The Bay Area in 2040: Three Scenarios

The Scenario Process in Plan Bay Area

ABAG forecasts that the Bay Area will add 1.3 million jobs, 2.4 million people, 782,600 households and 822,600 housing units between 2010 and 2040. While half of the employment growth had already occurred by the end of 2015, there remain almost 673,000 jobs, over 1.9 million people, 690,000 households and 765,000 housing units to accommodate in the region between now and 2040. This is a 17 percent increase in employment and over a 25 percent increase in people, households, and housing units.

A large urban area with millions of residents and workers requires many cross-cutting strategic decisions as to how it can function as strains on critical infrastructures are ever more apparent. The transportation system needs to be able to flexibly adjust to substantial increases and geographic re-mappings of demand, sometimes even within an economic cycle. The housing market is charged with accommodating new residents, but lead times are substantial, prices are stubbornly high, and the relation to the transportation networks often tenuous. To understand how a growing economy over the next 25 years of the magnitude described above might affect the region's land use and transportation demand, ABAG and MTC have developed three scenarios to show different strategic approaches we can collectively take to accommodate expected growth while meeting our goals for a sustainable, equitable, and less congested region. The scenarios incorporate different land use strategies and combinations of transportation investments to illustrate tradeoffs between alternatives and serve as a building block for identifying the preferred scenario, which will incorporate some of the best ideas from each scenario alternative.

Details of the development of the draft scenario concepts and initial assumptions were presented to the Regional Advisory Working Group on January 26, 2016.[1] They have also been shared with local City Councils, County Boards, Planning Directors, and representatives of advocacy organizations between December 2015 and March 2016. ABAG and MTC staff have used the input provided by these groups to refine the policies and investments used to shape each scenario. The latest assumptions are described in Appendix B.

This report presents the distribution of jobs and households that can reasonably be expected to result from the policies and investments described for each scenario. Results are presented by jurisdiction and by Priority Development Area (PDA). The body of the report gives an overview of growth by county, major city, and between PDAs and other parts of the region. Appendix A presents household and total employment growth by jurisdiction and PDA in each scenario.

ABAG and MTC will be seeking feedback from policymakers, stakeholders, and members of the public about these three scenarios. The input received will be used to inform the development of a Preferred Scenario, which is scheduled for adoption by ABAG and MTC in Fall 2016.

[1] Materials from the meeting are available at: http://mtc.ca.gov/file/42926/download?token=0zELxuiP

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The combinations of strategies in the scenarios are included to enable a discussion about regional priorities, and do not represent all of the potential public policy interventions that regional, state, or local governments could use to accomplish the Plan's goals. For instance, the specific structure of many potential state and local tax and regulatory policies falls largely outside the analytic scope of the scenario process, and requires a separate, more robust public policy analysis to determine costs and benefits. Once the preferred scenario is adopted, the final *Plan Bay Area 2040* document will describe a wider range of policies to support the Plan's goals.

The Three Scenarios and Their Major Assumptions

Each scenario proposes a different vision for how the expected growth in population, jobs, households, and housing units might be distributed, as well as the types of transportation investments needed to support the proposed land use pattern. *Scenario 1* describes a more dispersed pattern of growth with community expansion spread more widely across the region. *Scenario 2* identifies major urban corridors along which future growth will concentrate. *Scenario 3* concentrates growth further in the region's three large cities and in specific expansion nodes tied to the region's large corporate centers.

Scenario 1 targets future population and employment growth to the downtowns of every city in the Bay Area to foster a region of moderately-sized, integrated town centers. As in the other scenarios, most growth will be in locally-identified PDAs, but this scenario offers the most dispersed growth pattern, meaning that cities outside the region's core are likely to see higher levels of growth and, within cities, more growth will be accommodated outside of PDAs than in the other two scenarios. The economic development policies focus on trying to distribute jobs outside the region's core. Because of its dispersed nature, this scenario does include some development outside of urban growth boundaries. And the policies to encourage housing choices—such as promoting second units, reducing parking minimums, and resources for affordable housing—would apply broadly to jurisdictions throughout the region.

Scenario 2 targets growth to locally-identified PDAs and areas with good transit throughout the region, with an emphasis on growth in medium-sized as well as large cities with access to the region's major rail services, such as BART and Caltrain. Outside the PDAs, this scenario sees modest infill development, but avoids growth outside urban growth boundaries. As these communities grow over the next 25 years, compact development and strategic transportation investments will provide residents and workers access to a mix of housing, jobs, shopping, services, and amenities in proximity to transit traditionally offered by more urban environments. Resources for affordable housing will be dispersed across the Bay Area, with some concentration in PDAs to support the development of affordable housing where the most population and employment growth is targeted.

Scenario 3 concentrates future population and employment growth in the locally-identified PDAs within the Bay Area's three largest cities: San Jose, San Francisco, and Oakland. Neighboring cities that are already well-connected to these three cities by transit will also see increases in population and employment growth, particularly in their locally-identified PDAs and through the diversification of large corporate campuses. The amount of growth outside these areas is minimal, with limited infill development in PDAs and no development outside urban growth boundaries. Growth in the three biggest cities and their neighbors will require substantial investment to support transformational changes to accommodate households of all incomes. This scenario will prioritize strategies to make these existing urban neighborhoods even more compact and vibrant, and enable residents and workers

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to easily take transit, bike, or walk to clusters of jobs, stores, services, and other amenities. Resources for affordable housing will likewise be directed to the cities taking on the most growth.

Approach to Growth Allocation

As noted earlier, the three scenarios each distribute the total amount of growth expected in the Bay Area between 2010 and 2040, as identified in the *ABAG Regional Forecast for Plan Bay Area 2040*.[2] The distribution of population, employment, households, and housing units throughout the region was achieved through an iterative process that involved both technical adjustments and extensive review within and from outside the agency. This report focuses on the distribution of households and of total employment. Steps include:

1. **Defining a baseline for 2010:** The 2010 baseline data from *Plan Bay Area 2013* was revised based on updated information. Baseline data sources include the US Bureau of the Census' Decennial Census for 2010 population and household totals and PDA total estimates; the US Bureau of the Census' American Community Survey and Census Transportation Planning Products 2006-2010 data for estimates of the self-employed by place of work; and a custom data run for 2010 by the California Employment Development Department of wage and salary employment by jurisdiction.[3]
2. **Framing initial scenario outcomes:** Staff analyzed the *Plan Bay Area 2013* distribution, historical trends, and a broadly defined set of location criteria to develop an initial framework for representing the baseline and numerical distributions for the three scenarios. Location criteria included transportation access, employment levels and trends, housing prices, and community characteristics. In addition, jurisdiction records on recently completed, pipeline, and planned projects were added as information became available, modified where necessary if other sources of information on feasibility (the PDA Feasibility Study[4] or UrbanSim algorithms) suggested the planned growth was unlikely to be achieved.
3. **Modeling scenario concepts:** UrbanSim, a microsimulation model of household, business and developer location choices, translated each scenario concept into a distribution of households and jobs based on market factors, land use and development policies, and investment assumptions.[5] UrbanSim has been calibrated by MTC staff to the specifics of the Bay Area housing market. The model is "trained" from existing patterns to represent, among other things, how households of varying types "sort" into the housing stock according to relative differences in housing prices and access to amenities; how businesses in different industries value access to freeways or dense downtown areas; and how developers in turn pick sites for development projects given prevailing costs and expected returns. UrbanSim responds to a range of land market policy measures (such as land supply and development capacity) and has a fast enough runtime to allow for rapid experimentation on the effects of policies ranging from growth boundaries, to zoning, to impact fees for affordable housing. Ultimately, the model helped calibrate each scenario vision with what is reasonably foreseeable and feasible.

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[2] Adopted by the ABAG Executive Board on January 19, 2016. Available at: http://reports.abag.ca.gov/other/Regional_Forecast_for_Plan_Bay_Area_2040_F_030116.pdf

[3] EDD and BLS employment tabulations are not available for anything below the county level.

[4] Economic and Planning Systems, Inc., with Community Design + Architecture, *PDA Assessment Update*, Report EPS #141101, Prepared for the Metropolitan Transportation Commission, November 2015.

[5] See http://www.urbansim.com/urbansim

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4. **Modifying modeled results:** ABAG staff reviewed the UrbanSim model output and, when necessary, adjusted the results based on:
    a. Comparison with the initial scenario analysis based on the *Plan Bay Area 2013* distribution, historical trends, and location criteria
    b. Jurisdiction feedback on this initial scenario analysis
    c. Jurisdiction and ABAG planning department input on recent and pipeline developments and specific plans
    d. Feedback on model design and output from trade, advocacy and community organizations (such as the Building Industry Association of the Bay Area, the 6 Wins Coalition, Public Advocates, Greenbelt Alliance, the Sierra Club), and other public officials, business representatives and board representatives who are part of the Regional Advisory Working Group or county congestion management agencies
5. **Recalibrating the distribution** to create a consistent set of estimates that add up to the forecast totals.

The result is an UrbanSim-based description of each scenario. The detailed output is useful as an input for transportation modeling, while the types of policies that lead to the detailed output are informative for the discussion that will follow on how to achieve the land use pattern defined in the selected (preferred) scenario.

Sensitivity Test for Performance Target Related Factors

At the later stages of scenario development, the UrbanSim model will be used to test the effects of integrating policies related to the performance targets, such as allocation of housing subsidies or stricter limits on greenfield development. Policy considerations that are not included in the structure of the spreadsheet or of UrbanSim may be incorporated elsewhere in the regional plan. For example, equity considerations regarding access to jobs may be measurable in a very limited way using model output, but policies to link low income earners to advancement opportunities in middle wage jobs may be incorporated in language in the plan describing policies that are advantageous in any of the scenarios.

