery and Related Products Merchant Wholesalers	-57%	305	5.28	Dependent	39	0.53	Occurring
922130	Legal Counsel and Prosecution	0%	286	5.07	Dependent	0	0.00	Occurring
4441	Building Material and Supplies Dealers	#N/A	285	8.06	Dependent	57	1.26	Partial
485410	School and Employee Bus Transportation	109%	285	16.86	Dependent	0	0.00	Occurring
423220	Home Furnishing Merchant Wholesalers	-59%	276	5.56	Dependent	117	1.85	Partial
423210	Furniture Merchant Wholesalers	-35%	273	5.51	Dependent	107	1.69	Partial
515120	Television Broadcasting	-8%	269	2.27	Dependent	435	2.87	Dependent
484110	General Freight Trucking, Local	-85%	256	7.60	Dependent	19	0.44	Occurring
424930	Flower, Nursery Stock, and Florists' Supplies Merchant Wholesalers	-45%	255	13.65	Dependent	15	0.63	Occurring
238330	Flooring Contractors	7%	218	10.27	Dependent	11	0.41	Occurring
922190	Other Justice, Public Order, and Safety Activities	0%	217	4.13	Dependent	0	0.00	Occurring
442210	Floor Covering Stores	-69%	213	8.60	Dependent	16	0.51	Occurring

Table V.6. Top 30 Industries Dependent on Exclusive IL - San Francisco County

Of all the Bay Area counties, San Mateo has the greatest share of growing industries and jobs that are dependent on industrial land. Likely because of SFO, the top industry dependent on Exclusive IL is Freight Transportation Arrangement, though it is also dependent on MU IL. Perhaps because so much of the land in the county is mixed-use, many industries are concentrated on both Exclusive and Mixed-Use industrial land. There is very little heavy manufacturing in the county.

NAICS	Description	1990-2012 % change	Exclusive Jobs	LQ	Status	MU Jobs	LQ	Status
488510	Freight Transportation Arrangement	23%	1,109	4.05	Dependent	943	2.21	Dependent
488119	Other Airport Operations	744%	869	3.42	Dependent	7	0.02	Occurring
561720	Janitorial Services	41%	830	3.21	Dependent	310	0.77	Occurring
238220	Plumbing, Heating, and Air-Conditioning Contractors	79%	656	2.87	Dependent	658	1.85	Partial
811111	General Automotive Repair	14%	520	4.05	Dependent	144	0.72	Occurring
236220	Commercial and Institutional Building Construction	12%	493	2.08	Dependent	468	1.27	Partial
424490	Other Grocery and Related Products Merchant Wholesalers	-41%	453	5.11	Dependent	217	1.57	Partial
423830	Industrial Machinery and Equipment Merchant Wholesalers	-73%	439	5.65	Dependent	141	1.16	Partial
518210	Data Processing, Hosting, and Related Services	642%	437	2.39	Dependent	471	1.65	Partial
334220	Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing	-26%	430	3.44	Dependent	235	1.21	Partial
812320	Drycleaning and Laundry Services (except Coin-Operated)	47%	428	4.43	Dependent	145	0.96	Occurring
335931	Current-Carrying Wiring Device Manufacturing	-100%	423	11.90	Dependent	20	0.36	Occurring
561621	Security Systems Services (except Locksmiths)	-81%	405	6.47	Dependent	44	0.45	Occurring
332710	Machine Shops	-75%	401	4.72	Dependent	123	0.93	Occurring
334113	Computer Terminal Manufacturing	#N/A	400	9.59	Dependent	0	0.00	Occurring
237310	Highway, Street, and Bridge Construction	-71%	376	6.76	Dependent	53	0.61	Occurring
811121	Automotive Body, Paint, and Interior Repair and Maintenance	2%	329	4.41	Dependent	107	0.92	Occurring
334510	Electromedical and Electrotherapeutic Apparatus Manufacturing	80%	326	5.34	Dependent	71	0.75	Occurring
325510	Paint and Coating Manufacturing	-70%	323	12.20	Dependent	0	0.00	Occurring
561730	Landscaping Services	159%	308	2.11	Dependent	426	1.87	Partial
335311	Power, Distribution, and Specialty Transformer Manufacturing	28%	295	12.06	Dependent	0	0.00	Occurring
238340	Tile and Terrazzo Contractors	60%	258	7.07	Dependent	32	0.56	Occurring
447110	Gasoline Stations with Convenience Stores	-51%	240	4.22	Dependent	30	0.34	Occurring
323114	Quick printing	#N/A	239	3.39	Dependent	360	3.28	Dependent
238320	Painting and Wall Covering Contractors	46%	238	2.35	Dependent	112	0.71	Occurring
6241	Individual and Family Services	#N/A	228	2.21	Dependent	61	0.38	Occurring
423840	Industrial Supplies Merchant Wholesalers	-76%	210	6.35	Dependent	30	0.58	Occurring
423220	Home Furnishing Merchant Wholesalers	-18%	198	5.52	Dependent	50	0.89	Occurring
424460	Fish and Seafood Merchant Wholesalers	206%	193	5.87	Dependent	6	0.12	Occurring
423120	Motor Vehicle Supplies and New Parts Merchant Wholesalers	29%	189	4.37	Dependent	193	2.86	Dependent

Table V.7. Top 30 Industries Dependent on Exclusive IL - San Mateo County

Like San Mateo County, Solano County has a much larger share of industries dependent on industrial land that are growing, rather than declining. However, the total number of jobs is much lower. Top industries dependent on exclusive industrial land are refineries, construction, heavy manufacturing, and food-related wholesale.

Aside from the expected manufacturing, wholesale, and construction industries that are dependent on exclusive industrial land in the Bay Area, transportation industries also play a prominent role in exclusive industrial land employment. In addition to Freight Trucking and Passenger Air Transportation in a couple of key counties, car and automobile-related industries appear near the top of the list in most of the counties.

NAICS	Description	1990-2012 % change	Pure Jobs	LQ	Status	MU Jobs	LQ	Status
324110	Petroleum Refineries	52%	505	11.02	Dependent	0	0.00	Occurring
238220	Plumbing, Heating, and Air-Conditioning Contractors	-22%	452	3.34	Dependent	245	1.75	Partial
311340	Nonchocolate Confectionery Manufacturing	450%	440	10.94	Dependent	0	0.00	Occurring
424820	Wine and Distilled Alcoholic Beverage Merchant Wholesalers	33933%	435	9.49	Dependent	0	0.00	Occurring
446120	Cosmetics, Beauty Supplies, and Perfume Stores	282%	302	7.11	Dependent	1	0.02	Occurring
423840	Industrial Supplies Merchant Wholesalers	329%	276	8.04	Dependent	6	0.17	Occurring
238210	Electrical Contractors and Other Wiring Installation Contractors	-4%	263	2.74	Dependent	232	2.34	Dependent
561499	All Other Business Support Services	-92%	250	9.23	Dependent	0	0.00	Occurring
332431	Metal Can Manufacturing	0%	231	11.04	Dependent	0	0.00	Occurring
236220	Commercial and Institutional Building Construction	-24%	229	3.09	Dependent	38	0.50	Occurring
325412	Pharmaceutical Preparation Manufacturing	138477%	228	7.28	Dependent	111	3.43	Dependent
562910	Remediation Services	448%	218	8.63	Dependent	53	2.03	Dependent
238120	Structural Steel and Precast Concrete Contractors	712%	213	10.01	Dependent	2	0.09	Occurring
334516	Analytical Laboratory Instrument Manufacturing	1047%	206	2.56	Dependent	650	7.82	Dependent
423450	Medical, Dental, and Hospital Equipment and Supplies Merchant Wholesalers	1943%	198	4.59	Dependent	244	5.48	Dependent
423220	Home Furnishing Merchant Wholesalers	693%	186	5.25	Dependent	147	4.02	Dependent
238140	Masonry Contractors	-92%	183	6.69	Dependent	0	0.00	Occurring
424130	Industrial and Personal Service Paper Merchant Wholesalers	-6%	180	8.99	Dependent	33	1.60	Partial
423120	Motor Vehicle Supplies and New Parts Merchant Wholesalers	14%	168	4.93	Dependent	84	2.39	Dependent
812331	Linen Supply	-100%	164	8.54	Dependent	0	0.00	Occurring
311514	Dry, Condensed, and Evaporated Dairy Product Manufacturing	34212%	160	11.04	Dependent	0	0.00	Occurring
327991	Cut Stone and Stone Product Manufacturing	15379%	156	10.77	Dependent	0	0.00	Occurring
238910	Site Preparation Contractors	-80%	152	5.93	Dependent	0	0.00	Occurring
332313	Plate Work Manufacturing	7321%	150	11.04	Dependent	0	0.00	Occurring
238390	Other Building Finishing Contractors	-74%	150	7.17	Dependent	5	0.23	Occurring
237310	Highway, Street, and Bridge Construction	-24%	150	2.25	Dependent	61	0.89	Occurring
493110	General Warehousing and Storage	2127%	146	2.60	Dependent	445	7.66	Dependent
484110	General Freight Trucking, Local	16%	139	2.73	Dependent	9	0.17	Occurring
311999	All Other Miscellaneous Food Manufacturing	-96%	130	11.04	Dependent	0	0.00	Occurring
56221	Waste Treatment and Disposal	#N/A	130	8.25	Dependent	3	0.18	Occurring

Table V.8. Top 30 Industries Dependent on Exclusive IL - Solano County

NAICS	Description	MU Jobs	MU LQ	Status	Pure Jobs	County
334413	Semiconductor and Related Device Manufacturing	27,361	2.96	Dependent	4,721	Santa Clara
334119	Other Computer Peripheral Equipment Manufacturing	11,100	3.48	Dependent	690	Santa Clara
423690	Other Electronic Parts and Equipment Merchant Wholesalers	8,603	3.25	Dependent	794	Santa Clara
541618	Other Management Consulting Services	5,510	4.69	Dependent	230	San Mateo
334412	Bare Printed Circuit Board Manufacturing	5,157	2.03	Dependent	2,826	Santa Clara
238210	Electrical Contractors and Other Wiring Installation Contractors	4,895	2.70	Dependent	1,490	Santa Clara
334512	Automatic Environmental Control Manufacturing for Residential, Commercial, and Appliance Use	3,000	7.97	Dependent	0	San Mateo
622110	General Medical and Surgical Hospitals	2,885	2.58	Dependent	0	San Francisco
923130	Administration of Human Resource Programs (except Education, Public Health, and Veterans' Affairs Programs)	2,750	18.11	Dependent	0	Alameda
561320	Temporary Help Services	2,072	13.90	Dependent	0	Sonoma
524114	Direct Health and Medical Insurance Carriers	1,750	14.21	Dependent	0	Marin
923120	Administration of Public Health Programs	1,657	10.68	Dependent	0	Alameda
511210	Software Publishers	1,560	4.81	Dependent	50	San Francisco
517110	Wired Telecommunications Carriers	1,547	3.58	Dependent	180	San Francisco
236210	Industrial Building Construction	1,279	8.51	Dependent	52	Solano
541511	Custom Computer Programming Services	1,166	2.04	Dependent	380	San Francisco
621610	Home Health Care Services	1,084	7.63	Dependent	134	Contra Costa
511120	Periodical Publishers	1,076	6.71	Dependent	39	San Francisco
441110	New Car Dealers	1,035	4.80	Dependent	4	Contra Costa
511110	Newspaper Publishers	1,000	12.55	Dependent	140	Contra Costa

Table V.9. Top 20 Industries Dependent on MU Industrial Land

INDUSTRIES DEPENDENT ON MIXED-USE INDUSTRIAL LAND

We also looked at the industries dependent on mixed-use (MU) industrial land, which, similar to the pure industrial, we defined as having a location quotient greater than 2. Because MU industrial land includes uses such as light-office, heavy-office, mixed-use residential, and mixed-use commercial, there is a more diverse mix of industries within this grouping. Often they locate on mixed-use land because they encompass a wide variety of functions, from production, to administration and management, to R&D, to distribution. There are fewer manufacturing, wholesale, and transportation industries as a whole compared to those dependent on exclusive industrial land, with notable exceptions in Santa Clara, San Mateo, and Sonoma.

In Santa Clara County, the manufacturing sector plays a dominant role. Semiconductor and Related Device Manufacturing and Other Computer Peripheral Equipment Manufacturing employ a combined 38,000 people on MU industrial land, a significantly higher number than those on exclusive industrial land. Additionally, Other Electronic Parts and Equipment Merchant Wholesalers employ another 8,600 on MU industrial land while Bare Printed Circuit Board Manufacturing employs 5,100. Within San Mateo County, Other Management Consulting Services employs 5,500 on MU industrial land while Automatic Environmental Control Manufacturing for Residential, Commercial, and Appliance Use is the 7th largest industry among all counties in this category, responsible for 3,000 jobs.

In terms of employment, Alameda County does not have many large industries in this category and those industries that are sited on MU industrial land may not necessary require industrial land at all. Administration of Human Resource Programs (except Education, Public Health, and Veterans' Affairs Programs) employs 2,700 people and Administration of Public Health Programs employs another 1,700. Similarly, Sonoma County is home to over 2,000 jobs within the Temporary Help Services industry on land zoned MU industrial. In Marin County, the largest industry is Direct Health and Medical Insurance Carriers, which is also responsible for 1,700 jobs, and in San Francisco, the largest industry is Software Publishers at 1,500 jobs. Interestingly, Contra Costa County also does not have very large industries dependent on MU industrial land. The largest, Home Health Care Services, employs only 1,000 people, though it significantly more likely to site on land zoned MU industrial as opposed to land zoned for other uses.

