# *The Use of Residential Nexus Analysis in Support of California's Inclusionary Housing Ordinances: A Critical Evaluation*

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A Report to the California Homebuilding Foundation

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## Contents



**Note:** This document includes two **Electronic Addenda**: **(A)** a compressed folder containing PDFs of all nexus reports reviewed and **(B)** a Microsoft Excel file containing models for testing inter-firm and intra-firm variation.

## Executive Summary

Real estate consulting firms have drafted reports for several California municipal governments containing so-called "residential nexus analyses" ("RNAs"). These analyses purport to demonstrate the effect of market-rate residential development on the demand for affordable housing and thus justify inclusionary housing percentage requirements ("IHRs" or "inclusionary percentages") and "in-lieu" fees.

This report details the methodology and findings of a study evaluating the use of residential nexus analysis in California today and includes: (1) a literature review, (2) a review of available nexus reports, (3) a description of the general RNA model, (4) a step-by-step comparison of different firms' methods, and (5) an analysis of several RNA outputs.

Overall, this effort has uncovered (1) a set of universal issues common among all (or nearly all) of the RNAs studied that call into question the accuracy of the methodology as a whole and (2) a set of issues arising out of an abundance of inter-firm variation—in assumptions and data sources, but also in vital calculations—the prevalence of which challenge the existence of an industry standard, or even generally accepted principles, for residential nexus analysis.

For a summary of all such issues, with citations to the report sections discussing each issue, see ***Figures ES-1*** and ***ES-2*** below. For the full discussion of these issues, see **Section 4**.

***Figure ES-1. Summary of Universal RNA Issues***

| Issues | Implications | Examples |
|---|---|---|
| **4.1(A) - Overly Broad Jurisdictional Scope.** All RNAs studied set IHRs and in-lieu fees based on estimates of affordable housing demand generated at the countywide level or greater. | Cities relying on these estimates to set local IHRs and fees are likely charging developers for affordable housing demand generated in other cities and, in some cases, other counties. | Simply accounting for commuting rates in Berkeley (i.e., the percentage of jobs in the city filled by people living outside the city) would reduce RNA-estimated fees by 22%. |
| **4.1(B) - Unreliable Affordability Gap Estimates.** The RNAs studied used various methods to calculate affordability gaps (the difference between the cost of developing an "affordable" unit and the amount a lower-income tenant could afford to pay for the unit), all of which are questionable. | The affordability gap estimates in the RNAs studied are likely inflated, and thus the maximum in-lieu fee estimates generated using these figures are likely inflated as well. | Using fair market rent figures generated by the US Department of Housing and Urban Development, instead of the figures consultants generated via an informal survey of local rents, would reduce the RNA-estimated fees in Fremont by 30%. |
| **4.1(C) - Statistically Improbable Lower-Income Household Percentages.** All but one of the RNAs studied estimated that 60% to 78% of jobs created by market-rate development would fall in the bottom 40% of the area's income distribution. This is improbable since these RNAs purport to account for all jobs created across the income distribution, not just low-wage jobs. | The percentages of lower-income households (i.e., those earning 80% or less of area median income) estimated by most RNAs are likely inflated, and thus the IHR and in-lieu fee estimates generated using these percentages are likely significantly inflated. | Reducing the percentage of lower-income households generated in Mountain View from 78% to 40% (since 80% of values below a median represent the bottom 40% of the distribution) would reduce the RNA-estimated in-lieu fees by 96%. Similarly, reducing the same value in Fremont from 60% to 40% would lower the RNA-estimated in-lieu fees by 32%. |

| *Figure ES-1 (Continued)* | | |
|---|---|---|
| **4.1(D) - Use of Total Economic Impacts.** Rather than considering only the spending of the households occupying newly created housing (direct impacts), all but one of the RNAs studied estimate IHRs and fees based on all spending resulting from development (total impacts), no matter how remotely linked to the development itself. | The inclusionary percentages and in-lieu fees estimated by these RNAs are significantly higher than they would be if it was assumed that cities should only charge developers for their direct impacts on the local economy. | In Napa County, one firm estimated 26.9 jobs directly created but 46.6 total jobs created. Using only the direct impacts would have cut the RNA-estimated in-lieu fee by nearly 50%. |