Summary of Growth Allocations

This section describes the distribution of households and employment by county, jurisdiction and PDA, as it might occur if *Plan Bay Area* is not adopted (the *No Project* scenario) or under each of the three scenarios. Scenarios allow us to better understand the effects of an array of policy actions, as well as of the "status quo" scenario which serves as the baseline assumption against which the other scenarios will ultimately be evaluated using the 10 performance targets adopted by ABAG and MTC in November

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2015.[6] By design, the scenarios exhibit substantial variation across both geography as well as key dimensions of interest, such as building type and anticipated vehicle miles traveled.[7]

Overall Differences

The scenarios and the *No Project* alternative define distinct patterns of development across the region.[8] It should be noted that relative to employment, housing growth responds more readily to different policy approaches, largely because housing growth has historically been much more constrained in the region by land use policy.

Our results are summarized both according to development concepts that shape growth policy in the region and second according to several different geographic types that are relevant to planning efforts underway throughout the region. The basic concepts are shaped around the degree to which growth is concentrated in the more urbanized jurisdictions (either the largest 3 cities, or those linked by major transportation corridors), often through infill, or in Priority Development Areas (PDAs). PDAs are focused areas where there is more capacity for development, leveraging existing and proposed transportation infrastructures. Throughout the region, 77 jurisdictions have identified nearly 190 PDAs, spread across many smaller cities and some unincorporated parts of counties, as well as in the three largest cities and the corridor cities.

As well as presenting summaries by concept type, the geographic description in the summary section applies the concepts of urban concentration of growth and PDAs to distinct geographic types within the region. The development dynamics of the region's biggest cities, Oakland, San Francisco and San Jose, are unique in the region, and this group of cities is accordingly identified separately as one geographic type (Big Cities). Second, the Eastern and Western shores of the bay have prolonged activity nodes that concentrate services along key transportation networks connecting the region's large cities. We refer to these as "corridor cities."[9] Implementation of *Plan Bay Area 2013* focused in part on places along these corridors. We define a third geographic type as cities not counted in the preceding categories that also have planned for PDAs. The last two groups are cities without PDAs (29) and unincorporated portions of the region[10]. The different types of places are illustrated in the map shown in Figure 1.

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[6] The 10 performance targets are a way to systematically gauge how the various scenarios fare across a range of indicators, allowing policy makers and other interested parties to see the relative merits of each, along with costs and benefits. The targets span a range of topics, from greenhouse gas emissions to road safety, adequate housing provision, equitable access and open space preservation.

[7] As of the time of this writing, travel model runs are not available; this statement refers to a tabulation of growth by areas, classified by whether the area currently is characterized by a high or low VMT footprint.

[8] Detailed and aggregate results are available from UrbanSim.

[9] Participation in the corridor strategy is voluntary by jurisdiction—a few places, represented in blue in the map, are contiguous to the defined corridor but have not participated.

[10] Although some of the unincorporated jurisdictions also have PDAs, for simplicity we refer to all unincorporated portions of the region as a geographic type, rather than separating out those counties with or without PDAs in their unincorporated areas.

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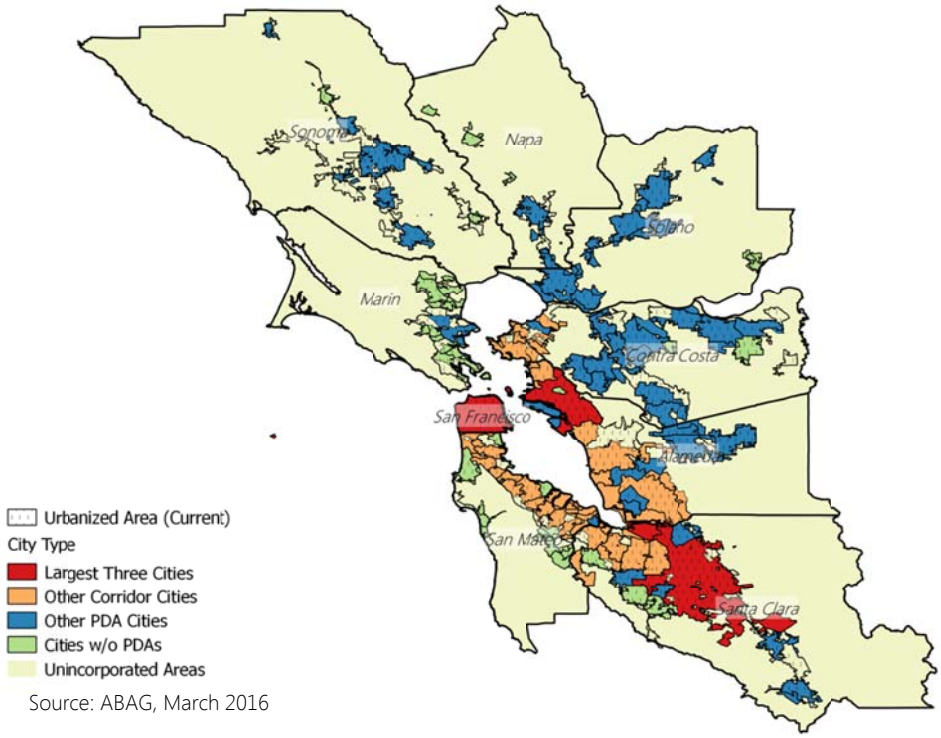
Figure 1: Bay Area Places by Plan Bay Area Concepts



Source: ABAG, March 2016

Household and Housing Summary

Table 1a shows the distribution of household growth by Scenario according to the development concepts described earlier (rather than by the jurisdiction types mapped above). The table shows the share of household growth in the three largest cities and also by PDAs (in all cities). The three large have the highest share of growth in *Scenario 3*, while household growth is most strongly concentrated in PDAs in *Scenario 2*. (Note that in this table, the PDA category overlaps with the Three Largest Cities category, as Oakland, San Francisco and San Jose each have portions of their cities set aside as PDAs).

Table 1a: Summary of Household Distribution by Geographic Concept and Scenario		
Scenario	Three Largest Cities	PDAs
No Project	24%	33%
Scenario 1	30%	48%
Scenario 2	33%	69%
Scenario 3	40%	56%

Table 1b shows the distribution of households by the geographic dimensions described in the earlier map. The PDAs are particularly effective in sharing growth among jurisdictions in Scenario 2. Table 1b also emphasizes the consequences of different scenarios for the unincorporated part of the region, which receives 35 percent of growth in *No Project*, 12 percent in *Scenario 2*, and only 6 percent in *Scenario 3.*

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Table 1b: Share of Household Growth by Jurisdiction Type and Scenario					
Scenario	Largest Three Cities (Oakland, San Francisco and San Jose)	Other Corridor Cities	Other PDA Cities	Cities with no PDAs	Unincorporated
No Project	24%	13%	21%	7%	35%
Scenario 1	30%	24%	22%	6%	18%
Scenario 2	33%	22%	27%	6%	12%
Scenario 3	40%	36%	13%	5%	6%

Table 2 adds a further dimension to the discussion, by identifying housing types added in the different scenarios. With no regional plan (*No Project*), the region reverts to building a majority of single family homes. With *Scenario 1*, the region continues adding a mix of homes similar to what was added in the past five years. In contrast, *Scenario 2* continues the trend of the past year, accelerating the share of multifamily units, and *Scenario 3* shifts almost entirely to the construction of multifamily units to meet the needs of the growing population in infill areas.

Table 2: Shares of multi- versus single-family housing across scenarios			
Scenario	Multifamily	Single-family	Total
No Project	48%	52%	100%
Scenario 1	69%	31%	100%
Scenario 2	78%	22%	100%
Scenario 3	92%	8%	100%
Source: ABAG from MTC UrbanSim runs 1113 to 1116, March 2016			

Figure 2 summarizes the information in Tables 1 and 2 visually, showing the shares of new housing units by subarea, building type and scenario. While Table 1 has overlapping categories (some of the PDAs shown in the table are in the largest cities), we define distinct geographic types in Figure 2. Thus "Other PDA Cities" are cities that have PDAs, but are neither the largest nor those along the corridors. Unincorporated parts of each county are shown as a single geographic type for visual simplicity, although these also have some PDA designated areas. This figure shows graphically the transition from *No Project* through each of the Scenarios. A much higher share of growth occurs in unincorporated areas in *No Project* compared to any of the Scenarios, and a greater share of the housing in that scenario is in single family units. The big cities and other corridor cities capture the highest shares of growth, primarily with multifamily units, in *Scenario 1* and *Scenario 3*, although at very different levels. Scenario 2 is distinguished from *Scenario 1* mainly by the higher share in other PDA cities, as other mid-sized cities, such as Santa Rosa, Concord, Walnut Creek and Livermore become subregional growth nodes, and by the lower share of growth in unincorporated areas. Growth in the big three cities is also higher in *Scenario 2* compared to *Scenario 1* but lower than compared to *Scenario 3.*

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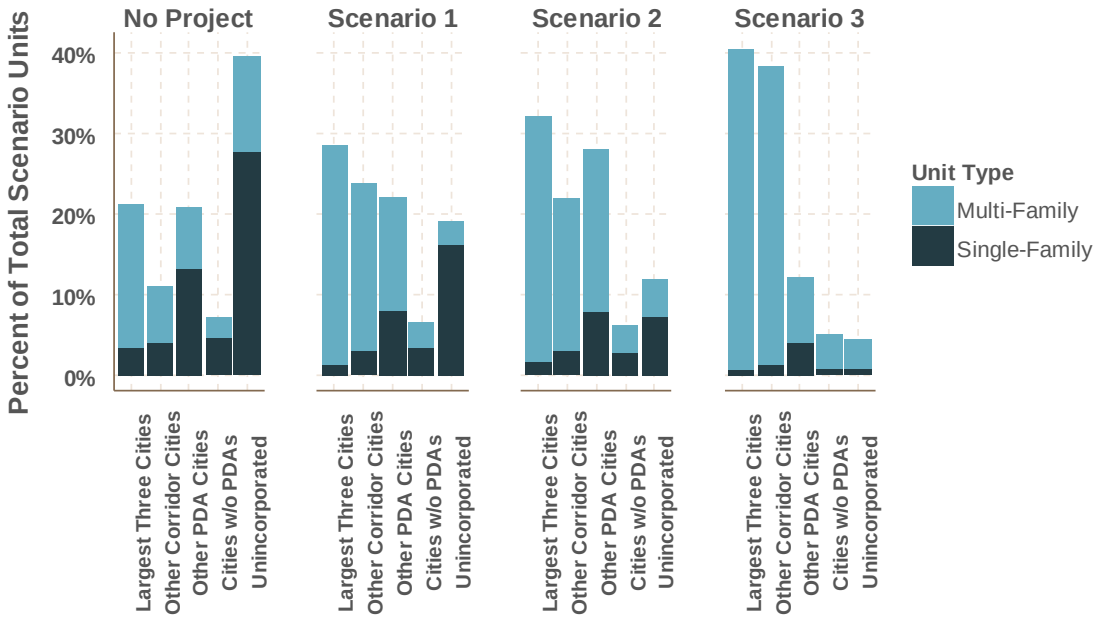
Figure 2 Housing Unit Growth, 2010-2040, by Area Type and Unit Type



Source: ABAG from MTC Urban Sim runs 1113 to 1116, March 2016

Rather than by place type, locations in the region can also be classified by the "typical" amount of vehicle miles traveled for residents in that particular location, broken into five categories, from small (little driving), to medium, to medium-high, high, and very high (long distances traveled). [11]

[11] This definition is applied at the travel analysis zone level (TAZ). There are 1,454 TAZs in the region.