NOTES AND APPENDICES

NOTES

1. Rent numbers for the Peninsula and San Francisco are calculated by aggregating CBRE sub-regions regions. In particular, the sub regions that comprised San Francisco are very small so sample sizes are much smaller. As a result, San Francisco and the Peninsula calculations my have higher margins of error. Often in San Francisco there was no data for certain sub-regions because data was not collected or was not available. For the warehouse rent data, the sub-regions San Francisco Downtown, San Francisco Downtown West, and San Francisco Outer Area were excluded from the aggregate. For the manufacturing rent data, San Francisco Downtown and San Francisco Downtown West were excluded from the aggregate. For the warehouse rent data, San Francisco Downtown and San Francisco Outer Area were excluded from the aggregate.
2. Interviews with real estate brokers covered the following areas: East Bay and Central Valley: Alameda and San Joaquin Counties; North Bay: Santa Rosa, Novato Healdsburg; North 880 Corridor: Richmond, Berkeley, Oakland, Alameda, Emeryville; South 880 Corridor: Fremont; San Francisco (large-scale and small-scale industrial); South Bay/Silicon Valley, Northern Waterfront region of Contra Costa County.
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6. Karen Chapple, *Planning Sustainable Cities and Regions: Towards More Equitable Development* (London, United Kingdom: Routledge, 2014).
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19. http://www.forbes.com/sites/kevinomarah/2015/07/22/industrie-4-0-is-ready-to-take-off/2/
20. http://www.manufacturingglobal.com/technology/458/Smart-manufacturing:-The-new-industrial-revolution
21. http://www.inboundlogistics.com/cms/article/the-shape-of-things-to-come/
22. http://www.inboundlogistics.com/cms/article/site-selection-the-rise-of-intermodal// ; interview with Tom O'Brien.
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24. http://www.areadevelopment.com/specialPub/ldw09/top-logistics-locations002.shtml

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39. The source of the assessors' data was DataQuick, while the shapefiles came from Boundary Shapefiles.
40. Though MTC developed a zoning layer for the last Plan Bay Area, it organized the zoning files by building type, rather than permitted uses, which is the focus of this study.
41. City of Antioch Zoning Code
42. City of Rio Vista Zoning Code
43. Counties were divided into the five geographic groups as follows: San Francisco (San Francisco County), South Bay (Santa Clara County), North Bay (Marin, Napa, Sonoma, and Solano Counties), Peninsula (San Mateo County), East Bay (Alameda and Contra Costa Counties)
44. Methodological Note on Total Land Acreage Transacted: Five large outlier properties were excluded from San Mateo.
45. During the time of research CBRE data was available through Q2 of 2015
46. CBRE EA Industrial Outlook: Methodology, Glossary of Terms, 2013
47. CBRE EA Industrial Outlook: Methodology, Table A.2 Definition of Use Type, 2013
48. We also do not know if the industrial stock counted by CBRE is located on the industrially zoned parcels identified by the Assessors' data.
49. Counties were divided into the five geographic groups as follows: San Francisco (San Francisco County), South Bay (Santa Clara County), North Bay (Napa, and Solano Counties), Peninsula (San Mateo County), East Bay (Alameda and Contra Costa Counties). Marin and Sonoma counties are not included in North Bay totals.
50. Methodological Note on Building Coverage: Some entries in the Assessor's data were excluded from this calculation to reduce error. The first exclusion was any lot size entry in the database that was either left blank or was entered as a zero. We assumed that these entries were caused by a reporting error in the Assessor's database. The second exclusion was any entry with a building square footage of zero. These were excluded after spot checking entries using google earth. The spot check found that the majority of the parcels did have a structure on them, despite indicating a building square footage of zero. As a result, the building coverage calculations in Table 2 only include parcels that have already been developed and exclude vacant parcels. This process of excluding entries significantly reduced our sample size (seen in the last two columns).
51. Rent numbers for the Peninsula and San Francisco are calculated by aggregating CBRE sub-regions regions. In particular, the sub regions that comprised San Francisco are very small so sample sizes are much smaller. As a result, San Francisco and the Peninsula calculations my have higher margins of error.

Often in San Francisco there was no data for certain sub-regions because data was not collected or was not available. For the warehouse rent data, the sub-regions San Francisco Downtown, San Francisco Downtown West, and San Francisco Outer Area were excluded from the aggregate. For the manufacturing rent data, San Francisco Downtown and San Francisco Downtown West were excluded from the aggregate. For the warehouse rent data, San Francisco Downtown and San Francisco Outer Area were excluded from the aggregate.

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Appendix I. Example Zoning Codes

Category	Example Zoning Codes
Heavy Industrial	Antioch, M-2 Heavy Industrial: "Uses include production of and extraction of metals or chemical products from raw materials, steel works and finishing mills, chemical or fertilizer plants, petroleum and gas refiners, paper mills, lumber mills, asphalt, concrete and hot mix batch plants, power generation plants, glassworks, textile mills, concrete products manufacturing and similar uses."
Medium Industrial	Santa Rosa, IG General Industrial: "Areas appropriate for industrial and manufacturing activities, warehousing, wholesaling and distribution uses. Uses may generate truck traffic and operate 24 hours. Retail and business service that could be more appropriately in another zone are not permitted. Land uses allowed in the IG zoning district have the potential for creating objectionable noise, smoke, odor, dust, noxious gases, glare, heat, vibration, or industrial wastes."
Light Industrial	San Bruno, M-1 Industrial: "Purpose. To establish areas for warehousing, light manufacturing, and fabrication."
Transportation and utilities	San Carlos, A Airport: "The Airport District is established to: A. Protect land uses around the San Carlos Airport from potential hazards of airport operations. B. Identify a range of uses compatible with airport accident hazard and airport noise exposure. C. Prohibit the development of incompatible uses that are detrimental to the general health, safety and welfare and to existing and future airport operations. D. Comply with Federal Aviation Administration (FAA) regulations."
Industrial-Office	Newark, MT Industrial Technology Park District: "reserves appropriately located areas for research and administrative facilities and specialized industries to concentrate in mutually beneficial relationships. Development in all industrial parks should be of the highest quality and should have no significant impacts on adjacent properties."
Mixed use industrial-residential	San Francisco, UMU Urban Mixed Use: "intended to promote a vibrant mix of uses while maintaining the characteristics of this formerly industrially-zoned area."
Mixed use industrial-commercial	San Jose, CIC Combined Industrial/Commercial District: "The CIC Combined Industrial/Commercial zoning designation is intended for commercial or industrial uses, or a compatible mixture of these uses, that support the goals of the combined industrial/commercial general plan designation. The district allows for a broad range of commercial uses with a local or regional market, including big box retail, and a narrower range of industrial uses, primarily industrial park in nature, but including some low-intensity light industrial uses. Assembly uses and day care centers are allowed where they are compatible with and will not impose constraints on neighboring industrial uses."

Appendix II. Methodological Notes on IL Percentage Calculations

Total Acreage

The total acreage used for the calculations in Table 3.2 does not come from the same Assessor's dataset as the industrial parcels. Instead the official land areas were calculated in GIS using the county shapefiles (clipped to exclude water) from MTC. This methodological decision was made because in several counties the total land area from the Assessor's database did not match the official numbers provided by the local governments. Many were in reasonable ranges, but two counties in particular were not close enough to use as denominators for our percentage calculations. In Alameda the Assessor's total was 252 square miles under the official land area, while San Mateo was 599 square miles over the official land area number.

We detected that these discrepancies are a result of several factors in Assessor's data, including: incomplete or misreporting of data, parcels that include land under water, overlaps in parcel boundaries and/or parcels with multi-story buildings being counted several times. Similar issues may exist in the industrial parcels, but because the total number of parcels is much lower we assume the error is also lower. We were also able to spot check many of the industrial parcels using Google maps to determine if the acreage reported by the Assessor seemed reasonable.

Despite these methodological issues, the range of potential percentages for total industrial land is still quite small. When we used the Assessor's total land number as the denominator, we found that 2.2% of land in the nine county region is zoned for industrial.

The acreage for ten industrially zoned parcels in San Mateo county were also recalculated using GIS to determine if their very large size was a result of a data entry error. These recalculated parcel sizes were supplemented for the original Assessor's data in these 10 instances.

Agricultural Designations

Agricultural designations that specifically allow for industrial uses were rare in the city zoning codes reviewed. This made it difficult to separate industrial uses from purely agricultural activity that can take up a significant number of acres. As a result, all agricultural designations were excluded to avoid skewing the results. This may explain why North Bay counties' percent of industrial land was much lower than other counties. For example, areas zoned for wineries were not included because even though there may be industrial uses on that land (e.g. processing the grapes), it is difficult to separate that land area from the larger vineyard land.

Only two counties – Contra Costa (33,708 acres) and San Mateo (1,725 acres) – had parcels that were explicitly zoned for both industrial and/or agricultural uses. Other cities may have had similar zoning 'on the books' but no parcels were found that actually contained that industrial agriculture zoning.

Fieldwork

Many industrial zones allow other uses such as schools or restaurants, or have nonindustrial uses that predate the industrial zoning of the area. We have quantified the amount of land in the Bay Area is zoned industrial, but we also wanted to estimate how much of that land currently has other uses on it in reality.

To estimate the nonindustrial uses on industrial land in the Bay Area, we first took a geographically random sample of fifty industrially zoned parcels for each of the nine counties using GIS software. (This software ensures a geographical spread, because a simple random sample could still be clustered in a few cities or even one city.) The sample includes only light industrial, medium industrial, heavy industrial, and transportation zoning categories, since many mixed-use categories allow a variety of uses.

Second, we looked at the fifty parcels in the sample for each county on Google Maps satellite view and street view, to see if we could tell if the parcel currently has a nonindustrial use (or whenever the most recent Google photos were taken). If it was not clear what the use on the parcel was, we visited the sites in person to make a determination.

Empty lots were considered industrial and were not included in our count of nonindustrial uses on industrial land. However, a parking lot or a construction site that was clearly nonindustrial was counted as a nonindustrial use of industrial land. For example, in Santa Clara County, the Levi Stadium parking lot was zoned industrial but we marked it as having a nonindustrial use in our data.

Across the Bay Area, we found that 10% of the sampled parcels had current nonindustrial uses, or a total of 6.5% of the industrial acreage in the region. The chart below shows the percent nonindustrial use by county. The highest levels of nonindustrial uses on industrial land by county were in Santa Clara and Sonoma Counties. Housing accounted for much of the nonindustrial uses on industrial land, particularly in San Francisco. Other nonindustrial uses included parks, dog parks, cemeteries, schools, and retail. Most of the land with nonindustrial uses was zoned for light industrial.

	Percentage of Industrial Land in Sample with Nonindustrial Uses
Bay Area	**10%**
Alameda	8%
Contra Costa	10%
Marin	6%
Napa	2%
San Francisco	8%
San Mateo	8%
Santa Clara	20%
Solano	4%
Sonoma	24%

Appendix III. Industrial Land by County and City.

Complete Industrial Land Classification by County

	Acres Zoned for Industrial Land						
	Mixed-Use			*100% Industrial*			
	Industrial-office	*MU-commercial*	*MU-residential*	*Light*	*Medium*	*Heavy*	*Transportation*
North Bay							
Marin	780	292	31	21	68	437	120
Sonoma	412	188	372	555	289	181	-
Napa	1,413	92	30	219	860	289	1,028
Solano	1,937	2,520	-	4,953	2,727	1,755	539
East Bay							
Alameda	1,471	1,535	530	4,019	13,523	2,025	1,089
Contra Costa	2,121	1,644	205	1,699	1,365	11,586	1,587
South Bay							
Santa Clara	7,856	1,948	35	3,505	1,023	4,098	36
Peninsula							
San Mateo	2,643	1,721	241	2,299	3,456	398	87
San Francisco							
San Francisco	517	42	426	407	579	-	-

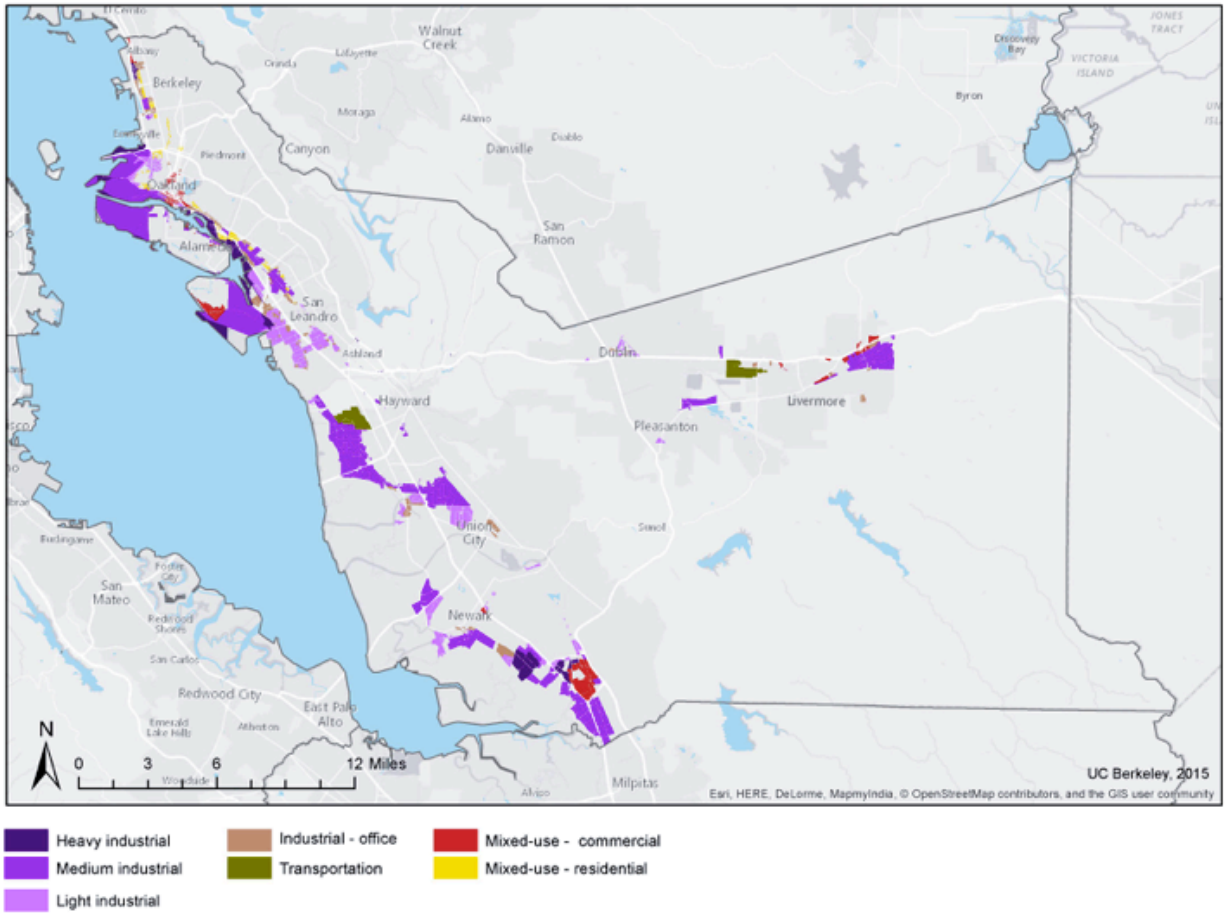
Industrially Zoned Land per City (top 50)