***Figure ES-2. Summary of Variation-Related RNA Issues***

| Issues | Implications | Examples |
|---|---|---|
| **4.2(A) - Wide Range of Jurisdictional Scopes.** The range of jurisdictional scopes used by the different firms studied varies from a county-level scope, to a regional scope, to an all-inclusive scope. | As discussed in ***Figure ES-1*** above, changing RNAs' jurisdictional scope could significantly affect their job creation estimates and, in turn, their IHR and in-lieu fee estimates. | Including in Hayward's affordable housing demand calculation a household that was actually created in another city or county increases the RNA-estimated fee for a two-bedroom condo by 8%, or more than $2,300. |
| **4.2(B) - Inconsistent Affordability Gap Estimation Methodology.** Each firm uses radically different assumptions, data sources, and calculations to determine affordable unit development costs and thus affordability gaps. | Because of the way in-lieu fees are calculated (i.e., by multiplying the number of lower-income households by affordability gaps), a one-dollar difference in an affordability gap estimate translates to a multi-dollar difference in an in-lieu fee estimate. | Increasing the affordability gap estimate for 0-80% AMI households in Mountain View by one dollar increases the RNA-estimated in-lieu fee by eighteen dollars. |
| **4.2(C) - Inconsistent Job Creation-Related Data Sources.** All three firms studied use different data sources to calculate the income distribution of new worker households. | This variation in data may explain significant variation in lower-income household percentages and thus RNA-estimated fees. | Even after controlling for differences between cities and unit types, there is nearly a 20% difference between the lowest and highest in-lieu fee estimates in the RNAs studied. |
| **4.2(D) - Inconsistent Lower-Income Household Percentages.** There is a great deal of unexplained inter-firm variation related to the percentage of lower-income households (i.e., those earning 0-80% of AMI) among newly created households. | As discussed in ***Figure ES-1*** above, changing this percentage has significant multiplier effects on RNA-estimated fees. | Reducing the percentage of lower-income households generated in Mountain View by 1% translates to a 2.5% reduction in RNA-estimated in-lieu fees. Doing the same in Fremont translates to a 1.6% reduction. |

As discussed further in **Section 5** below, these issues—coupled with fact that the methodology is untested and has not been vetted by peer review—have led me to conclude that residential nexus analysis, as it has been applied in California to date, is an unreliable means of estimating inclusionary housing percentage requirements and in-lieu fees.

## 1. Background and Problem Statement

In some form or another, California's municipal governments have sought to either incentivize or mandate the production of affordable housing since the 1960s. The earliest of these "inclusionary housing" ordinances, which "favor[ed] developers that would include affordable units in their projects," were enacted by bedroom communities in the San Francisco Bay area like Petaluma and Davis.[1]

Laws like these were relatively few—in California and elsewhere—until the late 1970s and early 1980s, when at least 30 municipalities in California enacted inclusionary housing ordinances. This rapid proliferation was spurred in part by California's newly revised housing element law[2] and newly created "Model Inclusionary Housing Ordinance."[3] The growth trend continued throughout the early 1990s, and, by 1996, there were 75 locally mandated inclusionary housing programs in California.[4]

In general, these programs require developers to build or otherwise provide units affordable to lower-income households—those earning anywhere from 0 to 120 percent of area median income, depending on the ordinance—or pay the city a fee in lieu of doing so (which is then presumably used to provide affordable housing).

Unlike the ordinances of the 1960s, which merely provided incentives for developers who chose to include affordable housing in their projects, many of these new inclusionary housing ordinances mandated compliance. In fact, the earliest attempt by a major US city to impose such a mandate was San Francisco's "Office/Affordable Housing Production Program," which was established by administrative decision in 1980 and codified in 1985.[5] As a condition of issuing commercial building permits (e.g., for retail or office space, as opposed to housing), the program required developers to either build affordable housing in the city or pay an "in-lieu" fee. In the years since, many California jurisdictions have adopted similar ordinances, and, according to a recent study, 76 percent of these ordinances allow payment of in-lieu fees.[6]