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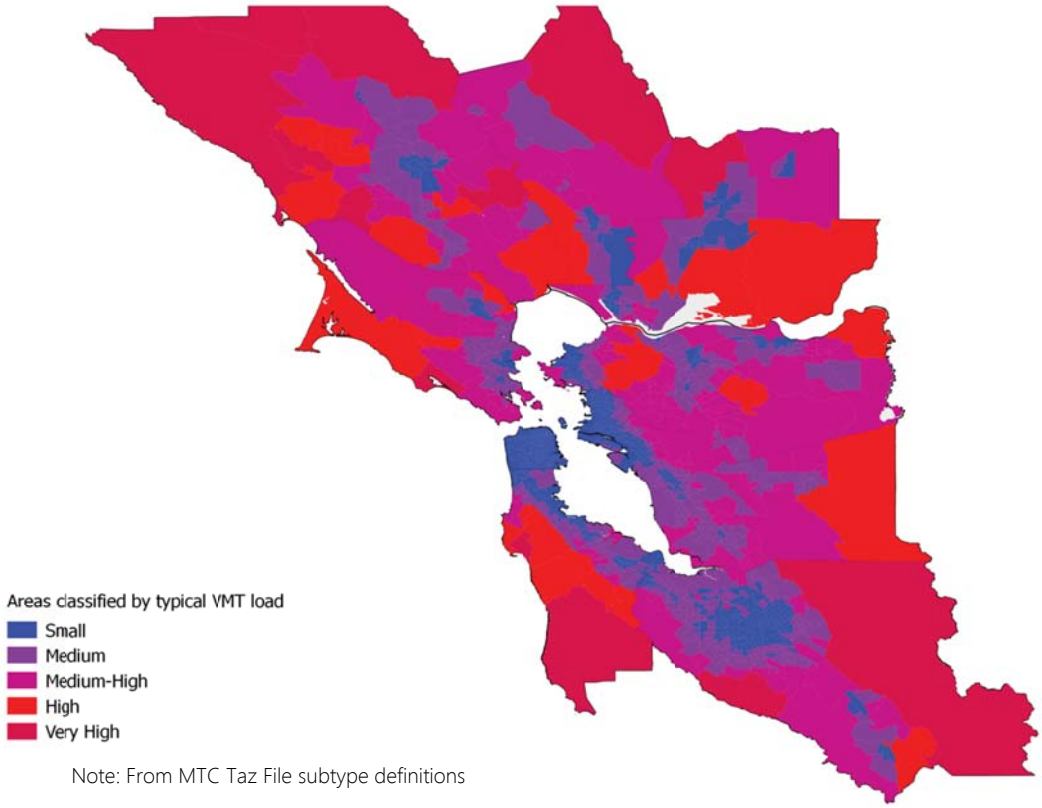
Figure 3: Travel Analysis Zones, classified by typical VMT load.



Source: MTC, March 2016

Table 3 shows the distribution of new housing units added between 2010 and 2040, by the level of VMT where the development occurs. Each scenario is shown in a separate line.

Table 3 Housing unit growth, by generic area VMT footprint						
scenario	Small	Medium	Medium-High	High	Very High	Total
No Project	33%	32%	24%	10%	1%	100%
Scenario 1	45%	30%	14%	9%	1%	100%
Scenario 2	50%	33%	13%	4%	1%	100%
Scenario 3	53%	40%	6%	1%	0%	100%
Source: ABAG from MTC UrbanSim runs 1113 to 1116, March 2016.						

Even with *No Project*, very little development happens in the Very High VMT areas, although the High category gets 10 percent. *Scenarios 1* through *3* receive 9, 4 and 1 percent, respectively, in the High category. The bigger differences are found in the Medium-High category, where the range is 24 percent (*No Project*) to 6 percent (*Scenario 3*), and in the Small VMT category, where under *No Project*, one-third of the units are found there, with a steady increase as we move to *Scenarios 1* (45 percent), *2* (50 percent) and *3* (53 percent). Or, to express it in policy terms, under *No Project*, 65 percent of units are found in Small and Medium VMT zones, while this figure moves to 93 percent under the most compact scenario (Scenario 3).

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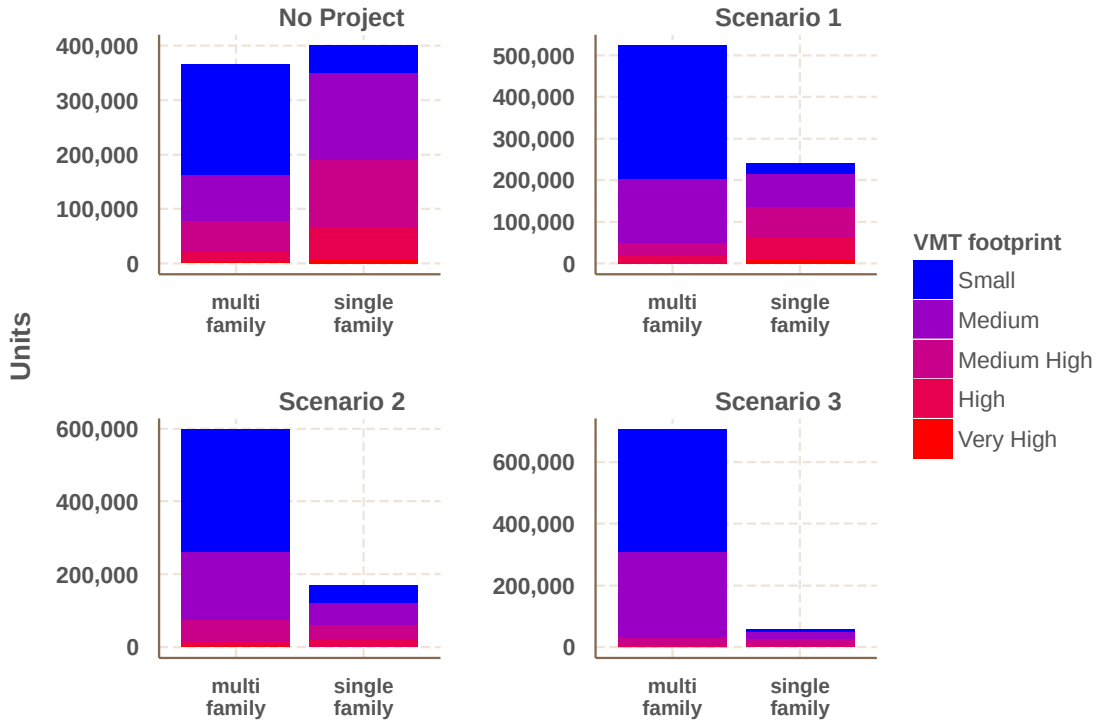
Figure 4 adds detail about housing unit types to this overview. The first panel shows the expected configuration of housing unit location with the *No Project* scenario—slightly more than half the units would be single-family attached or detached homes. For multifamily homes, about half would be located in areas with a Small VMT footprint (this share does not vary much across scenarios), while for single-family homes, about half would be located in areas with a small or medium VMT footprint.

Figure 4 Difference in building type and VMT impact across scenarios



Source: ABAG analysis from MTC Urban Sim runs 1113 to 1116, March 2016

The main factor differentiating *Scenario 1* (panel two in the figure) from the *No Project* version is that the regional plan will encourage the introduction of modest density increases to the more dispersed communities. The number of single family homes drops sharply, and the increase in multifamily homes is in areas with a small VMT footprint. Furthermore, for multifamily units, the number in medium high and very high VMT areas declines, replaced by units in medium VMT areas.

The third panel shows the distribution of households under *Scenario 2*. Of housing units added to the region, under *Scenario 2*, 78 percent will be in multifamily stand alone or residential mixed use developments, while about 22 percent will be in single-family attached or detached units. The share of households in high or very high VMT locations will drop from 11 percent in *Scenario 1* to 5 percent in Scenario 2.

The last panel shows the distribution of new development under *Scenario 3*. In this scenario, the great majority of housing is in multifamily stand-alone or residential mixed-use developments, while just 8 percent is in single-family units. This scenario notably consists of developments almost exclusively in low or medium VMT footprint areas.

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Employment Summary

As noted earlier, growth in employment is much less responsive to land use policies than is housing. This is because there is an overabundance of commercial zoning in the region, so constraints are not generally (with notable and local exceptions) of the land use sort, and the non-residential sector is comprised of rather distinctive product types (office buildings, strip malls, warehouses, production fabs, etc.) and submarkets, where substitution across these markets and building types is less nimble than what we typically see with housing.

Comparing the distribution of employment in the three scenarios shows this relative stickiness: From *No Project* to *Scenario 3*, the most urban focused scenario, there are only modest shifts: The three largest cities receive 34 percent of employment growth in *No Project*, but 38 percent in *Scenario 2* and *Scenario 3*. The unincorporated parts of the region receive ten percent of employment growth in *No Project*, while this drops to five percent in *Scenario 3* (See Table 4).