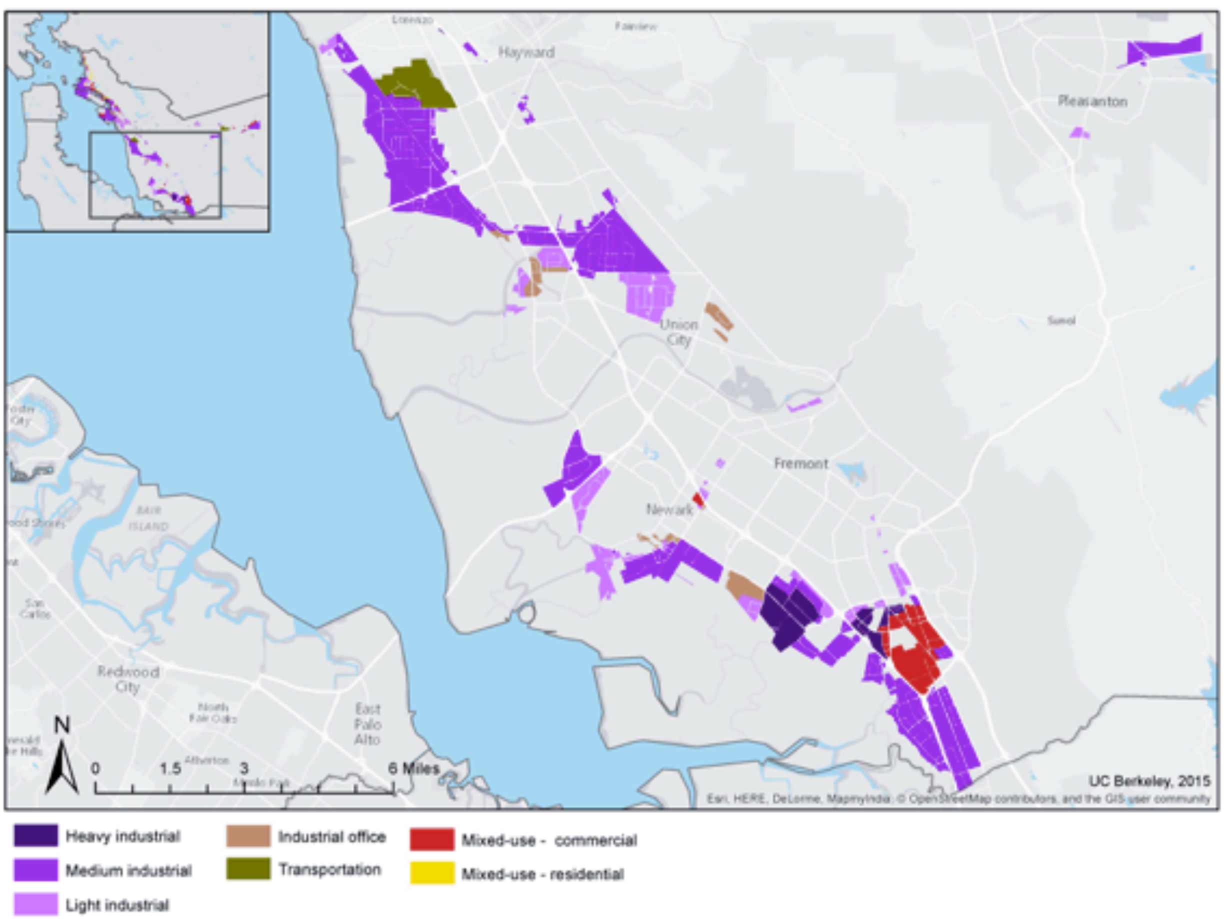
County	City	Acres
Alameda	Oakland	6,999
Santa Clara	San Jose	6,410
Contra Costa	Martinez	4,956
Contra Costa	Richmond	4,919
Solano	Unincorporated Area	4,487
Alameda	Fremont	4,180
Alameda	Hayward	3,610
San Mateo	Unincorporated Area	3,143
Contra Costa	Concord	2,722
Solano	Benicia	2,702
Contra Costa	Pittsburg	2,521
Solano	Fairfield	2,517
Napa	Unincorporated Area	2,354
San Mateo	South San Francisco	2,301
Santa Clara	Santa Clara	2,197
Solano	Vacaville	2,170
Alameda	San Leandro	1,788
Alameda	Livermore	1,762

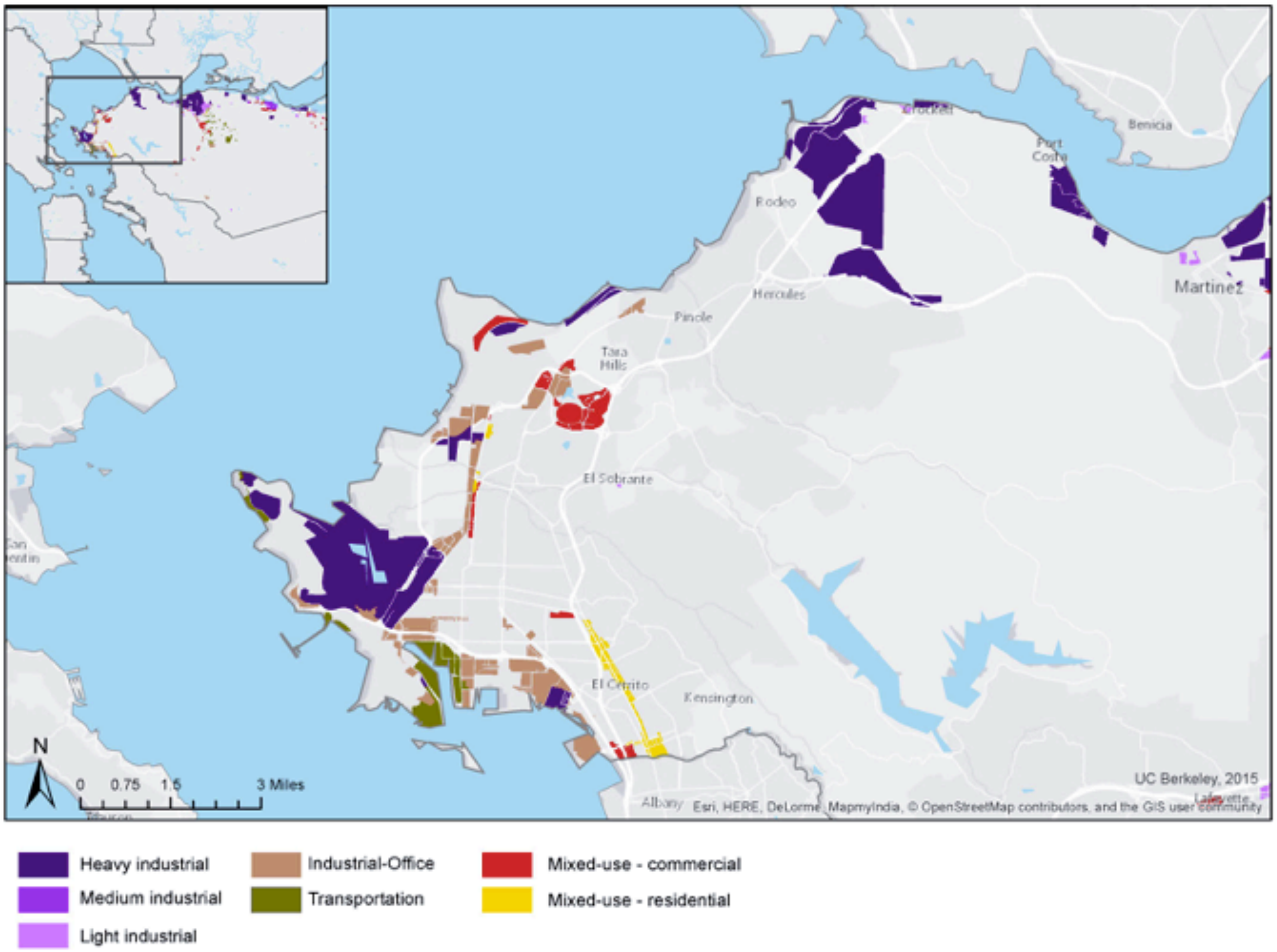
Industrially Zoned Land per City (top 50) contiued

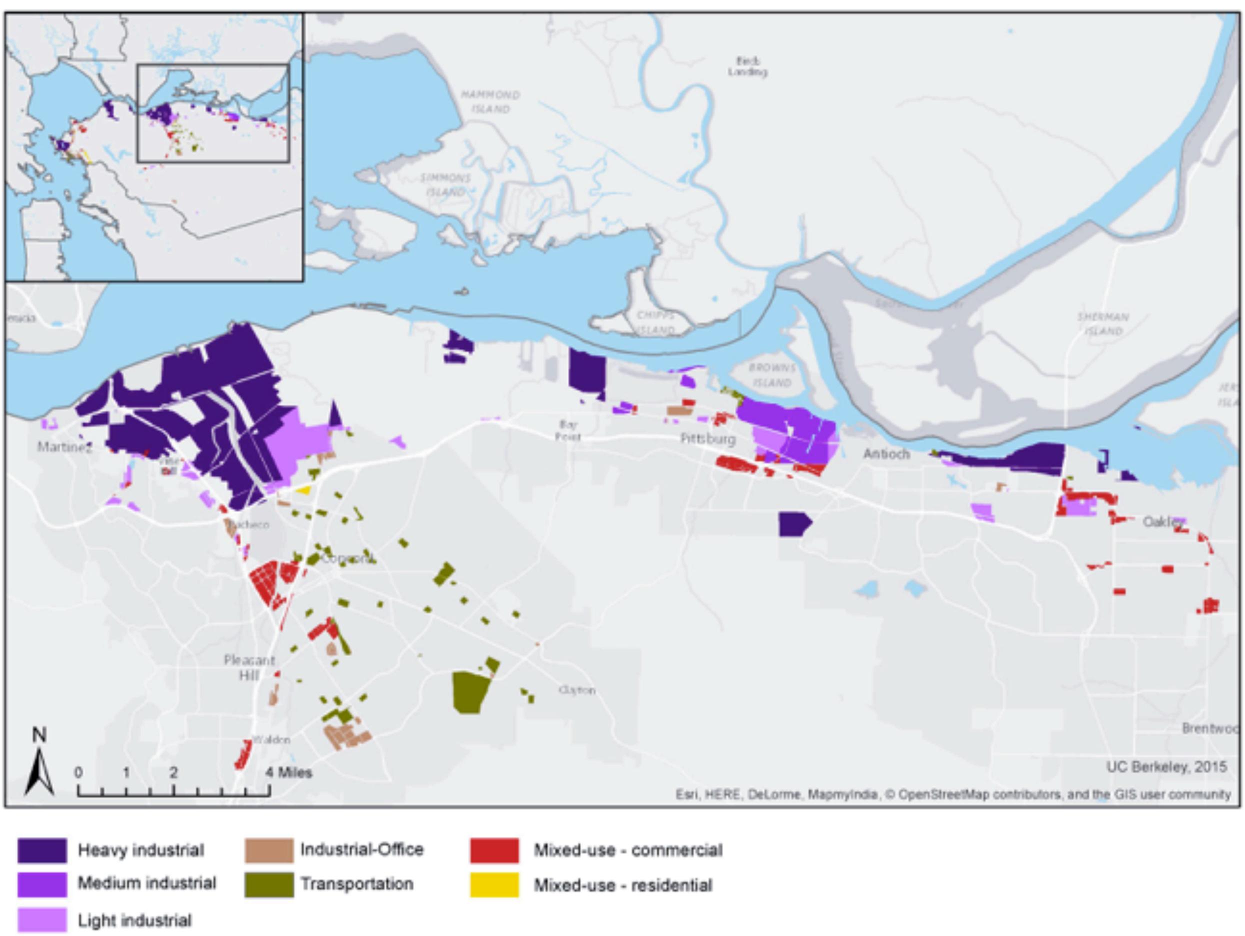
Santa Clara	Palo Alto	1,673
Santa Clara	Sunnyvale	1,585
Contra Costa	RODEO	1,537
Santa Clara	Gilroy	1,496
San Mateo	Brisbane	1,436
Santa Clara	Milpitas	1,374
San Francisco	San Francisco	1,276
Napa	American Canyon	1,110
Alameda	Newark	1,100
Alameda	Union City	1,019
Solano	Vallejo	994
Contra Costa	OAKLEY	862
Marin	Novato	791
Contra Costa	ANTIOCH	770
Solano	Dixon	731
Alameda	Alameda	731
Solano	Rio Vista	680
San Mateo	Foster City	677
San Mateo	Burlingame	618
Santa Clara	Mountain View	589
Contra Costa	CROCKETT	479
San Mateo	Redwood City	461
San Mateo	San Mateo	448
Marin	Unincorporated Area	436
Sonoma	Windsor	418
Santa Clara	Morgan Hill	406
San Mateo	San Carlos	393
Alameda	Berkeley	388
Napa	Napa	373
Sonoma	Petaluma	347
San Mateo	Menlo Park	342
Sonoma	Healdsburg	338