San Francisco's original ordinance also helped set a trend regarding legal justification of inclusionary housing requirements. In order to preempt legal challenges to the new ordinance, San Francisco commissioned two studies "documenting the causal link between the construction of new office space and an increased need for housing."[7] The importance of such studies would soon become clear when the U.S. Supreme Court began applying a heightened level of scrutiny to some permit conditions.[8] In two cases, the Court held that (1) a permit condition constitutes an impermissible "taking" under the Fifth Amendment[9] unless it can be shown that an "essential nexus" exists between the development condition and the purpose for imposing it[10] and (2) development conditions must be "roughly proportional" to the impact the development will have on the community.[11] Though it was an unsettled

[1] Calavita, 5. [See Works Cited section for full citations.]
[2] Id. (by "mandating that the determination of local housing needs be based on the locality's share of regional housing need")
[3] Calavita, 5.
[4] Id., 6.
[5] Alterman, 10.
[6] Porter & Davison, 13.
[7] Alterman, 10.
[8] i.e., rather than simply applying the "rational basis" test used to evaluate exercises of general police powers
[9] i.e., it is "impermissible" without "just compensation"
[10] *Nollan*, 836-7.
[11] *Dolan*, 2312.

legal question whether inclusionary housing ordinances imposed the kind of conditions covered by these decisions, many jurisdictions began commissioning studies similar to San Francisco's—often called "commercial nexus analyses" ("CNAs")—just in case.

Inclusionary housing percentage requirements ("IHRs" or "inclusionary percentages") and in-lieu fees are certainly not limited to commercial developments, however. In fact, most inclusionary housing ordinances in California (including later versions of San Francisco's ordinance) also impose these requirements on residential developments. That is, they require homebuilders to either provide affordable units or pay an in-lieu fee. Not surprisingly, many cities have hired consultants to justify these laws with nexus analyses as well.

The need for such analyses became even more apparent in early 2009 when, in *Building Industry Association of Central California v. City of Patterson*, a California appellate court seemed to signal that in-lieu fees should be treated as impact fees (rather than as an exercise of general police powers), thus requiring a nexus analysis similar to the one required by federal "takings" jurisprudence and by California's Mitigation Fee Act.[12] Specifically, the court found the city's in-lieu fee unreasonably high because "legal standards require that the amount of a development fee be limited to the cost of that portion of a public program attributable to the development." Later the same year, in *Palmer/Sixth Street Properties v. City of Los Angeles*, another California appellate court held that inclusionary housing percentage requirements for rental units violate the rent decontrol provisions of California's Costa-Hawkins Act.[13]

In light of these decisions, numerous cities have engaged consulting firms to conduct "residential nexus analyses" ("RNAs"),[14] which attempt to quantify the nexus between cities' inclusionary housing percentages/in-lieu fees and the public costs purportedly created by new market-rate development. In an attempt to forge a link between market-rate residential development and affordable housing demand, these analyses posit the following general argument:

> [N]ewly constructed units represent new households…These households represent new income…that will consume goods and services…New consumption translates to new jobs; a portion of the jobs are at lower compensation levels…[L]ow compensation jobs translate to lower income households that cannot afford market rate units…and therefore need affordable housing.[15]

Consultants have used this line of reasoning to argue that in-lieu fees of nearly 20% of value per market-rate unit may be justified from a nexus perspective.[16]

[12] It should be noted, however, that the court seemed to stop short of requiring full impact fee analysis as described in that act.
[13] The theory was that requiring a certain percentage of units to remain affordable in perpetuity violates the provision that landlords may reset controlled rents after tenants move out.
[14] As this is the moniker used by Keyser Marston Associates, Inc., the firm that has produced the great majority of such analyses, I have adopted it for the purposes of this memo. It should be noted, however, that different consultancies refer to these analyses by various other names, including "nexus-based affordable housing fee analysis," "affordable housing fee nexus study," and "housing nexus analysis." For a more complete list of names, see the studies noted in **Appendix A.**
[15] Fremont Report, 11. [For information on the RNAs cited in this report, including authors and URLs, see **Appendix A**.]
[16] See Solana Beach Report.

At the request of the Building Industry Association of the Bay Area, during summer 2010, the Berkeley Program on Housing and Urban Policy conducted a preliminary analysis of a recently completed RNA[17] and hosted a panel to discuss its initial findings.[18] In general, the panel agreed that the report raised important methodological concerns, many of which warranted more comprehensive study.