Table 4: Share of Employment Growth by Jurisdiction Type and Scenario

scenario	Largest Three Cities (Oakland, San Francisco and San Jose)	Other Corridor Cities	Other PDA Cities	Cities with no PDAs	Unincorporated
No Project	34%	31%	21%	4%	10%
Scenario 1	35%	30%	23%	3%	8%
Scenario 2	38%	30%	23%	3%	6%
Scenario 3	38%	33%	21%	3%	5%

Source: ABAG from MTC UrbanSim runs 1113 to 1116, March 2016

Figure 5 shows this information graphically, with sectoral detail added. In all scenarios, the corridor cities see some loss of manufacturing, warehouse and transportation employment counterbalanced by stronger growth in professional, finance, health, education, and the "other" sector (which includes construction, information and government). The unincorporated areas see twice the employment growth in *No Project* compared to *Scenario 3*, with the higher job numbers largely comprised of retail, as well as health, education and recreation and "other."

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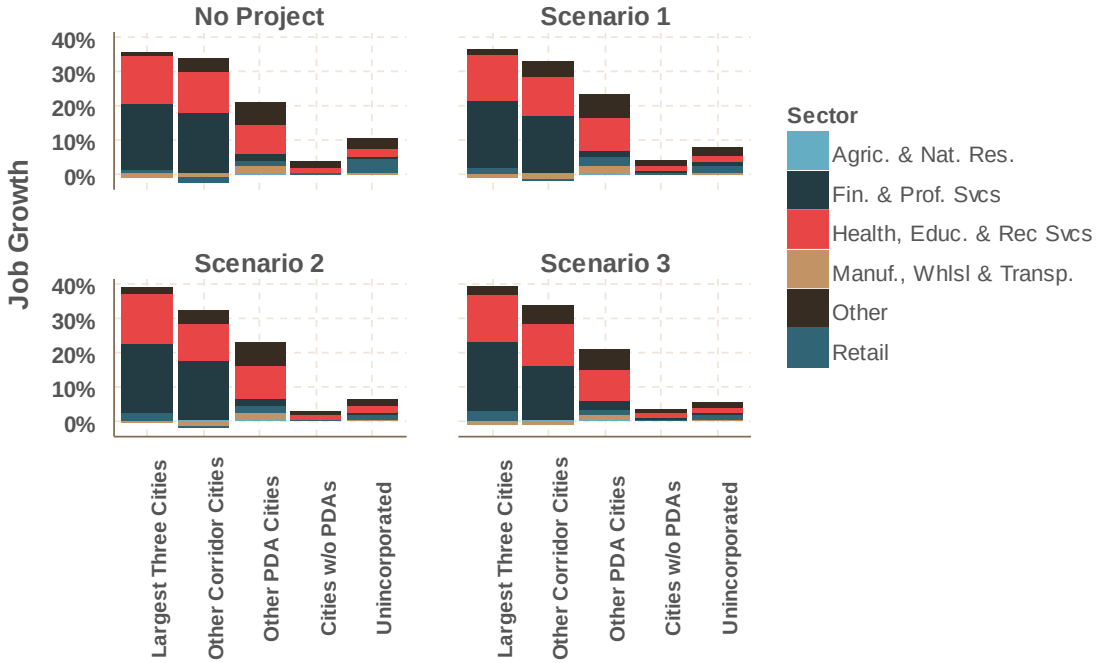
Figure 5 Share of Growth in Employment (2010 to 2040) by Area Type and Sector



Source: ABAG from MTC UrbanSim runs 1113 to 1116, March 2016

Share of Growth by Counties

Scenario differences by county reflect the distinct roles counties play in the region, currently and in the future. County shares of household growth vary widely by scenario. Santa Clara County has the highest share of household growth in *Scenario 3*, capturing almost half of all new households [This may change when growth in major corporate centers is tamed]. Solano County has the highest share of the region's household growth in *Scenario 1*. In *Scenario 2*, Alameda County has the highest share of new households (See Table 5).

Table 5: Distribution of Households in 2010 and Growth of New Household by County

County	Share of Total Base Year 2010	Share of Growth 2010-2040			
		No Project	Scenario 1	Scenario 2	Scenario 3
Alameda	21%	16%	19%	24%	15%
Contra Costa	14%	16%	10%	14%	6%
Marin	4%	3%	3%	2%	1%
Napa	2%	2%	1%	1%	1%
San Francisco	14%	11%	15%	13%	18%
San Mateo	10%	8%	11%	10%	8%
Santa Clara	23%	18%	22%	21%	49%
Solano	5%	13%	13%	8%	1%
Sonoma	7%	13%	7%	7%	2%
BAY AREA	100%	100%	100%	100%	100%

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Source: ABAG from MTC UrbanSim runs 1113 to 1116, March 2016

With respect to employment, there is less variation among scenarios compared to *No Project*. Santa Clara County receives 28 percent of the region's employment growth in *No Project* while in *Scenario 3* it receives 33 percent. San Mateo and Alameda counties receive their highest shares of regional employment growth in *No Project*, although the differences in Alameda County are very small among the four scenarios. Contra Costa County and the four North Bay counties also have very little difference across scenarios in the shares of employment growth received. [Note: we will be working with UrbanSim to create greater variation in growth of local serving jobs based on household growth]. San Francisco receives the greatest share of employment growth in *Scenario 2* (19 percent). Only San Francisco and Napa counties have smaller shares of growth compared to their 2010 employment bases, consistently across scenarios. [For San Francisco, this may change when the base share is corrected for our new baseline numbers.] (See Table 6).

Table 6: Distribution of Employment in 2010 and Growth by County

County	Share of Total, Base Year 2010	Share of Growth, 2010-2040			
		No Project	Scenario 1	Scenario 2	Scenario 3
Alameda	21%	22%	21%	21%	21%
Contra Costa	11%	11%	11%	11%	10%
Marin	3%	2%	2%	2%	2%
Napa	2%	1%	1%	1%	1%
San Francisco	21%	16%	16%	19%	16%
San Mateo	9%	10%	7%	7%	8%
Santa Clara	26%	28%	30%	29%	33%
Solano	3%	4%	4%	4%	4%
Sonoma	5%	7%	8%	8%	6%
BAY AREA	100%	100%	100%	100%	100%

Share of growth by PDAs

Overall, somewhat less growth is concentrated in PDAs than was the case in *Plan Bay Area 2013*. A part of this is basic math: regional growth expectations for 2040 now exceed what was imagined in 2013, while the number of PDAs has actually been reduced, although acreage has changed insignificantly. With these changes, as well as adjustments to account for the PDA Feasibility study completed in Fall 2015[12], the share of growth in PDAs is expected to be smaller. *Scenario 2* has the highest share of household growth in PDAs, at 69 percent, while the lowest share occurs in *No Project* (33 percent).

New household growth is more heavily concentrated in PDAs than employment in the three Scenarios, as the PDA concept centers around residential and mixed use (commercial plus residential) development. San Francisco County has the highest share of PDA household growth in all scenarios, ranging from 86 percent in *Scenario 1* to 89 percent in *Scenarios 2* and *3*. (See Figure 6). Alameda County

[12] Economic and Planning Systems, Inc., *op cit*

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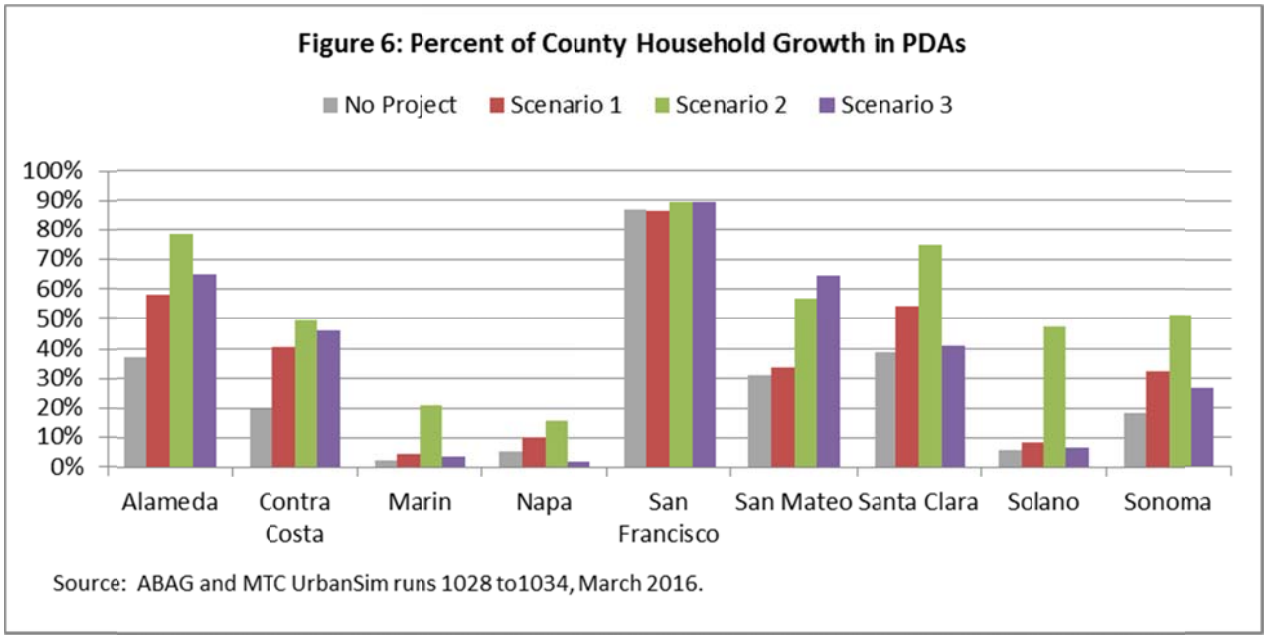
has the next highest share of household growth in PDAs, ranging from 37 percent under *No Project* to 79 percent in *Scenario 2*. Santa Clara County PDA household growth ranks third overall, with 75 percent in PDAs in *Scenario 2* and 39 percent in *No Project.* Santa Clara County's low share of household growth in PDAs in *Scenario 3* may be surprising, given its focus on the big cities. It is in part due to strong *employment* growth under *Scenario 3*, trading off residential and commercial development in these areas, as well as the housing growth allocated around corporate centers which are not currently designated as PDAs.