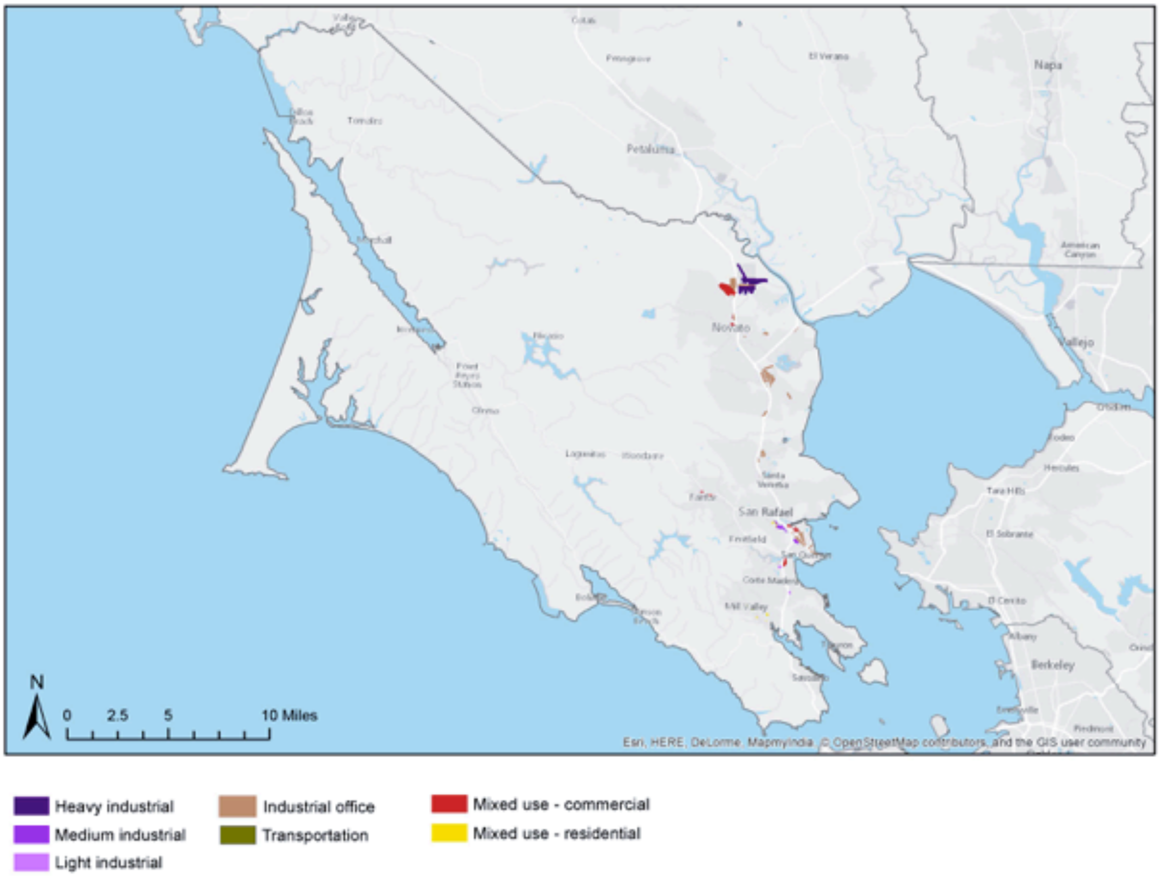
Appendix IV. Industrial Land by County.

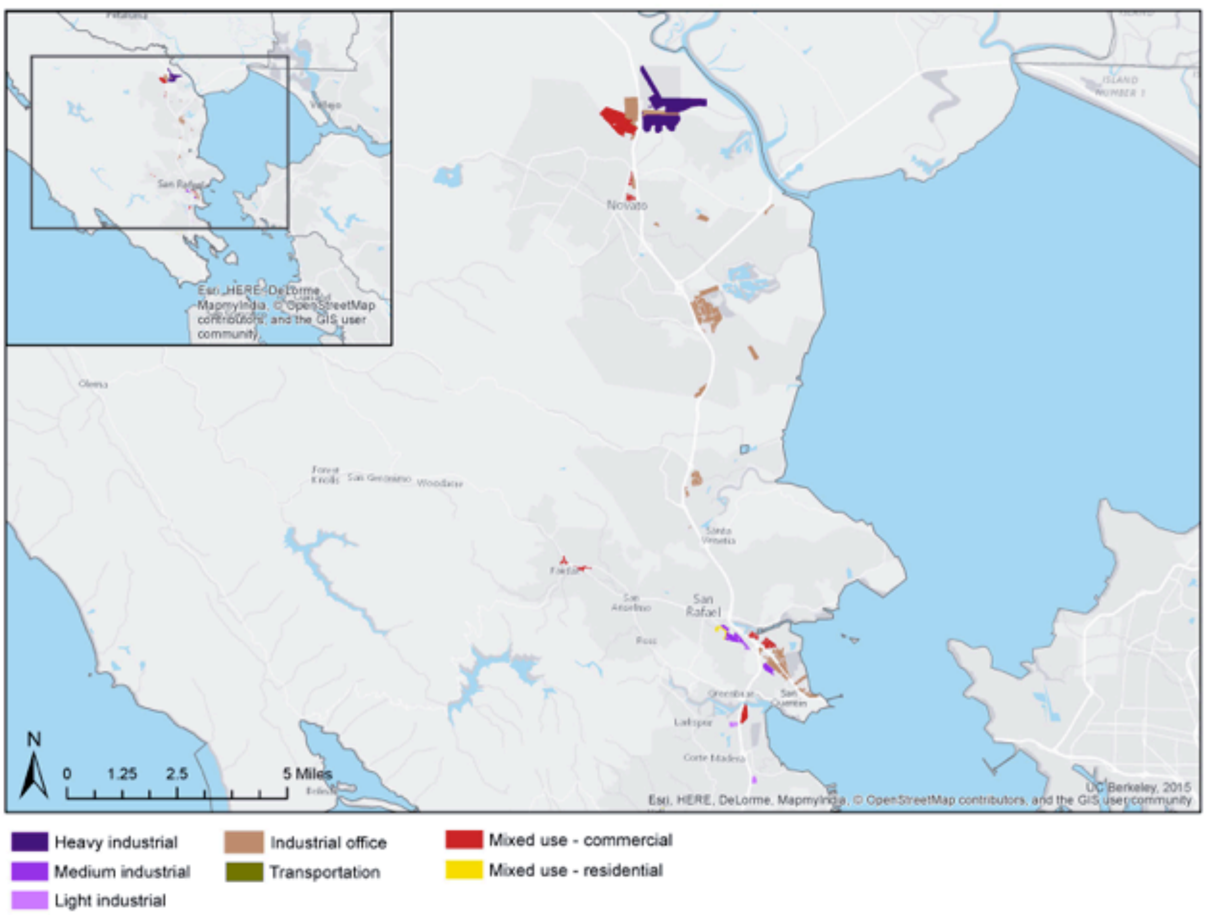


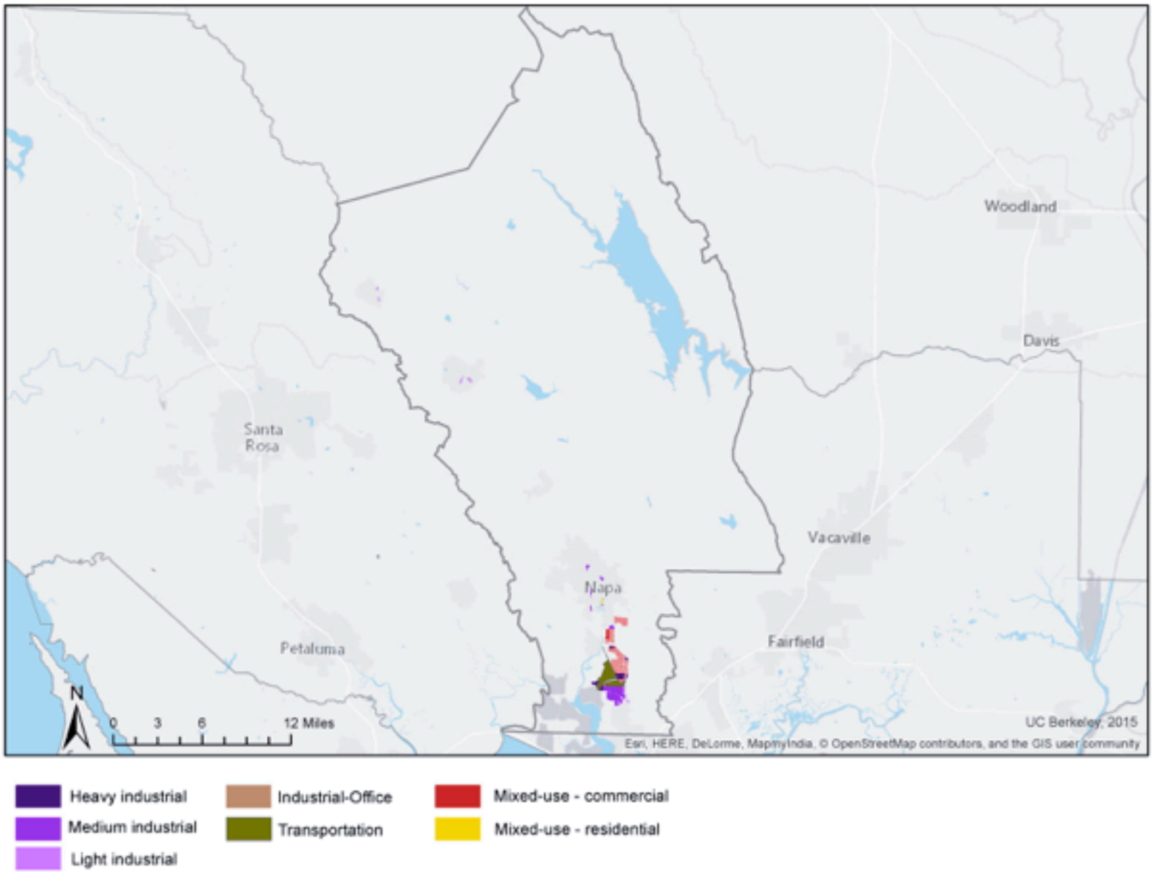



Crockett
Benicia
Port Costa
Rodeo
Hercules
Pinole
Tara Hills
Martinez
El Sobrante
El Cerrito
Kensington
Albany
N
0 0.75 1.5 3 Miles
UC Berkeley, 2015
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community
Heavy industrial
Medium industrial
Light industrial
Industrial-Office
Transportation
Mixed-use - commercial
Mixed-use - residential