Accordingly, this report is intended as an initial contribution to a currently scant body of research regarding residential nexus analysis in California. The following pages include: a review of the academic literature surrounding nexus analysis and related issues (2.1), a review of publicly available nexus analyses conducted in California and elsewhere (2.2), a description of a general RNA model (3.1), a comparison of the RNA methodologies applied in California since the *Palmer* and *Patterson* decisions (3.2), an analysis of the outputs of several RNAs (3.3), and an overall evaluation of the RNA methodology (4).

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[17] i.e., the Fremont Report, prepared by Keyser Marston Associates, Inc. in April 2010.

[18] The panel involved faculty and researchers from several disciplines, including business, city planning, economics, and public policy.

## 2. Reviews Conducted

I began researching this topic by conducting reviews of (1) the academic literature related to nexus analysis and (2) the body of nexus reports, both commercial and residential, available to the public. The methods and findings of each review are as follows:

### 2.1. Literature Review

I conducted a literature review in connection with this study in order to locate relevant background information and to find any empirical justifications or critiques of the nexus analysis methodology that might inform my own examination of California RNAs.

#### 2.1.1. Methodology

For this review, I drew heavily from online sources. Specifically, I queried five separate databases/search engines: EBSCOhost, Google, Google Scholar, ISI Web of Knowledge, and Social Science Research Network. For a full list of review queries by database/search engine, see **Appendix B**.

In the course of my literature review, I located over 150 sources that were relevant or potentially relevant to my analysis, including journal articles, book chapters, presentations, and government reports. I narrowed these sources down to about 50—most of which appear in the **Works Cited** or **Selected Bibliography** sections below—by eliminating duplicative results and focusing on three broad topic areas: (1) background information (on linkage fees, takings jurisprudence, or inclusionary zoning); (2) discussions of economic theory or empirical studies (related to linkage fees or inclusionary zoning); and (3) California-related sources.

#### 2.1.2. Findings

Overall, the findings of my literature review were disappointing. Despite the efforts just described, I was unable to locate any journal articles, peer reviewed or otherwise, in support of the RNA methodology. Similarly, I found no relevant articles critiquing the methodology or its major elements, such as the IMPLAN model. The lion's share of what I did find were law review articles, most of which dealt with federal takings jurisprudence. I also found a few non-law-review articles discussing the economic theory behind inclusionary housing ordinances or evaluating the effect of these programs on development, but none of these have provided information particularly helpful to an evaluation of residential nexus analysis, specifically. As discussed in **Section 2.1.1** above, most of the sources I found relevant or potentially relevant are identified in the **Works Cited** or **Selected Bibliography** sections below.

### 2.2. Nexus Report Review

I also conducted an extensive review of publicly available RNAs and CNAs in connection with this study. The primary purpose of the review was to provide a large and diverse sample of recently completed RNAs to allow for a description of the general RNA methodology applied in California today. I chose to search for commercial nexus analyses as well as residential nexus analyses because I was hoping to identify similarities and differences between the methodologies that might aid my critique. Copies of all nexus studies reviewed are included in **Electronic Addendum A**.

### 2.2.1. Methodology

Again, I relied heavily on online sources. First, I submitted twelve separate queries to an online search engine, all of which are identified in **Appendix B**, collecting reports as I located them. Next, I searched the websites of each of the consultancies that had drafted the reports I had just located, noting their municipal clients and specifically searching those clients' websites for nexus analyses. Finally, I searched the sources identified in the earlier literature review for references to specific nexus analyses that had been conducted.

### 2.2.2. Findings

The following table describes the distribution and general characteristics of the nexus analyses located:

***Figure 1. Residential and Commercial Nexus Analyses Located***

| | RNA or Both | CNA |
|---|---|---|
| **California, 2009-Present** | 7 | 1 |
| **California, Before 2009** | 2 | 8 |
| **Non-California** | 3 | 3 |
| **Totals:** | **12** | **12** |

For a more complete description of studies, including firm information and URLs, see **Appendix A.**

Based on my review, both residential and commercial nexus analyses are quite common in California, and RNAs seem to have spiked following the *Palmer* and *Patterson* decisions. Also suggested by this review is that Keyser Marston Associates, Inc. ("KMA") conducts most residential nexus analysis in California. Of the nine California RNAs reviewed, KMA authored six studies, while Bay Area Economics ("BAE"), Economic and Planning Systems, Inc. ("EPS"), and Stanley R. Hoffman Associates ("SRH") each authored one study.