Because strategies are more directed toward residential than nonresidential growth and because employment growth has been less constrained by land use restrictions than has housing growth, there is much less variation among scenarios in the share of employment growth in PDAs. Regionwide, the highest share of employment growth in PDAs, at 48 percent, occurs in *Scenario 3*, followed closely by *Scenario 1* (47 percent) and *Scenario 2* (47 percent). Even the *No Project* distribution has 44 percent of employment growth in PDAs, capturing a higher share than household growth.

The highest share of employment in PDAs is in San Francisco *Scenario 1* (92 percent), and the county with the lowest share among the three scenarios is Marin (8 percent). (See Figure 7). Contra Costa, San Francisco, and Solano have their highest PDA shares of employment in *Scenario 1*. In the case of San Francisco, this is not because the City has more PDA-located jobs in *Scenario 1* than in the other scenarios, but because it has fewer jobs outside of the PDAs in *Scenario 1*, as the lower number of those non-PDA jobs is counterbalanced by a small increase in the number of jobs in other parts of the region. San Francisco still has a far higher share of jobs in PDAs in all three scenarios compared to any of the other counties. In contrast, Contra Costa and Solano counties have higher shares of employment within PDAs in *Scenario 1* because a higher share of growth overall is going to smaller jurisdictions in this scenario.

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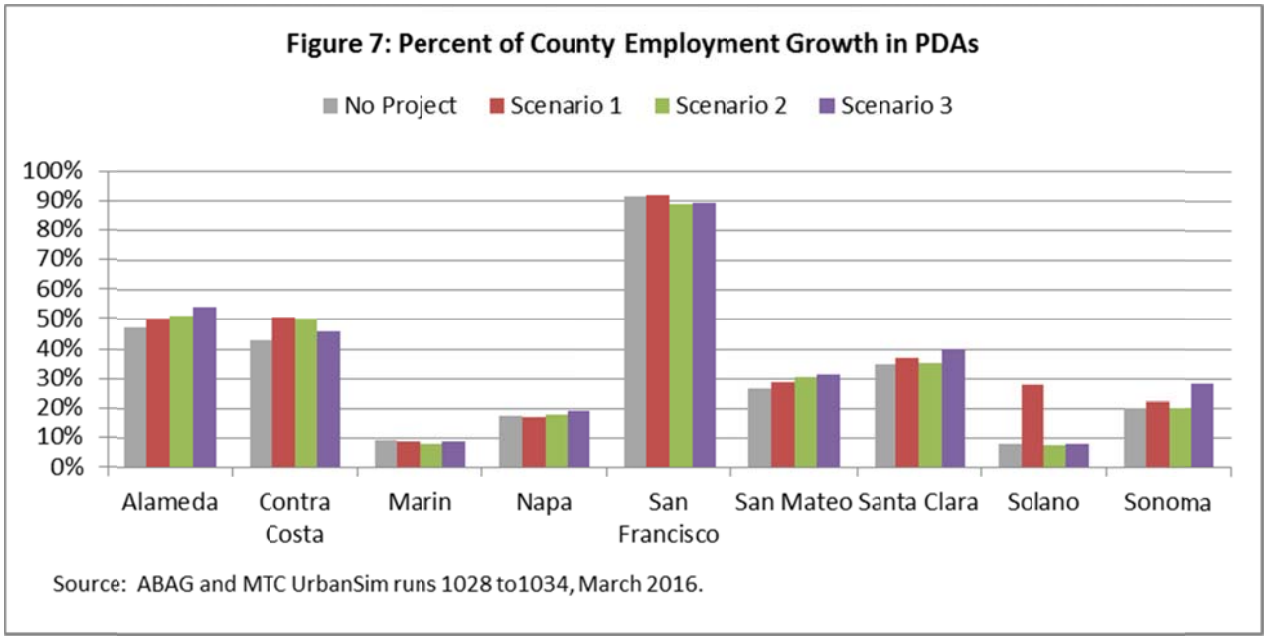
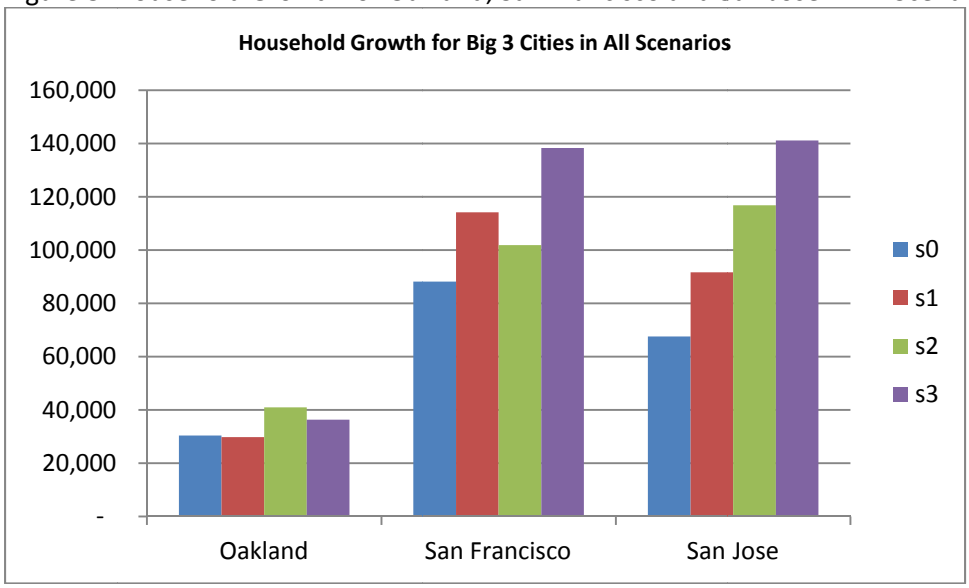


The Big Cities and Places with the Largest Amounts of Growth

The scenarios are further characterized by growth differences among jurisdictions and other places within the counties. Most of these differences are much more pronounced in the distribution of households than that of employment. This is apparent from comparing household and employment change in the three biggest cities. As shown in Figure 8, household growth is most heavily concentrated in the big three cities in *Scenario 1* and least heavily concentrated in *No Project*. Employment growth, in contrast, varies much less, and less regularly across the three cities. San Francisco's highest growth occurs in *Scenario 2*, while San Jose's highest growth occurs in *Scenario 3*. (See Figure 9).

Figure 8: Household Growth for Oakland, San Francisco and San Jose in All Scenarios



Source: ABAG from MTC Urban Sim runs 1113 to 1116, March 2016

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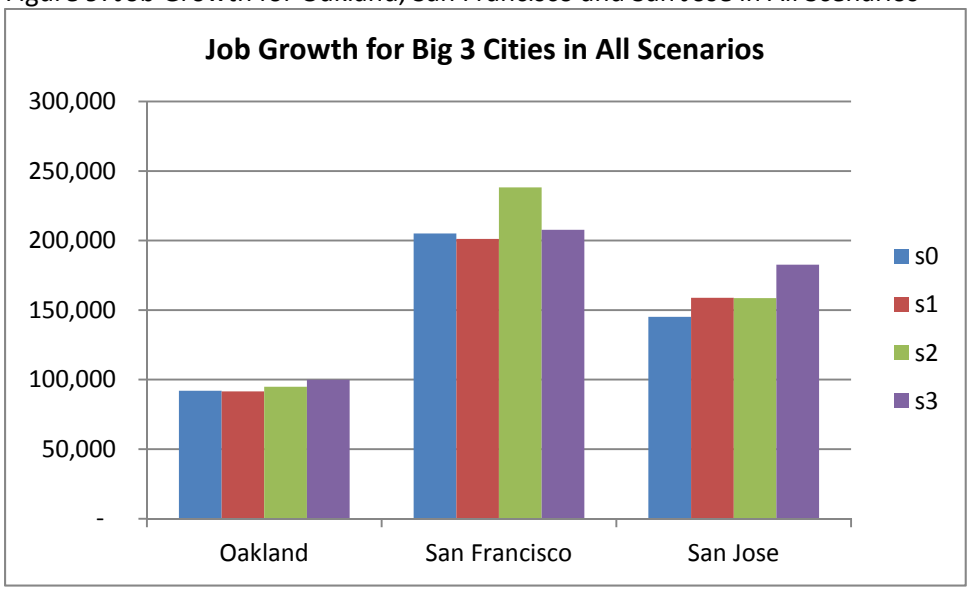
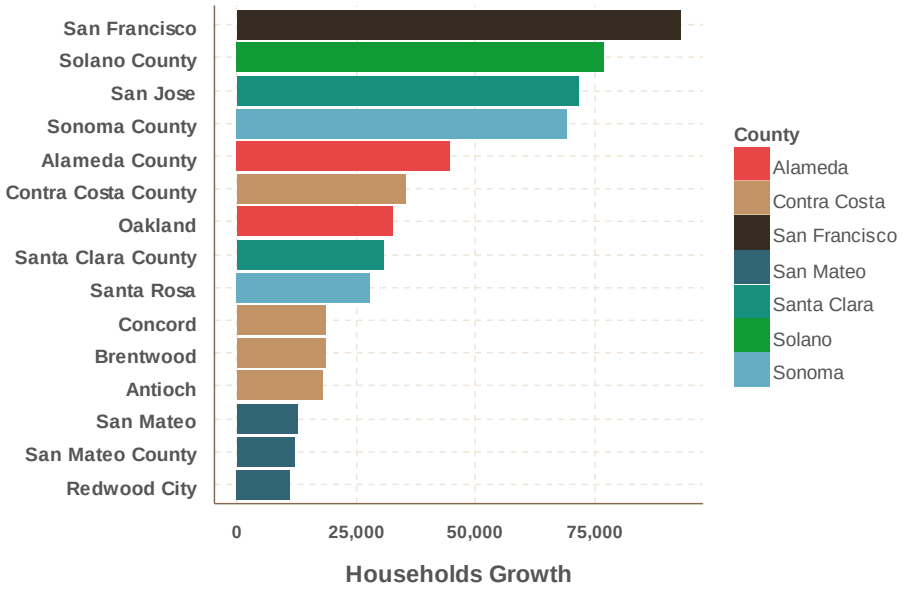
Figure 9: Job Growth for Oakland, San Francisco and San Jose in All Scenarios



Source: ABAG from MTC Urban Sim runs 1113 to 1116, March 2016

The following 8 bar charts, Figures 10 to 17, show the places capturing the most growth (household and employment) in each of the three scenarios and *No Project*. Each bar is colored to indicate in which county the place is located. Where the place includes "County" in its name, this indicates the total growth in the unincorporated places within the county. For example, in Figure 10 (household growth, *No Project*), the unincorporated portion of Solano County receives the second highest amount of household growth of anywhere in the region, after San Francisco. Note that the chart scale changes with scenario. In Figure 10, household growth under *No Project*, no city receives 100,000 households or more. San Francisco receives more households than any other place in *No Project*. In contrast, San Francisco drops to number two in terms of total household growth in *Scenarios 2* (Figure 12) and *3* (Figure 13), but in *Scenario 2* it receives over 100,000 households and in *Scenario 3* over 140,000 new households.