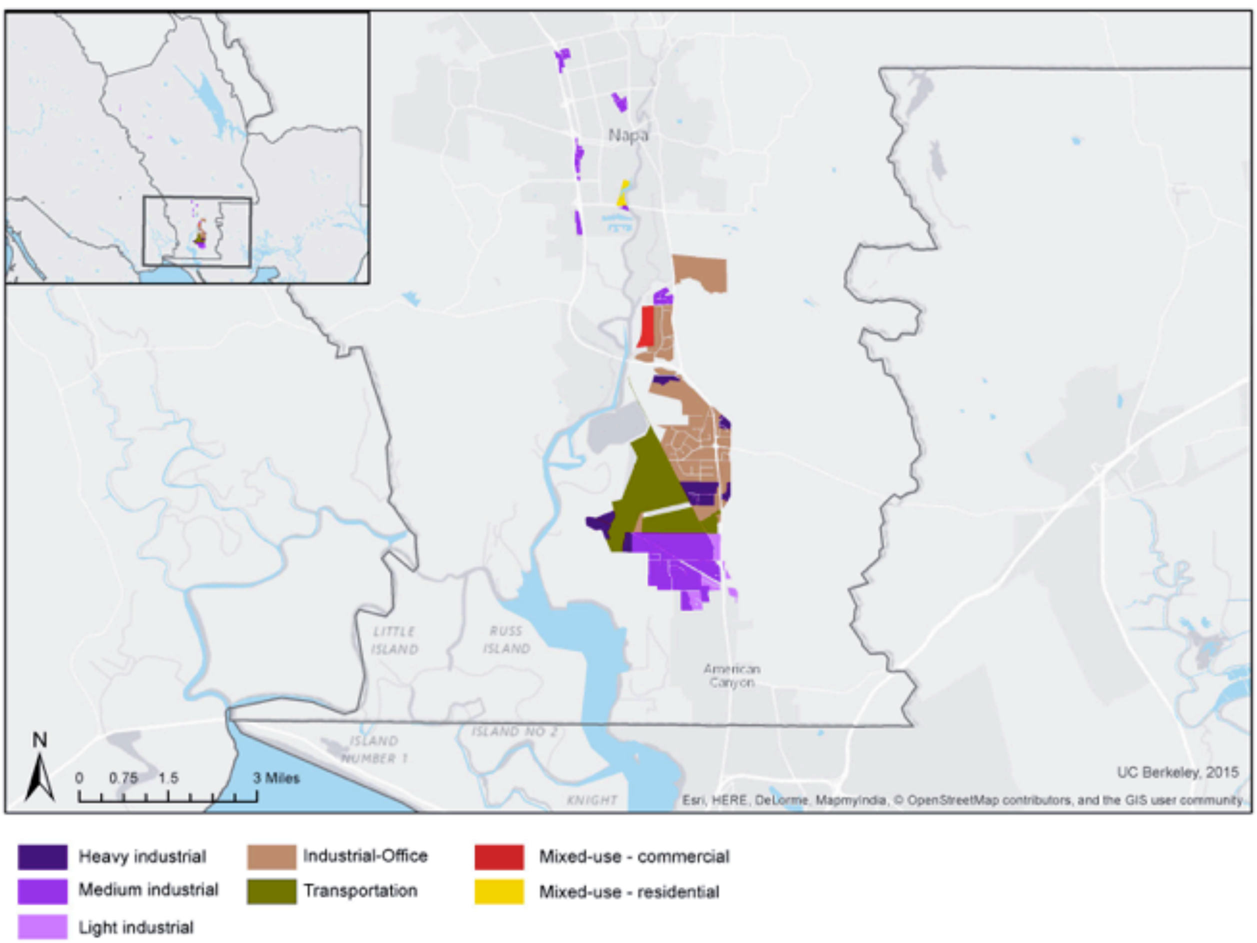

HAMMOND ISLAND
SIMMONS ISLAND
CHIPPS ISLAND
BROWNS ISLAND
SHERMAN ISLAND
Martinez
Pacheco
Concord
Pleasant Hill
Walden
Clayton
Bay Point
Pittsburg
Antioch
Oakley
Brentwood
N
0 1 2 4 Miles
UC Berkeley, 2015
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community
Heavy industrial
Medium industrial
Light industrial
Industrial-Office
Transportation
Mixed-use - commercial
Mixed-use - residential


Napa
Petaluma
Vallejo
Novato
San Rafael
Berkeley
N
0 2.5 5 10 Miles
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community
Heavy industrial
Medium industrial
Light industrial
Industrial office
Transportation
Mixed use - commercial
Mixed use - residential

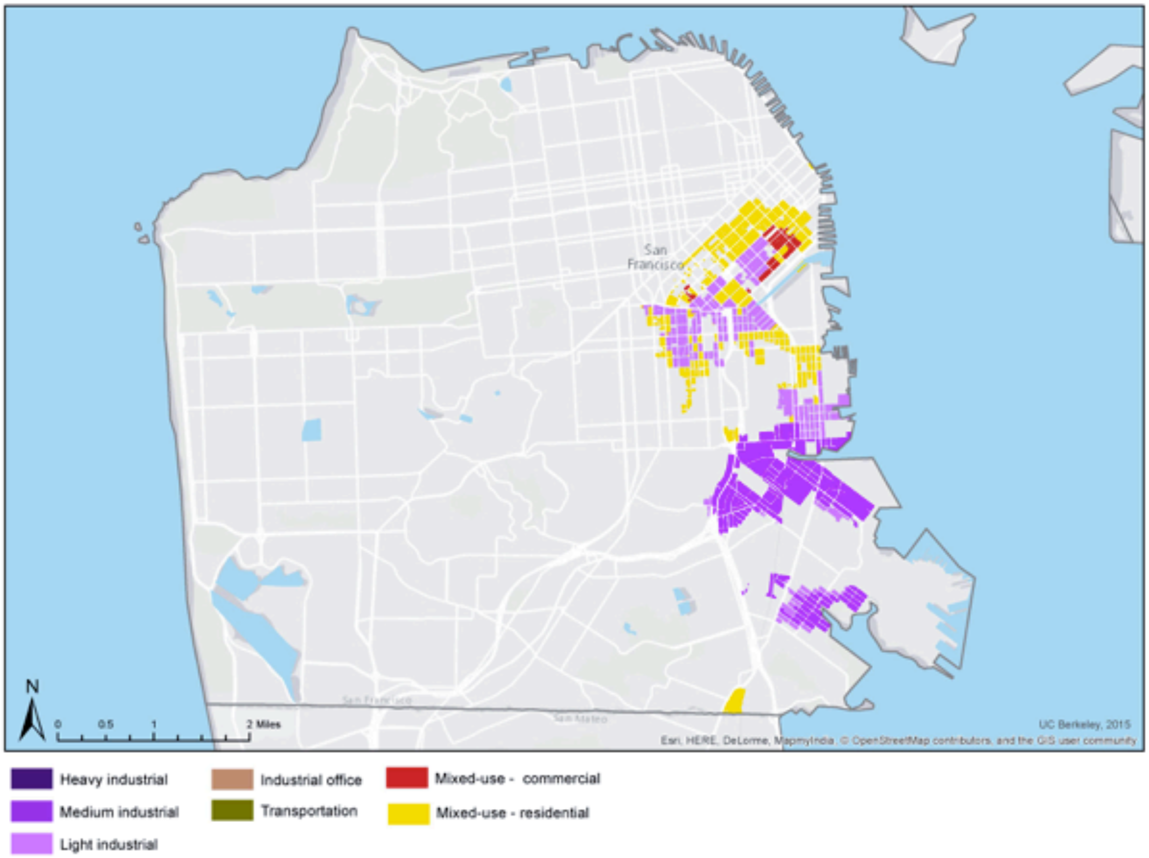

Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community
Novato
San Rafael
N
0 1.25 2.5 5 Miles
UC Berkeley, 2015
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community
Heavy industrial
Medium industrial
Light industrial
Industrial office
Transportation
Mixed use - commercial
Mixed use - residential

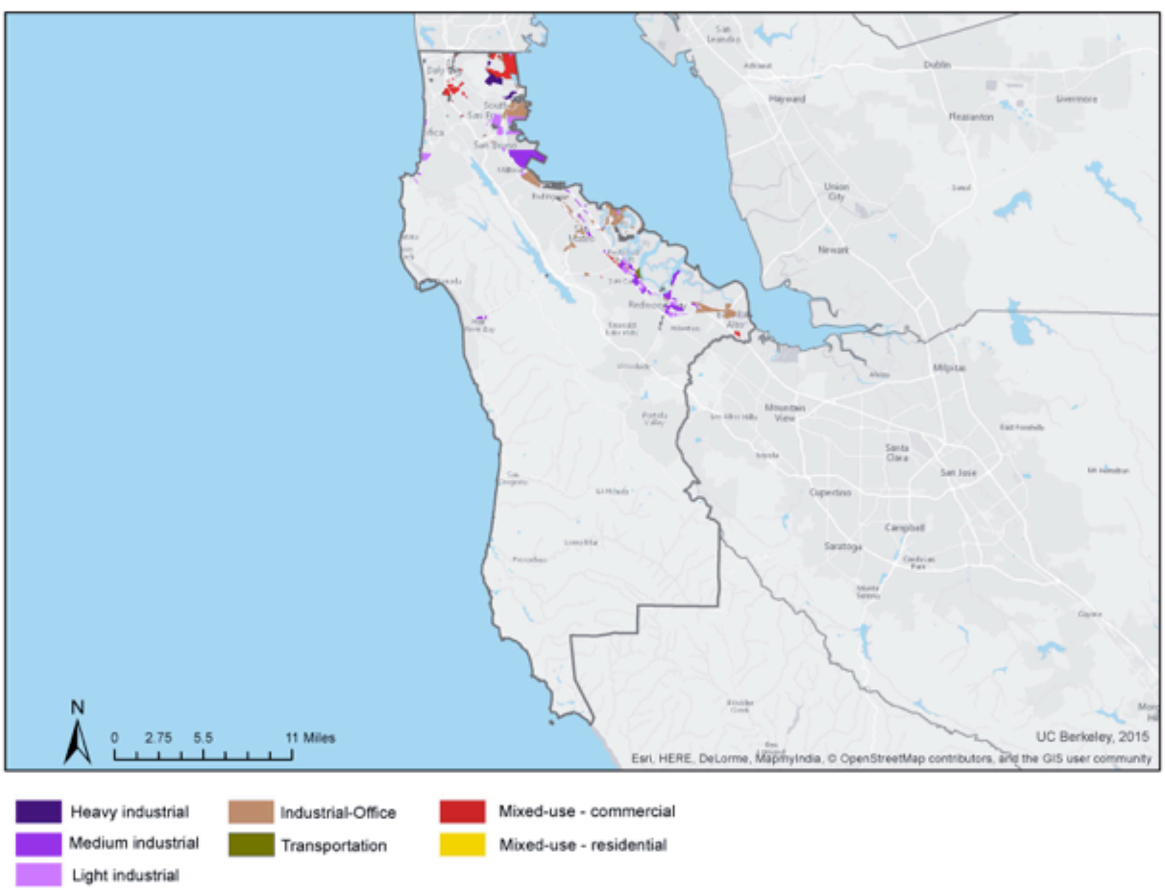


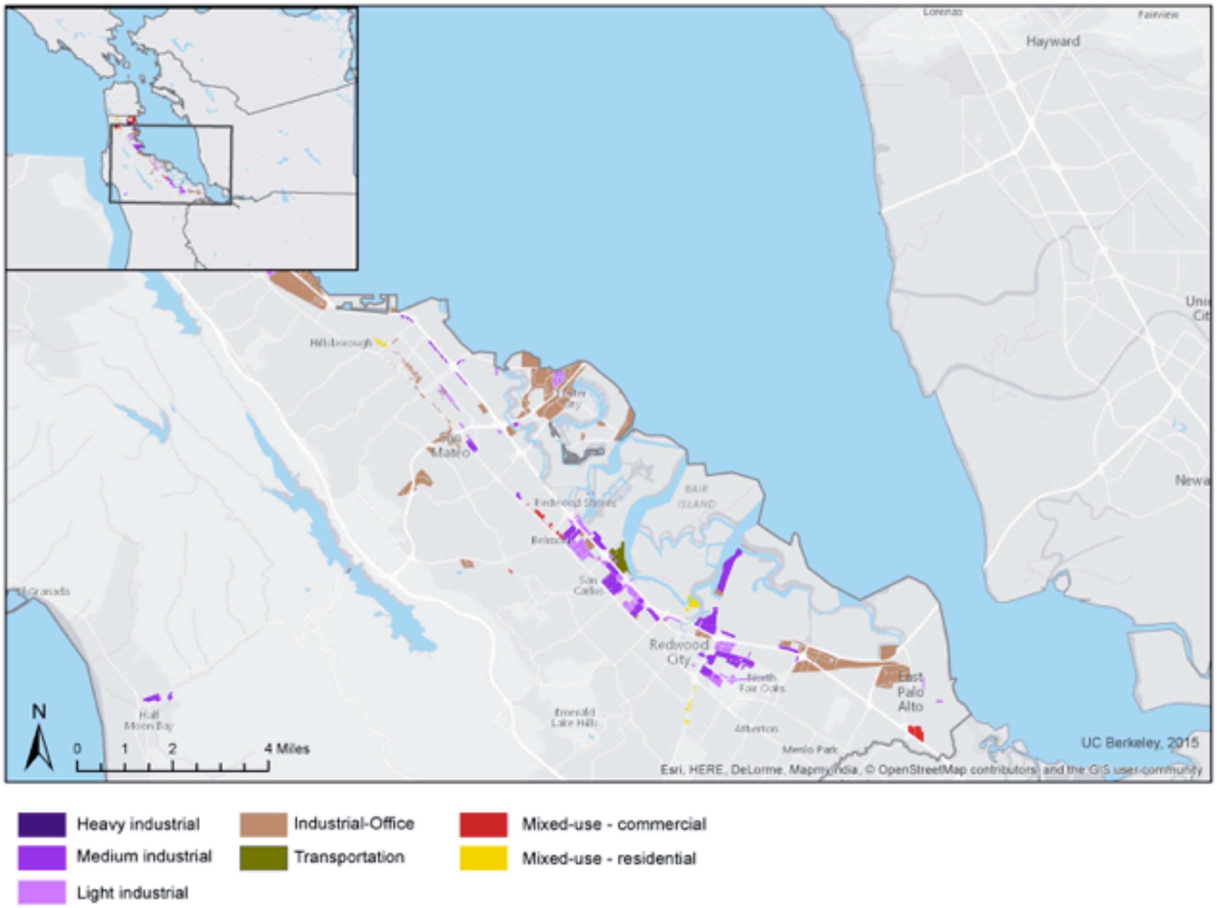
Woodland
Davis
Santa Rosa
Vacaville
Napa
Fairfield
Petaluma
N
0 3 6 12 Miles
UC Berkeley, 2015
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community
Heavy industrial
Medium industrial
Light industrial
Industrial-Office
Transportation
Mixed-use - commercial
Mixed-use - residential