For the purpose of critiquing the current RNA methodology used in California, I decided to focus primarily on the seven RNA studies conducted in California since 2009, the year both the *Palmer* and *Patterson* decisions were handed down:

***Figure 2. Residential Nexus Analyses: California, 2009-Present***

| Month/Year | City | County | Analysts |
|---|---|---|---|
| 04/2011 | Mountain View | Santa Clara | EPS |
| 08/2010 | Solana Beach (Draft) | San Diego | KMA |
| 06/2010 | Berkeley | Alameda | BAE |
| 06/2010 | Walnut Creek (Draft) | Contra Costa | KMA |
| 04/2010 | Fremont | Alameda | KMA |
| 04/2010 | Hayward | Alameda | KMA |
| 11/2009 | N/A | Napa | KMA |

# 3. Analyses Conducted

In addition to the literature and nexus report reviews, I conducted three types of analyses: a general RNA model description, a step-by-step RNA comparison, and two types of RNA output studies.

## 3.1. General RNA Model Description

The first of these analyses, the general RNA model description, was by far the simplest, but its findings provided the foundation for all subsequent work. While this general description holds for all RNAs studied, different firms employ fundamentally different assumptions, calculations, and data sources at various points in the process and thus arrive at different results. These differences are noted in **Appendix C** and discussed in greater detail in **Section 4.2** below.

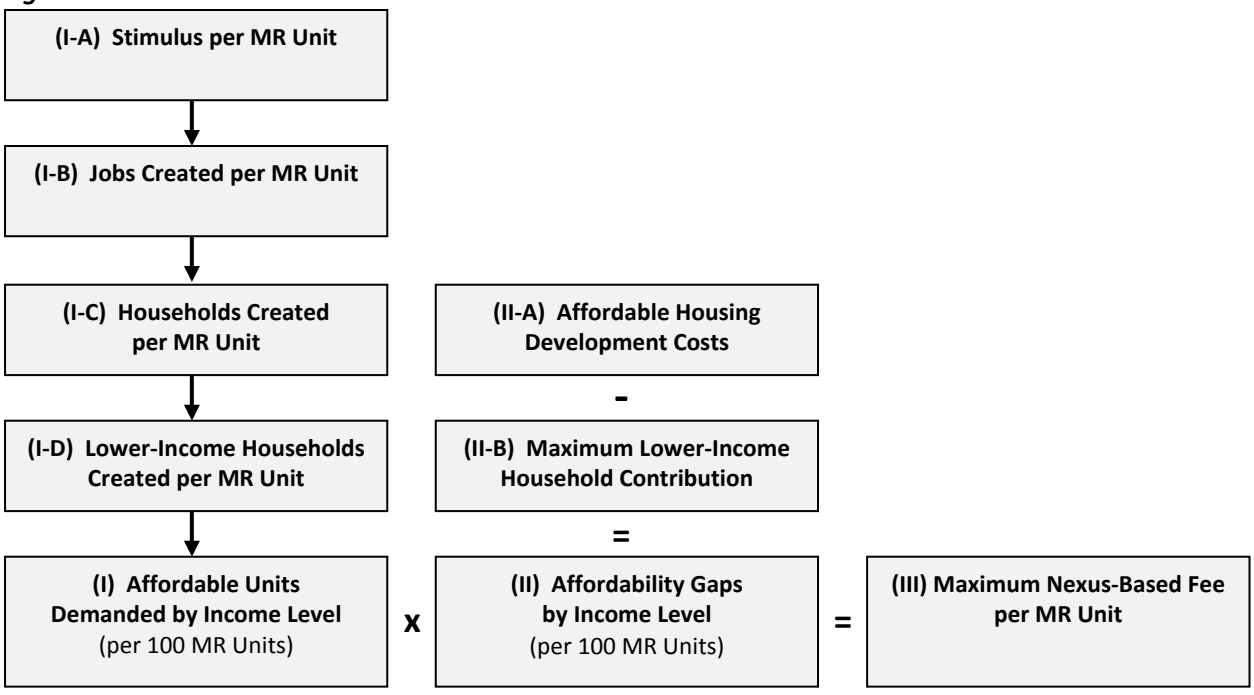
### 3.1.1. Methodology

This portion of my work simply involved a "close read" of the seven post-2009 California RNAs listed at the end of the previous section. Specifically, I carefully studied the methodology employed in each of these RNAs in order to develop a generalized model for further study.