Figure 10: Household Growth, Top 15 places, No Project



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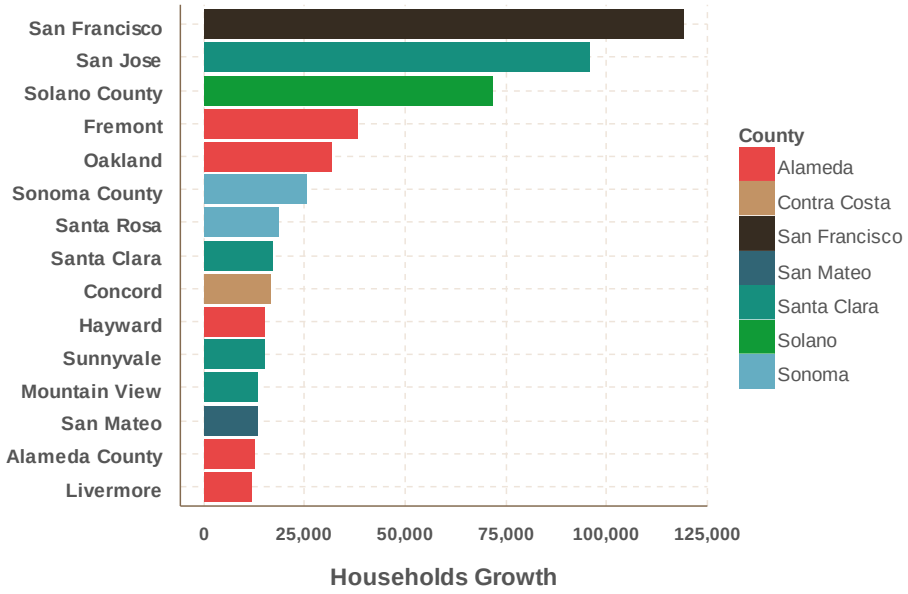
Source: ABAG from MTC Urban Sim runs 1113 to 1116, March 2016

Places Receiving the Largest Amounts of Household Growth

The places experiencing the largest amount of household growth varies by scenario, as does the overall proportion of growth concentrated in these jurisdictions. The 15 cities with largest increases in households will add 71 percent of the total household growth in the region in *No Project*, 64 percent in *Scenario 1,* 65 percent in *Scenario 2*, and 82 percent in *Scenario 3*.

Figure 11: Household Growth, Top 15 places, Scenario 1



Source: ABAG from MTC Urban Sim runs 1113 to 1116, March 2016

Scenario policies affect which places within the region dominate household growth. While the City of San Francisco is among the top two places for household growth in every scenario, as well as with *No Project*, San Jose's position ranges from first in *Scenarios 2* and *3* to third in *No Project*. Santa Clara County has only one place (San Jose) in the top 15 in *Scenario 2*, but six in *Scenario 3*. In contrast, only one Contra Costa County place, Concord, is among the 15 largest household gainers in *Scenarios 1* (Figure 11) and *3* (Figure 13), while four Contra Costa County places rank in the top 15 in *Scenario 2* (Figure 12) and *No Project*, including the unincorporated part of Contra Costa County.

The City of Oakland is among the top five places receiving growth in the three scenarios. Oakland is number six in *No Project*. The unincorporated part of Alameda County is the only other Alameda County place among the top 15 in *No Project*, but as growth policies are applied in *Scenarios 1* through *3*, Alameda County places take a stronger role. In *Scenario 2*, for example Fremont is the place ranking third in the region in household growth, with Oakland number four, Livermore number eight, and Dublin ranking number 11. In *Scenario 3*, Alameda County's highest household growth places switch from the Interstate 580 corridor to the East Bay corridor, with San Leandro (number 11) and Hayward (number 13) replacing Livermore and Dublin.

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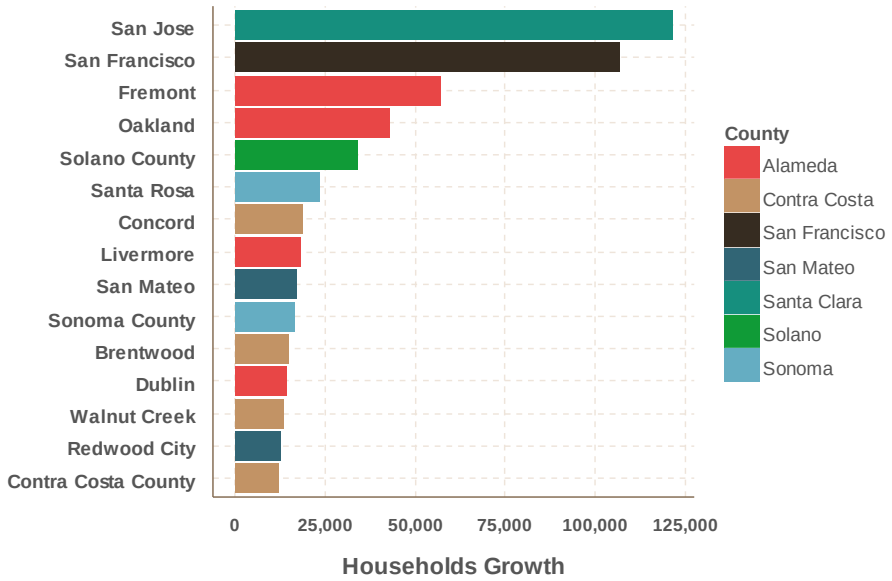
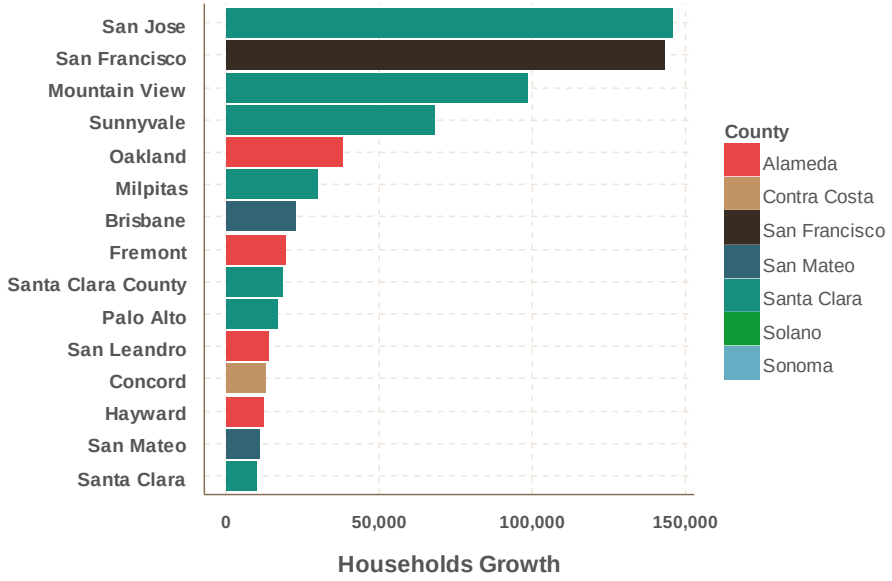
Figure 12: Household Growth, Top 15 places, Scenario 2



Source: ABAG from MTC Urban Sim runs 1113 to 1116, March 2016

The City of San Mateo is among the top fifteen places receiving household growth in every scenario as well as *No Project*, ranging from number 14 in *Scenario 3* to number 9 in *Scenario 2*. The city ranks 13th in *Scenario 1* and *No Project*. Redwood City is the 15th fastest growing city in *No Project* and the 14th fastest in *Scenario 2*, but does not appear among the top 15 in the other two scenarios. Unincorporated San Mateo County is among the top 15 places for household growth in *No Project* but not in any of the scenarios.