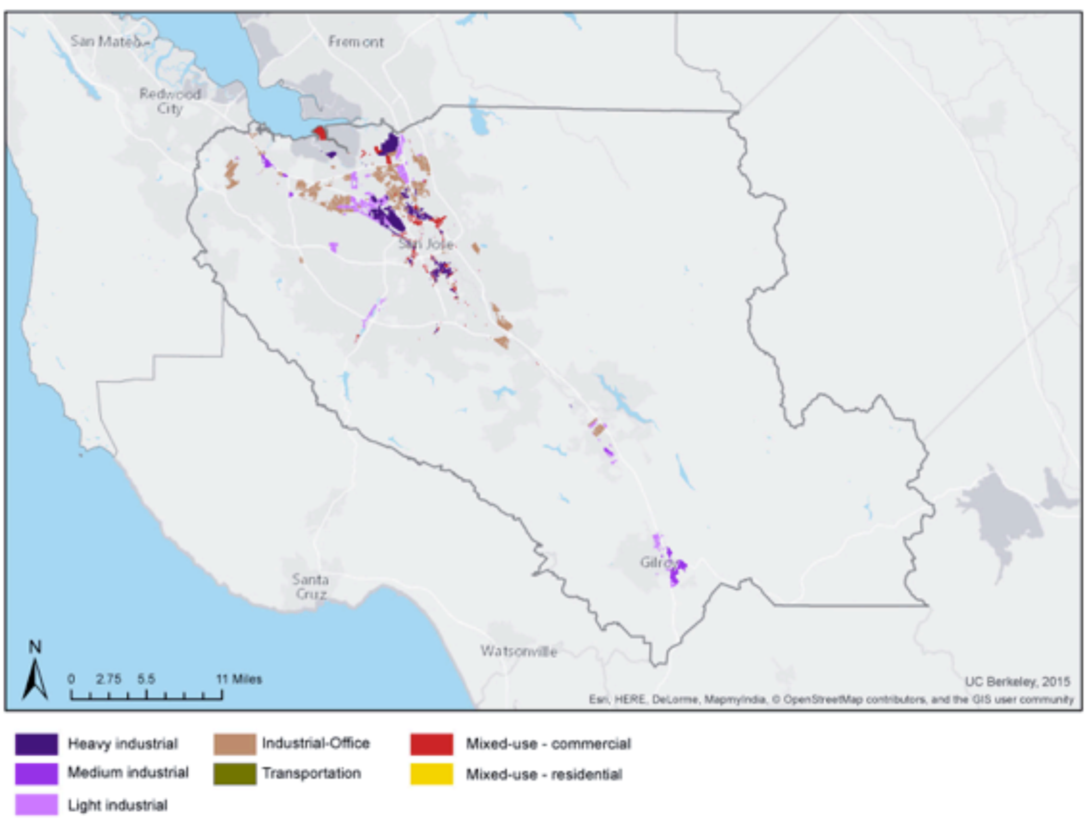


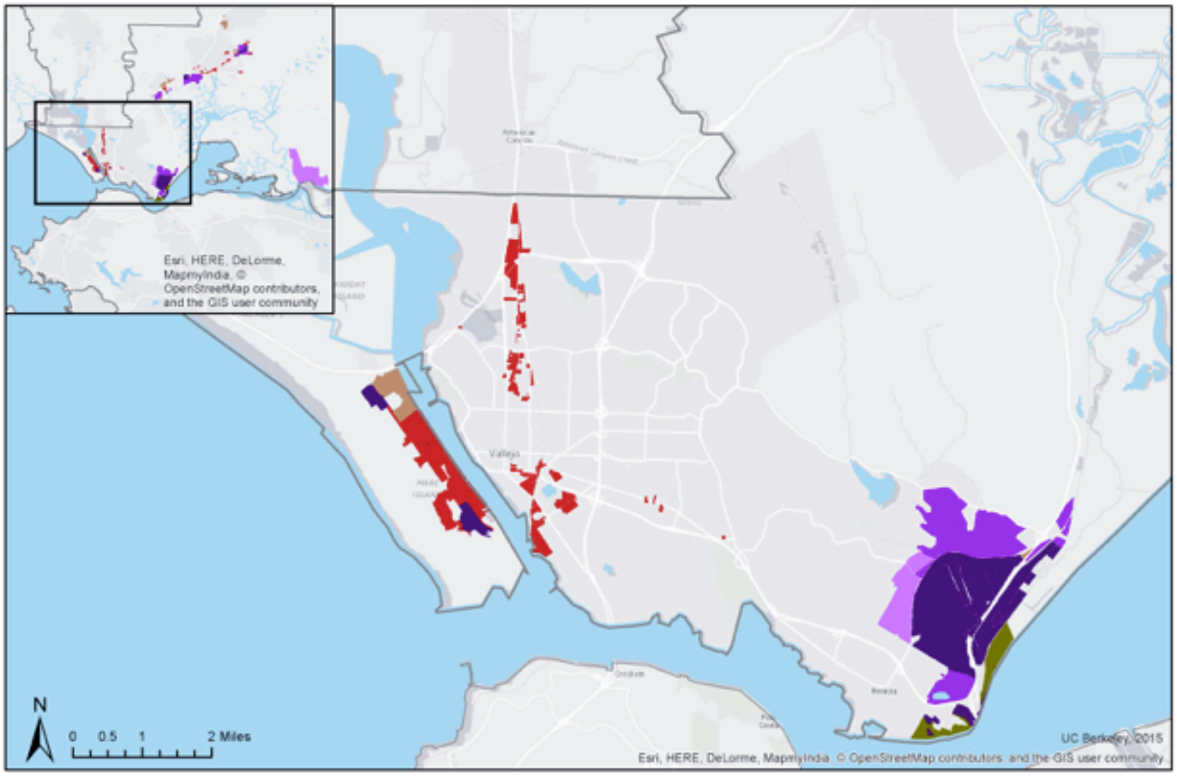
Napa
LITTLE ISLAND
RUSS ISLAND
American Canyon
ISLAND NUMBER 1
ISLAND NO 2
KNIGHT
N
0 0.75 1.5 3 Miles
UC Berkeley, 2015
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community
Heavy industrial
Medium industrial
Light industrial
Industrial-Office
Transportation
Mixed-use - commercial
Mixed-use - residential


San Francisco
N
0 0.5 1 2 Miles
UC Berkeley, 2015
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community
Heavy industrial
Medium industrial
Light industrial
Industrial office
Transportation
Mixed-use - commercial
Mixed-use - residential

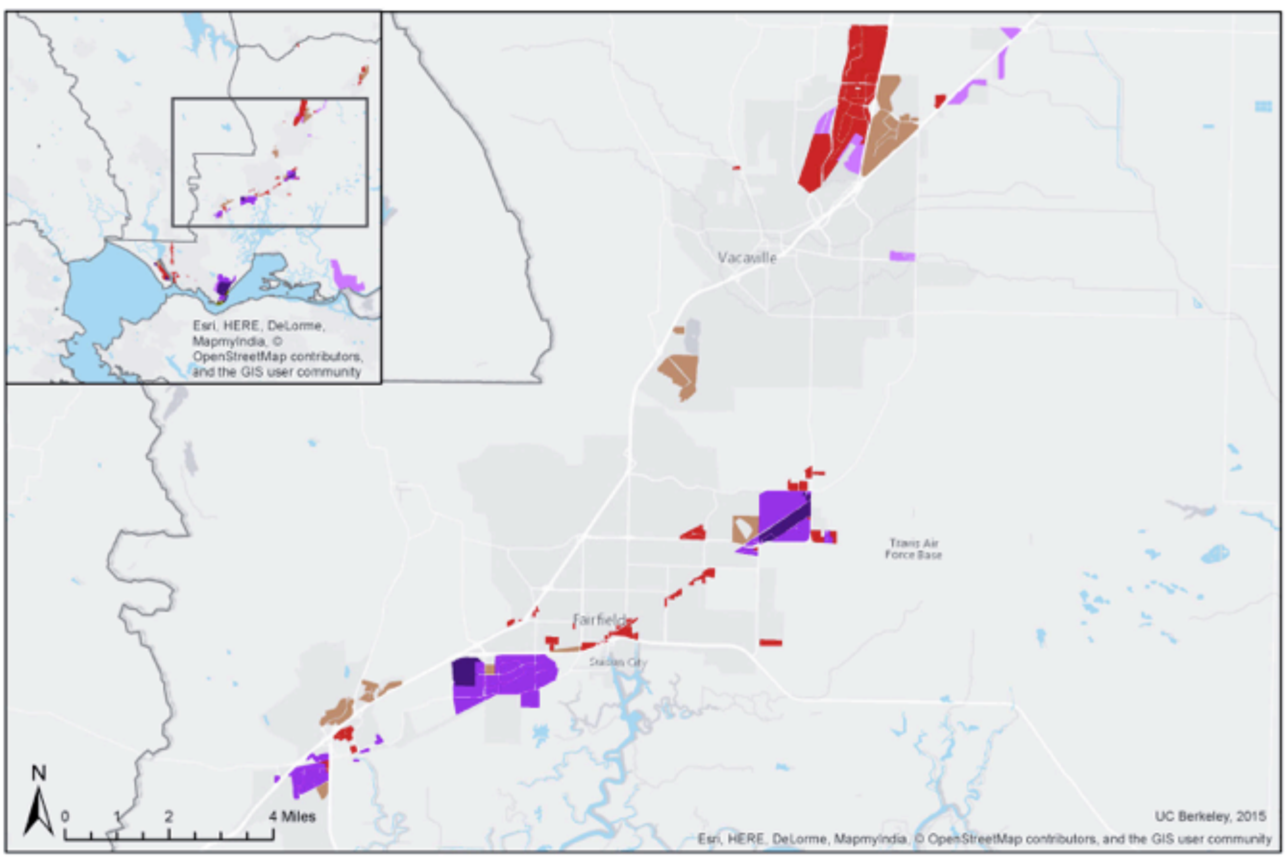

N
0 2.75 5.5 11 Miles
UC Berkeley, 2015
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community
Heavy industrial
Medium industrial
Light industrial
Industrial-Office
Transportation
Mixed-use - commercial
Mixed-use - residential


Hayward
Hillsborough
San Mateo
Redwood Shores
Belmont
Redwood City
North Fair Oaks
East Palo Alto
Atherton
Menlo Park
N
0 1 2 4 Miles
UC Berkeley, 2015
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community
Heavy industrial
Medium industrial
Light industrial
Industrial-Office
Transportation
Mixed-use - commercial
Mixed-use - residential

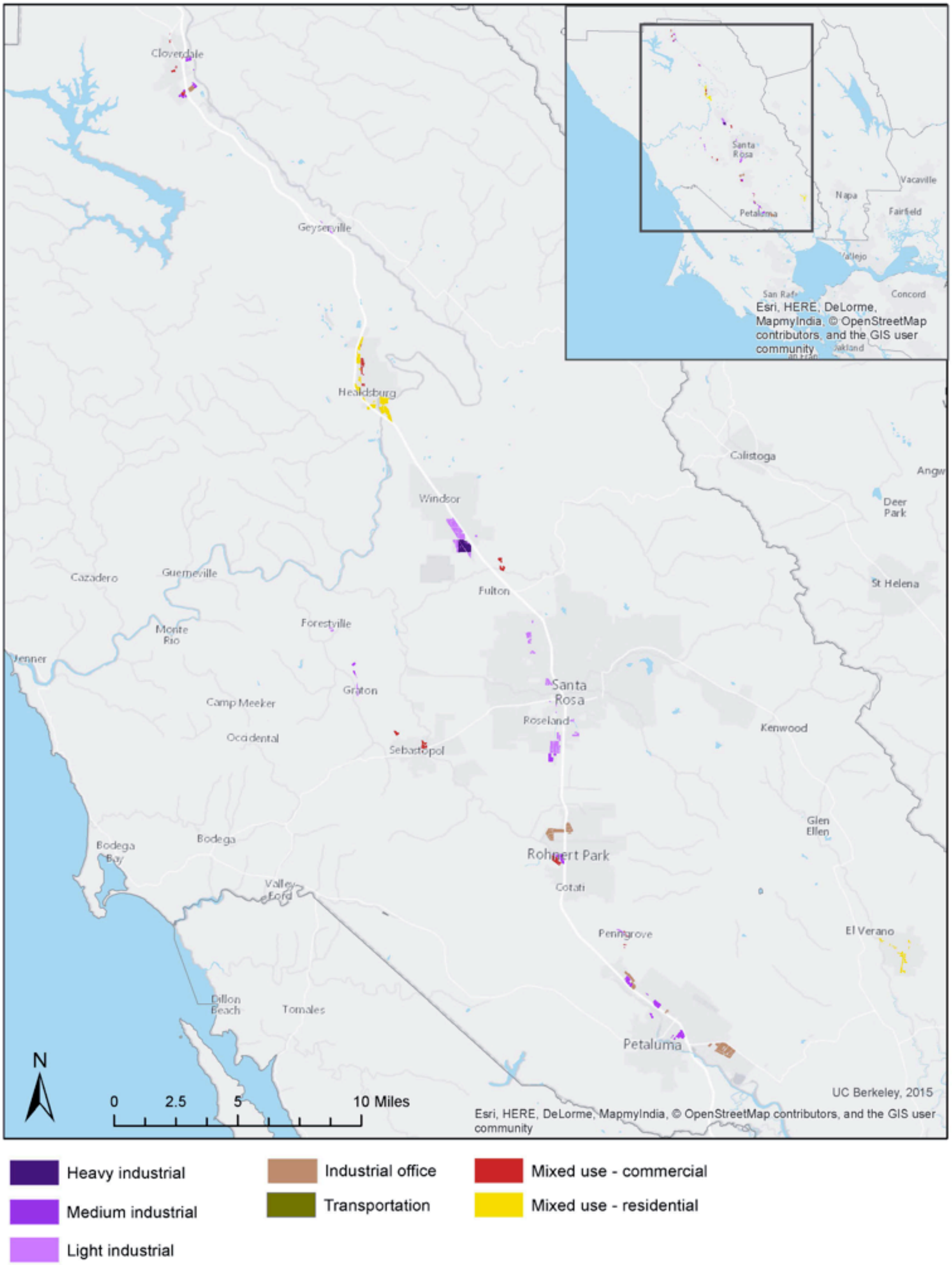

San Mateo
Fremont
Redwood City
San Jose
Gilroy
Santa Cruz
Watsonville
N
0 2.75 5.5 11 Miles
UC Berkeley, 2015
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community
Heavy industrial
Medium industrial
Light industrial
Industrial-Office
Transportation
Mixed-use - commercial
Mixed-use - residential