### 3.1.2. Findings

Based on my review of these RNAs, the following general RNA model emerged:

***Figure 3. General RNA Model***




The analysis begins with an estimate of the affordable unit demand created by the addition of one market rate ("MR") unit **(I)**. First, the stimulus to the economy generated by the production of that unit is calculated using assumptions about the household income required to purchase or rent the unit and

the typical spending patterns of those households **(I-A)**. Next, using either a commercially available input-output model or information from the Economic Census, this stimulus is translated into jobs created **(I-B).** These jobs are then translated into households using data about workers per household from the American Communities Survey **(I-C)**. Then, the portion of these households that fall within inclusionary housing guidelines (i.e., "lower-income households") is calculated using average salary data for the jobs created and the city's inclusionary housing guidelines **(I-D)**.

For each inclusionary income level, an affordability gap is also calculated **(II)**. This is done by subtracting the maximum amount a lower-income household could afford to pay for a new unit based on government guidelines **(II-B)** from the estimated cost of producing that unit **(II-A)**.

Finally, the maximum nexus-based fee per unit **(III)** is calculated by multiplying the affordable units demanded at each income level **(I)** by the affordability gaps at each income level **(II)**.

The following figure shows this entire process in outline form and, more importantly, presents the affordable housing demand analysis in greater detail:

***Figure 4. General RNA Model, Additional Detail***

**I. Affordable Housing Demand Analysis**

A. Stimulus Estimate
   1. Identify Prototype Market-Rate ("MR") units
   2. Estimate Sale/Rental Prices for New MR units
   3. Estimate Annual Gross Income for Households Occupying New MR Units
   4. Estimate New Households' Average Annual Expenditures on Goods/Services

B. Jobs Estimate
   Estimate Number of Jobs Created by Stimulus

C. Households Estimate
   Estimate Number of Households Created by New Jobs

D. Lower-Income Households Estimate
   1. Estimate Occupational Distribution of Newly Created Households
   2. Estimate Income Distribution of Newly Created Households
   3. Estimate Size of Newly Created Households
   4. Estimate Number of Households Meeting Inclusionary Criteria

**II. Affordability Gap Analysis**

A. Affordable Housing Development Costs
   1. Unit Type

B. Maximum Lower-Income Household Contribution

C. Gap Calculation

**III. Maximum In-Lieu Fee Calculation**

For each income level, Lower-Income Households x Affordability Gap

For even greater detail, see the inter-firm comparison in **Appendix C** and the detailed analysis of the Fremont Report, which is representative of KMA's methodology, in **Appendix D**.

### 3.2. Step-by-Step RNA Comparison

After identifying the three firms that have completed RNAs in California since 2009—Bay Area Economics ("BAE"), Economic and Planning Systems, Inc. ("EPS"), and Keyser Marston Associates, Inc. ("KMA")—I compared their respective methodologies and found significant differences in assumptions, data sources, and calculations.

#### 3.2.1. Methodology

In order to conduct a thorough comparison of these firms' methods, I constructed a matrix with the outline from ***Figure 4*** above in the left margin and spaces to the right of each outline section for the assumptions, calculations, and data sources used by each of the three firms. I then filled in these spaces based on a close read of a recent RNA completed by each firm for a different California city: Fremont (KMA), Berkeley (BAE), and Mountain View (EPS). See **Appendix C** for the completed version of this matrix.

Based on a review of four additional reports KMA produced for other cities, I am quite confident that the Fremont report is sufficiently representative of KMA's methodology. Since I was only able to locate one recent California RNA for each of the other firms, I am slightly less confident about the representativeness of those reports. However, while some specific information is likely to vary between reports (e.g., local building costs), it is unlikely that the general methodology these firms employ (e.g., the calculations they use) would vary significantly between reports. As a result, I am confident that the important issues this memo raises would be the same regardless of which of a particular firm's recent reports I analyzed.