Figure 13: Household Growth, Top 15 places, Scenario 3



Source: ABAG from MTC Urban Sim runs 1113 to 1116, March 2016

Not surprisingly, no North Bay places are among the top 15 places for household growth in *Scenario 3*, the most concentrated scenario. However, unincorporated Solano County receives the second largest

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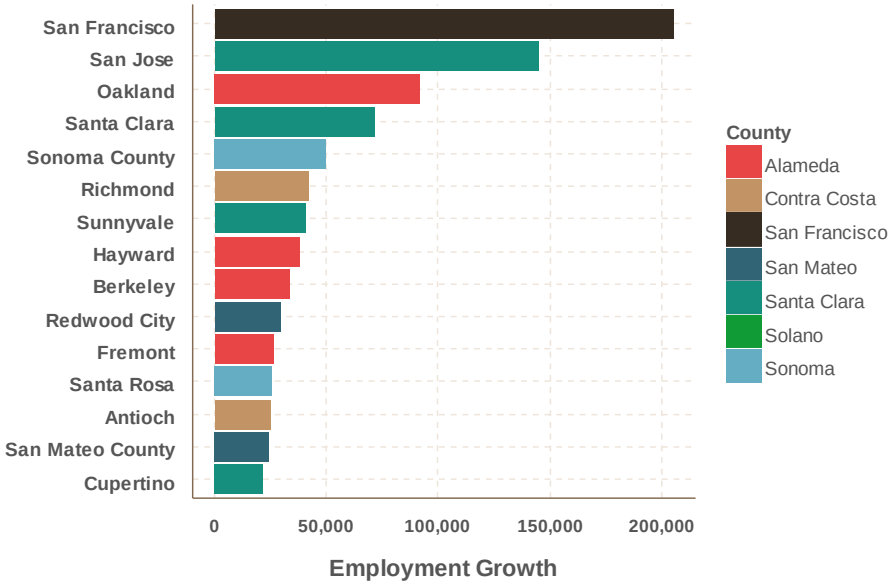
amount of household growth in *No Project*, the third highest amount in *Scenario 1* and the fifth highest amount in *Scenario 2*. Santa Rosa and unincorporated Sonoma County are among the top fifteen places for household growth in *No Project*, and *Scenarios 1* and *2*. Santa Rosa exceeds the numbers of households added in the unincorporated part of the county in Scenario 2, but receives fewer households than unincorporated Sonoma County in *No Project* or *Scenario 1*.

Places Receiving the Largest Amounts of Employment Growth

In general, the places that currently have the largest share of regional employment in 2010 will add more jobs between 2010 and 2040. Compared to household growth, there is less variation across the scenarios in the percentage of future job growth that will be in the top 15 cities: 67 percent in *No Project*, 70 percent in *Scenario 1*, and 72 percent in *Scenarios 2* and *3*.

The list of cities receiving the most employment growth varies little among the different distributions described by *No Project* (Figure 14) and the three scenarios (Figures 15, 16 and 17), although the level of growth and the ranking varies among the cities. San Francisco, San Jose, and Oakland are the three cities receiving the largest number of jobs in each of the described geographic distributions. However, San Francisco grows by close to 200,000 jobs in *No Project*, *Scenario 1* and *Scenario 3*, but by almost 250,000 jobs in *Scenario 2*, while San Jose's job growth is below 150,000 in *No Project*, almost 160,000 in *Scenarios 1* and *2*, and over 180,000 in *Scenario 3*. Oakland adds about 92,000 jobs in *No Project* and *Scenario 1*, but almost 100,000 jobs in *Scenario 3*.

Figure 14: Employment Growth, Top 15 places, No Project



Source: ABAG from MTC Urban Sim runs 1113 to 1116, March 2016

The City of Santa Clara gains the fourth largest number of jobs in *No Project* and in all three scenarios. Other places in the top 15 in all scenarios and *No Project* include unincorporated Sonoma County (number five in *No Project* and *Scenario 1* and nine in *Scenario 3*), Santa Rosa (number 5 in *Scenario 2*), Richmond (ranging from a rank of seven in *Scenario 1* to five in *Scenario 3*), Sunnyvale and Cupertino in Santa Clara County, Berkeley, Fremont and Hayward in Alameda County, and Redwood City in San Mateo County.

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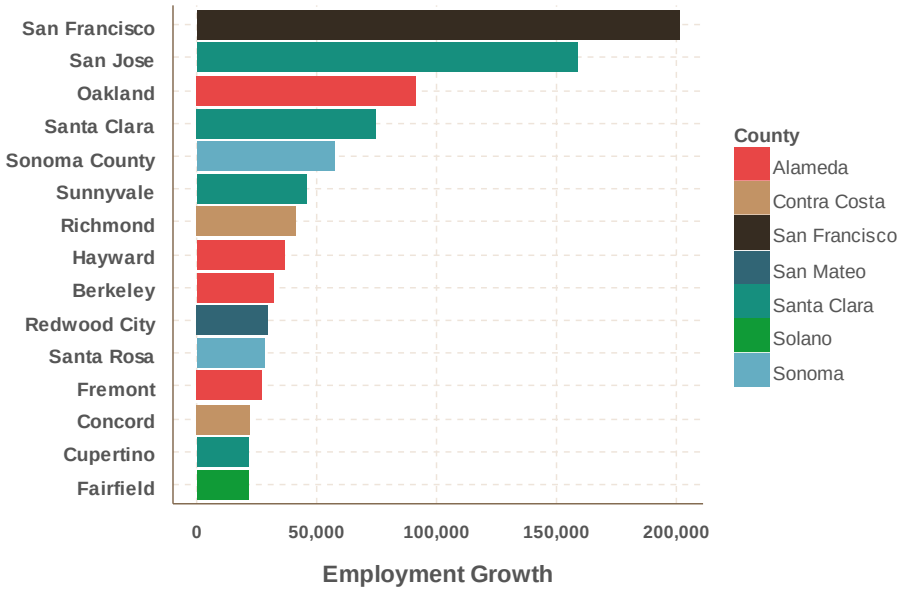
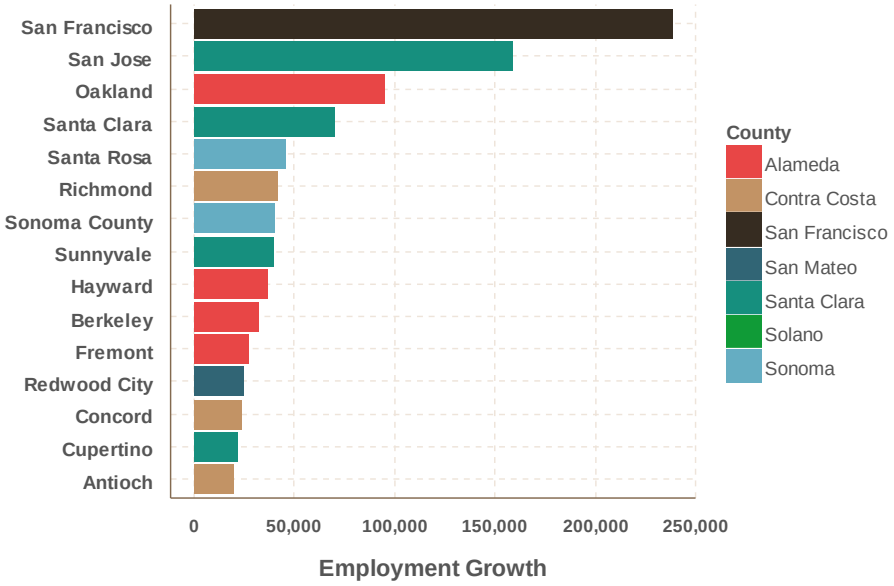
Figure 15: Employment Growth, Top 15 places, Scenario 1



Source: ABAG from MTC Urban Sim runs 1113 to 1116, March 2016

Figure 16: Employment Growth, Top 15 places, Scenario 2



Source: ABAG from MTC Urban Sim runs 1113 to 1116, March 2016

A few other places rank in the top 15 in some but not all of the geographic distributions of employment. Concord is among the top 14 in all three scenarios but not in *No Project*. Antioch is among the top fifteen in *Scenario 2* as well as in *No Project*. San Mateo County receives the 14th largest amount of job growth in *No Project* but does not make the top 15 in any of the three scenarios. Fairfield is among the top 15 in *Scenario 1* only, and is the only Solano County place to be among the top fifteen places for job growth in any of the geographic distributions.

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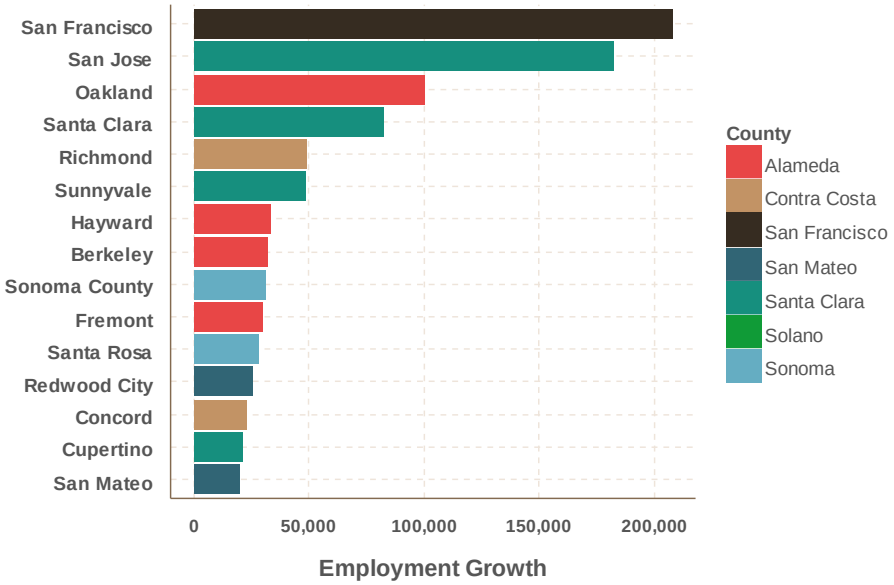
Figure 17: Employment Growth, Top 15 places, Scenario 3



Source: ABAG from MTC Urban Sim runs 1113 to 1116, March 2016

Corridors – East Bay and El Camino Real

Transportation and business corridors have been used as one framework for shaping collaborative planning efforts towards developing PDAs. This section describes the projected growth along the East Bay Corridor and the El Camino Real Corridor. (The two corridors are shown in Figure 1, the map at the beginning of this report).

East Bay Corridor

The East Bay Corridor consists of 48 PDAs in cities stretching from Fremont to Oakland. Household growth projected in the PDAs along this corridor ranges from about 39,000 in *No Project* to almost 116,000 in *Scenario 2*, three times the level of *No Project*. *Scenarios 1* and *3* each lead to growth of just over 70,000 households (See Table 7). In *Scenario 2*, PDAs in the East Bay Corridor account for 76 percent of the corridor's total household growth, and 15 percent of the growth for the Bay Area.