Heavy industrial
Medium industrial
Light industrial
Industrial-Office
Transportation
Mixed-use - commercial
Mixed-use - residential



Heavy industrial
Medium industrial
Light industrial
Industrial-Office
Transportation
Mixed-use - commercial
Mixed-use - residential



Cloverdale
Geyserville
Healdsburg
Windsor
Fulton
Guerneville
Cazadero
Forestville
Monte Rio
Jenner
Graton
Camp Meeker
Santa Rosa
Roseland
Occidental
Sebastopol
Kenwood
Calistoga
Deer Park
St Helena
Glen Ellen
Bodega Bay
Bodega
Rohnert Park
Cotati
Valley Ford
Penngrove
El Verano
Dillon Beach
Tomales
Petaluma
Vacaville
Napa
Fairfield
Vallejo
Concord
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community
N
0 2.5 5 10 Miles
UC Berkeley, 2015
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community
Heavy industrial
Medium industrial
Light industrial
Industrial office
Transportation
Mixed use - commercial
Mixed use - residential

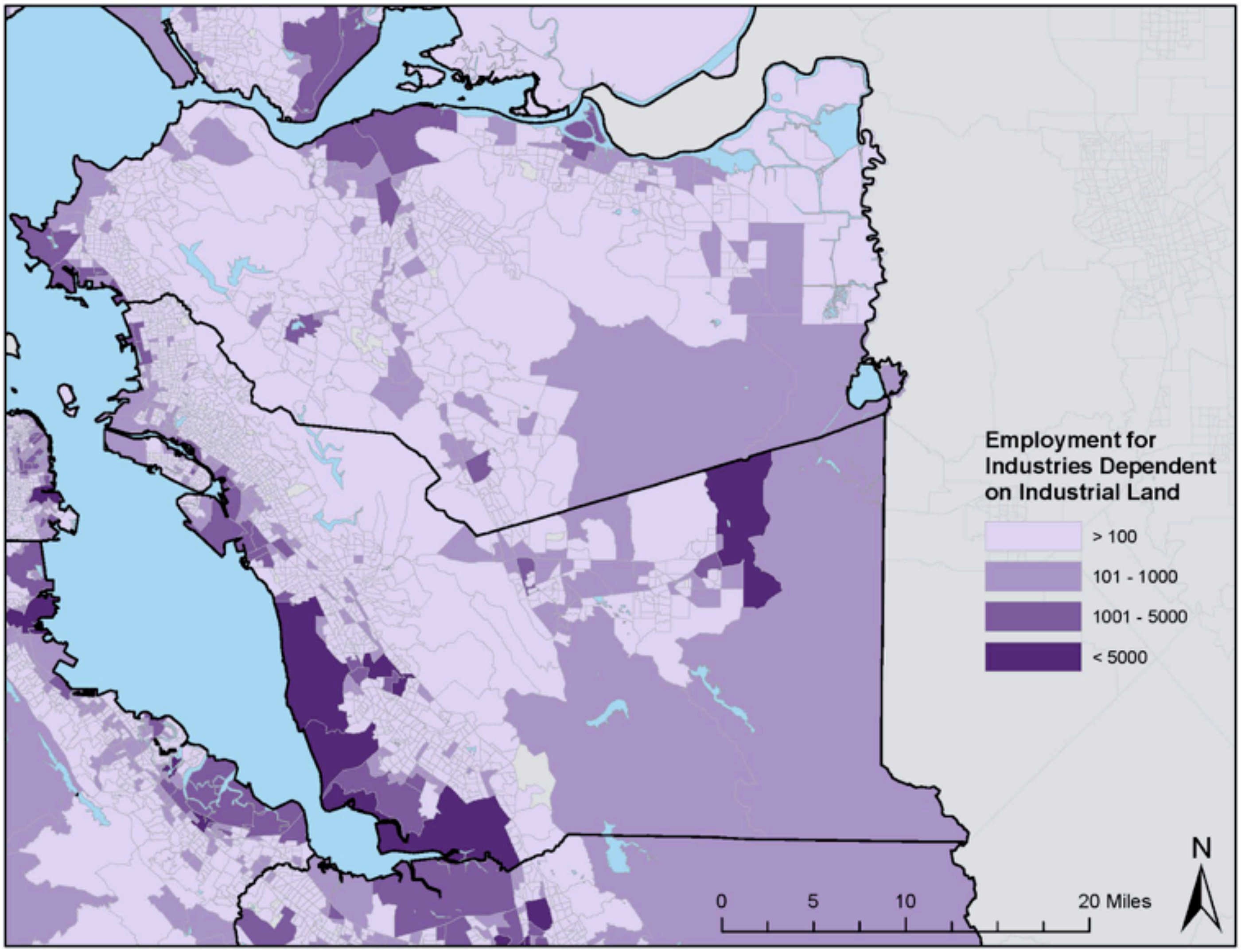
Appendix V. Top Industries Dependent on Industrial Land in Marin, Napa, and Sonoma Counties.

Top 30 Industries Dependent on Exclusive IL – Marin County								
NAICS	**Description**	**1990-2012 % change**	**Exclusive Jobs**	**LQ**	**Status**	**MU Jobs**	**LQ**	**Status**
562111	Solid Waste Collection	792%	97	54.78	Dependent	57	6.43	Dependent
562920	Materials Recovery Facilities	-74%	83	76.53	Dependent	0	0.00	Occurring
811121	Automotive Body, Paint, and Interior Repair and Maintenance	-31%	72	15.02	Dependent	134	5.59	Dependent
423990	Other Miscellaneous Durable Goods Merchant Wholesalers	-23%	69	23.53	Dependent	12	0.82	Occurring
488410	Motor Vehicle Towing	91%	64	38.30	Dependent	5	0.60	Occurring
423710	Hardware Merchant Wholesalers	-91%	61	44.09	Dependent	8	1.16	Partial
238220	Plumbing, Heating, and Air-Conditioning Contractors	40%	45	5.32	Dependent	174	4.11	Dependent
561720	Janitorial Services	333%	39	7.18	Dependent	31	1.14	Partial
541710	Research and Development in the Physical, Engineering, and Life Sciences	#N/A	34	4.32	Dependent	0	0.00	Occurring
811310	Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance	-7%	30	12.79	Dependent	3	0.26	Occurring
511110	Newspaper Publishers	-43%	29	4.12	Dependent	0	0.00	Occurring
238390	Other Building Finishing Contractors	18%	26	17.15	Dependent	0	0.00	Occurring
621330	Offices of Mental Health Practitioners (except Physicians)	177%	26	6.13	Dependent	2	0.09	Occurring
811111	General Automotive Repair	12%	26	4.40	Dependent	133	4.50	Dependent
423920	Toy and Hobby Goods and Supplies Merchant Wholesalers	-68%	23	27.71	Dependent	0	0.00	Occurring
621310	Offices of Chiropractors	-30%	22	6.29	Dependent	11	0.63	Occurring
236118	Residential Remodelers	35%	22	2.55	Dependent	51	1.18	Partial
523930	Investment Advice	89%	22	2.46	Dependent	8	0.18	Occurring
562991	Septic Tank and Related Services	-92%	20	36.88	Dependent	0	0.00	Occurring
237110	Water and Sewer Line and Related Structures Construction	95%	20	7.93	Dependent	12	0.95	Occurring
424490	Other Grocery and Related Products Merchant Wholesalers	-41%	19	4.36	Dependent	20	0.92	Occurring
337110	Wood Kitchen Cabinet and Countertop Manufacturing	-50%	15	14.89	Dependent	15	2.98	Dependent
813211	Grantmaking Foundations	124%	15	3.89	Dependent	11	0.57	Occurring
541430	Graphic Design Services	9%	15	3.13	Dependent	11	0.46	Occurring
541211	Offices of Certified Public Accountants	8%	15	2.18	Dependent	25	0.72	Occurring
334519	Other Measuring and Controlling Device Manufacturing	61239%	14	30.85	Dependent	0	0.00	Occurring
424480	Fresh Fruit and Vegetable Merchant Wholesalers	-76%	14	21.44	Dependent	3	0.92	Occurring
713930	Marinas	258%	14	13.60	Dependent	0	0.00	Occurring
611620	Sports and Recreation Instruction	1419%	14	6.29	Dependent	5	0.45	Occurring
624310	Vocational Rehabilitation Services	-12%	14	4.29	Dependent	15	0.92	Occurring

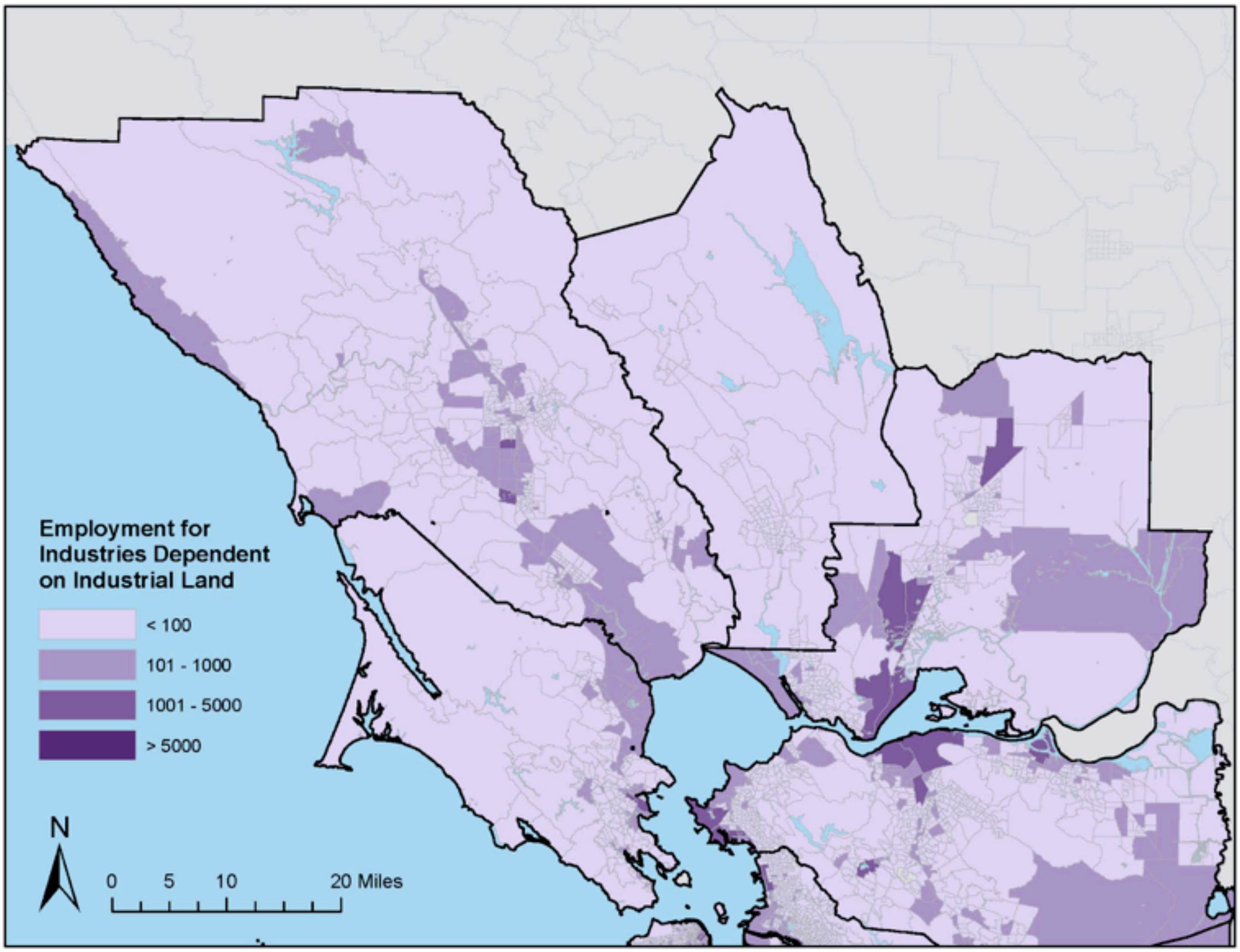
Top 30 Industries Dependent on Exclusive IL – Napa County								
NAICS	Description	1990-2012 % change	Exclusive Jobs	LQ	Status	MU Jobs	LQ	Status
811111	General Automotive Repair	-20%	12	4.63	Dependent	0	0.00	Occurring
236220	Commercial and Institutional Building Construction	-63%	9	5.67	Dependent	3	2.70	Dependent
424490	Other Grocery and Related Products Merchant Wholesalers	-47%	9	4.85	Dependent	4	3.08	Dependent
424990	Other Miscellaneous Nondurable Goods Merchant Wholesalers	69%	8	4.14	Dependent	4	2.95	Dependent
4441	Building Material and Supplies Dealer	#N/A	7	5.84	Dependent	1	1.19	Partial
561730	Landscaping Services	166%	7	2.35	Dependent	0	0.00	Occurring
493110	General Warehousing and Storage	25829 %	6	9.12	Dependent	4	8.69	Dependent
531130	Lessors of Miniwarehouses and Self-Storage Units	7519%	6	8.16	Dependent	2	3.89	Dependent
811118	Other Automotive Mechanical and Electrical Repair and Maintenance	-92%	6	7.39	Dependent	0	0.00	Occurring
811420	Reupholstery and Furniture Repair	43%	5	10.77	Dependent	0	0.00	Occurring
444190	Other Building Material Dealers	-18%	5	9.94	Dependent	0	0.00	Occurring
332710	Machine Shops	-45%	4	20.68	Dependent	0	0.00	Occurring
321920	Wood Container and Pallet Manufacturing	62%	4	9.40	Dependent	1	3.36	Dependent
337110	Wood Kitchen Cabinet and Countertop Manufacturing	-9%	4	9.40	Dependent	0	0.00	Occurring
321911	Wood Window and Door Manufacturing	-100%	4	6.46	Dependent	0	0.00	Occurring
811121	Automotive Body, Paint, and Interior Repair and Maintenance	47%	4	6.08	Dependent	1	2.17	Dependent
441310	Automotive Parts and Accessories Stores	-5%	4	5.74	Dependent	0	0.00	Occurring
423840	Industrial Supplies Merchant Wholesalers	-44%	4	4.31	Dependent	6	9.23	Dependent
541710	Research and Development in the Physical, Engineering, and Life Sciences	#N/A	4	3.83	Dependent	2	2.73	Dependent
813910	Business Associations	145%	4	3.23	Dependent	1	1.15	Partial
54121	Accounting, Tax Preparation, Bookkeeping, and Payroll Services	#N/A	4	3.23	Dependent	0	0.00	Occurring
238310	Drywall and Insulation Contractors	-69%	4	2.95	Dependent	1	1.05	Partial
484110	General Freight Trucking, Local	495%	4	2.15	Dependent	4	3.08	Dependent
562991	Septic Tank and Related Services	325%	3	12.93	Dependent	0	0.00	Occurring
321999	All Other Miscellaneous Wood Product Manufacturing	439%	3	11.08	Dependent	2	10.5 5	Dependent
339950	Sign Manufacturing	209%	3	9.69	Dependent	0	0.00	Occurring
811198	All Other Automotive Repair and Maintenance	1015%	3	8.62	Dependent	0	0.00	Occurring
488510	Freight Transportation Arrangement	177%	3	7.05	Dependent	4	13.4 2	Dependent
484121	General Freight Trucking, Long-Distance, Truckload	-91%	3	7.05	Dependent	3	10.0 7	Dependent
485320	Limousine Service	1550%	3	3.69	Dependent	0	0.00	Occurring

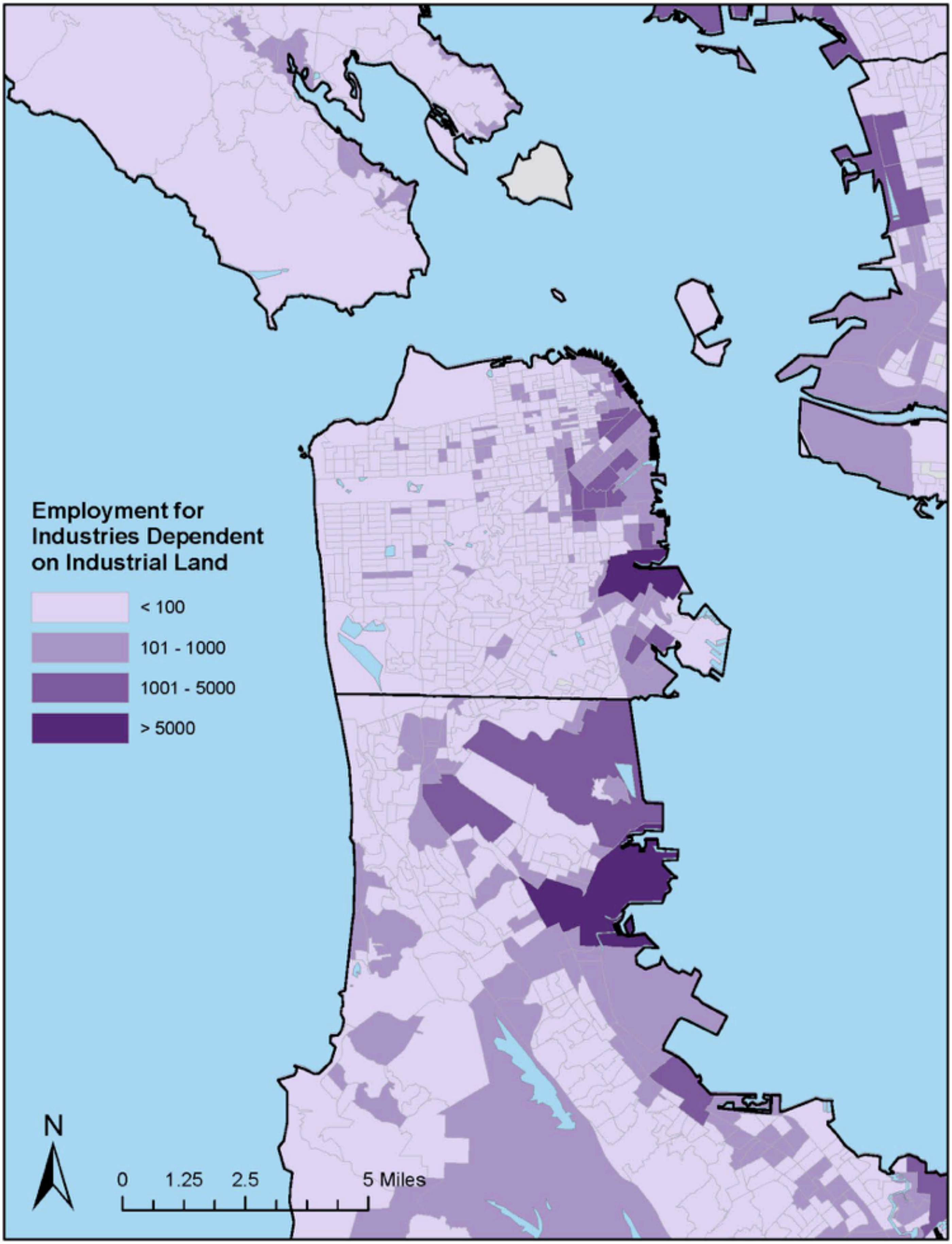
Top 30 Industries Dependent on Exclusive IL – Sonoma County

NAICS	Description	1990-2012 % change	Exclusive Jobs	LQ	Status	MU Jobs	LQ	Status
238220	Plumbing, Heating, and Air-Conditioning Contractors	3%	226	8.10	Dependent	180	1.69	Partial
238310	Drywall and Insulation Contractors	-72%	151	11.94	Dependent	31	0.64	Occurring
721110	Hotels (except Casino Hotels) and Motels	108%	147	2.50	Dependent	48	0.21	Occurring
236220	Commercial and Institutional Building Construction	-54%	140	8.98	Dependent	57	0.96	Occurring
311513	Cheese Manufacturing	-48%	135	50.84	Dependent	0	0.00	Occurring
238130	Framing Contractors	-37%	120	14.94	Dependent	0	0.00	Occurring
238210	Electrical Contractors and Other Wiring Installation Contractors	3%	110	4.83	Dependent	90	1.04	Partial
4441	Building Material and Supplies Dealers	#N/A	91	4.43	Dependent	29	0.37	Occurring
441110	New Car Dealers	-9%	77	3.26	Dependent	173	1.92	Partial
811111	General Automotive Repair	2%	72	5.62	Dependent	71	1.45	Partial
812910	Pet Care (except Veterinary) Services	274%	71	11.94	Dependent	7	0.31	Occurring
811121	Automotive Body, Paint, and Interior Repair and Maintenance	10%	70	6.82	Dependent	32	0.82	Occurring
453998	All Other Miscellaneous Store Retailers (except Tobacco Stores)	-8%	57	3.80	Dependent	25	0.44	Occurring
311712	Fresh and Frozen Seafood Processing	#N/A	56	61.38	Dependent	0	0.00	Occurring
621910	Ambulance Services	401%	55	9.93	Dependent	0	0.00	Occurring
333294	Food Product Machinery Manufacturing	#N/A	50	25.58	Dependent	6	0.80	Occurring
812331	Linen Supply	39%	50	15.12	Dependent	45	3.57	Dependent
562910	Remediation Services	-98%	48	39.81	Dependent	0	0.00	Occurring
811118	Other Automotive Mechanical and Electrical Repair and Maintenance	-65%	48	10.52	Dependent	13	0.75	Occurring
333999	All Other Miscellaneous General Purpose Machinery Manufacturing	569%	47	33.16	Dependent	0	0.00	Occurring
722320	Caterers	184%	44	8.77	Dependent	3	0.16	Occurring
236118	Residential Remodelers	-6%	44	3.96	Dependent	7	0.17	Occurring
238350	Finish Carpentry Contractors	-2%	40	5.75	Dependent	49	1.85	Partial
423720	Plumbing and Heating Equipment and Supplies (Hydronics) Merchant Wholesalers	632%	39	7.62	Dependent	47	2.41	Dependent
532412	Construction, Mining, and Forestry Machinery and Equipment Rental and Leasing	-17%	38	11.16	Dependent	142	10.93	Dependent
238170	Siding Contractors	-92%	35	28.27	Dependent	0	0.00	Occurring
332710	Machine Shops	-3%	35	9.22	Dependent	12	0.83	Occurring
337110	Wood Kitchen Cabinet and Countertop Manufacturing	9%	35	7.93	Dependent	68	4.04	Dependent
334419	Other Electronic Component Manufacturing	-66%	34	3.98	Dependent	71	2.18	Dependent
454210	Vending Machine Operators	-50%	33	27.37	Dependent	0	0.00	Occurring



Employment for Industries Dependent on Industrial Land
> 100
101 - 1000
1001 - 5000
< 5000
0
5
10
20 Miles
N


Employment for Industries Dependent on Industrial Land
< 100
101 - 1000
1001 - 5000
> 5000
N
0 5 10 20 Miles



Employment for Industries Dependent on Industrial Land
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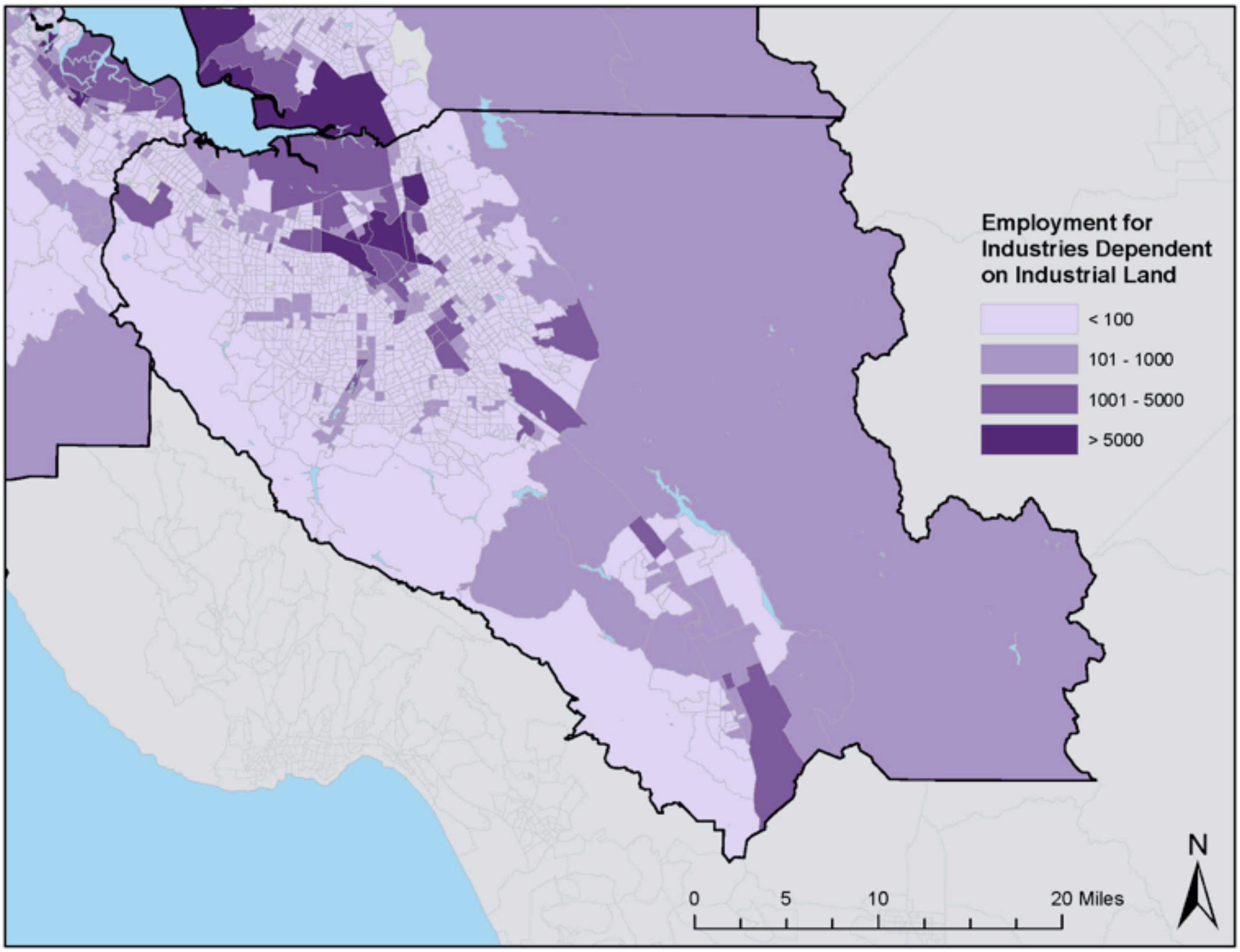
101 - 1000
1001 - 5000
> 5000
N
0 1.25 2.5 5 Miles


Employment for Industries Dependent on Industrial Land
< 100
101 - 1000
1001 - 5000
> 5000
N
0
5
10
20 Miles