Table 7: East Bay Corridor PDAs Household Growth

	2010	2040	Growth	Percentage Growth	Share of Corridor Growth	Share of Regional Growth
No Project	181,038	219,869	38,831	21%	38%	5%
Scenario 1	181,038	253,723	72,685	40%	61%	9%
Scenario 2	181,038	296,750	115,712	64%	76%	15%
Scenario 3	181,038	251,842	70,804	39%	66%	9%

Source: ABAG from MTC Urban Sim runs 1113 to 1116, March 2016

Job growth in the East Bay Corridor PDAs ranges from 130,000 in *No Project* to 145,000 in *Scenario 3*, a much smaller range than in household growth. (See Table 8). *Scenarios 1* and *2* are again fairly close, with 131,000 jobs added in *Scenario 1* and 145,000 jobs in *Scenario 2*. Job growth in East Bay Corridor

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PDAs in *Scenario 3* accounts for for 49 percent of the corridor's total job growth, and 11 percent of Bay Area's total job growth .

Table 8: East Bay Corridor PDAs Job Growth						
	2010	2040	Growth	Percentage Growth	Share of Corridor Growth	Share of Regional Growth
No Project	314,405	444,762	130,357	41%	46%	10%
Scenario 1	314,405	445,764	131,359	42%	47%	10%
Scenario 2	314,405	449,355	134,950	43%	48%	10%
Scenario 3	314,405	459,547	145,142	46%	49%	11%
Source: ABAG from MTC Urban Sim runs 1113 to 1116, March 2016						

Looking at job growth and household growth together for the East Bay Corridor, *No Project* would leave the corridor with a substantial shortage of new households compared to employment growth. The shortfall would be substantially less in *Scenarios 1* and *3*, while *Scenario 2* could produce household growth at a level that there could be a net improvement of the jobs housing balance along the corridor.

El Camino Real Corridor

The El Camino Real Corridor includes 17 PDAs along the West Bay Shore from East Palo Alto and Palo Alto through Brisbane. Projected household growth in PDAs along the corridor ranges from about 15,000 in *No Project* to over 27,000 in *Scenario 2*. In *Scenario 2*, PDAs also have the highest proportion of corridor growth—13 percent, compared to 9 percent in *No Project* and only 5 percent in *Scenario 3*. This corridor has a lower share of household growth for the region compared to the East Bay Corridor. The El Camino Real Corridor share of regional growth ranges from 2 percent in *No Project* and *Scenario 3* to 4 percent in *Scenario 2*. (See Table 9).

Table 9: El Camino Real PDAs Household Growth						
	2010	2040	Growth	Percentage Growth	Share of Corridor Growth	Share of Regional Growth
No Project	42830	58,293	15,463	36%	9%	2%
Scenario 1	42830	63,692	20,862	49%	10%	3%
Scenario 2	42830	70,185	27,355	64%	13%	4%
Scenario 3	42830	60,305	17,475	41%	5%	2%
Source: ABAG from MTC Urban Sim runs 1113 to 1116, March 2016						

El Camino Real PDAs receive their highest levels and shares of employment growth in *Scenario 3*, and lowest levels and shares in *Scenario 1*. (See Table 10). In *Scenario 3*, PDAs would add 35,000 jobs but only 17,000 households. In *No Project*, the household to jobs short fall would be similar in proportion, adding 15,000 households compared to 30,000 jobs. In contrast, household to jobs proportions would be more balanced in the El Camino Real Corridor PDAs in *Scenarios 1* and *2*.

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Table 10: El Camino Real PDAs Job Growth						
	2010	2040	Growth	Percentage Growth	Share of Corridor Growth	Share of Regional Growth
No Project	73,530	103,442	29,912	41%	7%	2%
Scenario 1	73,530	101,833	28,303	38%	7%	2%
Scenario 2	73,530	105,335	31,805	43%	8%	2%
Scenario 3	73,530	108,353	34,823	47%	8%	3%
Source: ABAG from MTC Urban Sim runs 1113 to 1116, March 2016						

Integrating Equity, Environmental and Resilience Factors into the Scenarios

Equity, protection of environmental quality, and resilience are all important goals of *Plan Bay Area*. Six of the plan's 13 performance targets address equity considerations, while two targets address the environment, with all targets supporting an overall more resilient region. Rather than creating an "Equity" scenario, an "Environment" scenario and a "Resilience" scenario, the considerations for each of these factors are partially addressed in the land use analysis for the scenarios reported here and are partially addressed through the application of policies at a regional level as appropriate to each scenario.[13]

Equity

Equity considerations are addressed within the land use analysis through the application of local policies to enhance the availability of affordable housing throughout the region and in jurisdictions close to employment opportunities. For example, UrbanSim can represent deed-restricted inclusionary units which are limited to residents in certain income groups. This ensures that affordable housing is one component of new residential developments, while providing replacement affordable housing in the event that naturally affordable units are removed by infill development. In *Scenarios 2* and *3*, the model applies revenues from an indirect source tax (eg. vehicle miles traveled) to fund housing close to job centers. *Scenario 1* does not address the jobs/housing fit as directly as *Scenarios 2* and *3*, but policies applied at the regional level could address the travel cost problems associated with the greater concentration of new housing in suburban areas more distant from employment.

In addition to housing affordability, other equity targets focus on healthy and safe communities, transportation and housing costs, access to jobs, decreasing risk of displacement, and access to middle wage jobs. The performance target analysis will address these factors, which are not as easily represented in the UrbanSim model. Rather than including a partial analysis in the land use component alone, it will be addressed when land use and transportation elements are both completed.

Equity targets were also used to evaluate which transportation projects were selected for regional investment through the Project Performance Assessment where MTC scored each proposed transportation project according to how closely each achieved the policy objectives set in the performance targets. Please refer to the companion piece [NAME—to be added if completed before the May distribution of this memo] written by MTC for more detail.

[13] See http://planbayarea.org/the-plan/plan-details/goals-and-targets.html for more information on *Plan Bay Area* performance targets.

ABAG and MTC are also preparing an additional equity analysis for *Plan Bay Area 2040*. The overall Equity Framework will include a Title VI analysis of *Plan Bay Area* investments that use state or federal funds, an environmental justice analysis of PBA investments to determine any disproportionately high adverse impacts on low-income and minority populations or communities of concern, and an equity analysis of the distribution of benefits and burdens of the alternatives on communities of concern compared to the rest of the region.

Environment

Environmental considerations are addressed within the land use allocation through restrictions on greenfield development, the type of housing, concentration of housing (and in some scenarios employment) in areas accessible to transit, and the air quality impacts of selected projects. The manifestations of this approach vary by scenario. No greenfield development occurs in *Scenarios 2* and *3*, while in *Scenario 1*, the amount of greenfield development, and more generally of rural and suburban development, is substantially less than if the Plan were not adopted, and the concentration of new development in core and urban areas (and in multifamily units) is higher (as shown earlier in Figure 3). *Scenarios 2* and *3* have even greater concentration of growth in denser, more urban areas, improving the potential for use of less polluting public transit alternatives. The transportation analysis will address the use of transit as compared to other types of travel in the three scenarios.

Resilience

Resilience was not directly addressed in the land use analysis for the scenario development, because vulnerability to natural disasters or climate change impacts is widespread throughout the region. Instead, *Plan Bay Area* will include policies to be applied to the preferred scenario to improve resilience in the region.

No single scenario avoids the effects of natural disasters or climate change. Integration of climate adaptation and hazard mitigation planning in areas of new development is necessary in all scenarios to keep Bay Area residents safe, and regional investments secure. Resilience measures taken in areas of new development must be responsive to the unique risks created by the variety of intersecting hazards and communities. The growth patterns proposed in each scenario will change the Bay Area's built environment and land areas, which will require specific strategies to address risks.

For example, in *Scenario 1*, while new single family homes are structurally highly resilient to shaking, the development pattern of single family neighborhoods, especially in more distant suburban areas, makes the neighborhoods more dependent on expansive infrastructure networks, which may require greater redundancy to reliably serve communities. To provide reliable water, energy, and transportation services, single-family communities may consider investing in distributed energy systems, on-site water reuse systems, and redundant transportation networks. These policies could be particularly important in *Scenario 1*, to ensure that residents can still maintain livable conditions if infrastructure is damaged, and reach commercial and employment centers and medical services after an event.

In *Scenarios 2* and *3*, greater concentration of new development in multifamily homes may require improved building standards, to make this type of housing more resilient to a major event. In upgrading building requirements, the focus should expand from life-safety to measures that would improve the chances a building could be occupied after the earthquake shaking stops, or the flood waters recede.

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While services are likely to be more accessible because they are closer than in a more dispersed scenario, upgrading of infrastructure is important in these two scenarios to make roadways and transit services more resistant to damage along corridors that follow the fault lines and shorelines.

The plan will draw from conclusions in *Stronger Housing, Safer Communities* (http://resilience.abag.ca.gov/projects/stronger_housing_safer_communities_2015/) which provides strategies to address residential seismic and flooding risks and the resources gathered for creating a local Mitigation and Adaptation Plan (http://resilience.abag.ca.gov/projects/2016-mitigation-adaptation-plans/) to strengthen the resilience of communities over the next 25 years by addressing the risks from all natural hazards.

Summary/Concluding Section

The three scenarios described here present alternative land use patterns that can help to meet the state requirements for greenhouse gas reduction as well as the broader performance targets defined for the sustainable community strategy. Companion pieces [a companion piece?] written by MTC address 1) the resulting travel demand and greenhouse gas production of the different scenarios and 2) compare the effects of the different scenarios on performance targets for the plan.

From the land use analysis alone, major conclusions are:

- A regional plan that is based on policies conceived at a regional level through collaborative efforts among jurisdictions but implemented at the local level can significantly change the long term development direction of the region.
- Denser infill development can improve access to public transit resources while preserving the region's open space.
- Affordable housing needs can be addressed in a variety of development patterns, but different types of policies may be necessary to meet broader equity goals, such as lower housing plus transportation costs, greater access to middle wage jobs, or limitations on displacement, in each scenario.
- Integration of resilience with future infrastructure investments improves reliability and prosperity for both existing and future residents.
- The combination of land use and transportation planning is surfacing public health, equity, resilience, and ecosystem co-benefits that are attracting integrated funding and financing platforms for comprehensive planning and development.

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