#### 3.2.2. Findings

While the RNA model outlined in ***Figures 3 and 4*** above describes all three firms' *general* methods, a close look at each firm's *specific* assumptions, calculations, and data sources reveals major inter-firm differences—all of which significantly affect the inclusionary housing percentages and in-lieu fees each firm estimates. The major differences by section (i.e., section of the RNA model) and type (i.e., assumptions, data sources, or calculations) are as follows:

A. **Jobs Created (I-B): Different Assumptions, Calculations, and Data Sources.** KMA and BAE both use a commercially available input-output model called IMPLAN to calculate the number of jobs created by the addition of market rate households,[19] while EPS uses a completely different method. Specifically, EPS (1) uses the Consumer Expenditure Survey[20] to determine the percentage of household income spent within different industry sectors at the national level; (2) converts those expenditures by sector into wages by sector using a gross-receipts-to-wages ratio from county-specific data in the Economic Census;[21] and (3) converts industry wages into jobs using county-specific average wage data by sector, also from the Economic Census.[22]

[19] For more information on estimating direct, indirect, and induced job creation using the IMPLAN model, see **Appendix H**.
[20] http://www.bls.gov/cex/
[21] http://www.census.gov/econ/census07/
[22] For a more detailed picture of this process, see **Appendix E**.

Also, all three firms employ different assumptions regarding the proper jurisdictional scope of job projections for RNAs. KMA uses IMPLAN projections for the county, BAE uses IMPLAN projections for the region (in the case of the Berkeley RNA, a nine-county area), and EPS (due to its unique projection methodology) seems to project all directly created jobs, regardless of jurisdiction.

**B. Occupational Distribution (I-D-1): Different Calculations and Data Sources.** KMA matches the industry codes from the IMPLAN output to the North American Industry Classification System ("NAICS") job-level codes[23] in order to distribute newly created jobs across industries,[24] while BAE simply computes job distributions at the industry level using the Public Use Microdata Sample ("PUMS").[25] As described above, EPS bases the occupational distribution of new households on Consumer Expenditure Survey data.

**C. Income Distribution (I-D-2): Different Data Sources.** All three firms use different data sources to calculate the income distribution of new worker households: KMA matches NAICS job codes with county wage and salary data from the California Employment Development Department, BAE matches the IMPLAN output with a national income distribution by industry from PUMS, and EPS uses county-level data on average wage by job type from the Economic Census.

**D. Affordable Housing Development Costs (II-A): Different Assumptions, Calculations, and Data Sources.** Each firm uses radically different assumptions, calculations, and data sources to determine affordable unit development costs. BAE, which only analyzes rental units, uses development cost estimates from the city's housing element, which cannot be found using the citation BAE provides in its report.[26]

KMA uses market-rate prices from a citywide survey for ownership units and a simple capitalized cost formula [(Annual Market Rate Rent - $7,000 Operating Expenses) x Capitalization Rate] for rental units, which is based on a citywide survey of rental properties. While the formula is fairly standard, the use of market-rate rents is problematic because market-rate housing costs more to build than lower-income housing, since market-rate households can afford more amenities (e.g., high-end finishes and fixtures) than lower-income households. This difference is illustrated by the fact that the 2009 Fair Market Rent figure calculated by the US Department of Housing and Urban Development ("HUD") for a two-bedroom apartment in Fremont, California[27] is half the average market-rate rent KMA used to estimate the affordability gaps in the Fremont Report.[28]

EPS uses a pro forma method[29] for both ownership and rental units that produces cost estimates which, in the RNA studied, were significantly higher than the capitalized cost of the rental units EPS surveyed earlier in its analysis. This is problematic because, as KMA notes,[30] the capitalized cost of existing rental units should account for all of the costs the pro forma model is attempting

[23] Bureau of Labor Statistics, Occupational Employment Survey (http://www.bls.gov/oes/)
[24] For a more detailed picture of this process, see **Appendix F**.
[25] http://www.census.gov/acs/www/data_documentation/public_use_microdata_sample/
[26] For potential implications of this uncertainty, see the note in Section II-C of **Appendix C**.
[27] http://www.huduser.org/portal/datasets/fmr/fmrs/fy2009_code/index.asp?data=fmr09
[28] Appendix II, Table 3.
[29] See **Appendix G** for a detailed application of this method.
[30] Fremont Report, 65.

to capture. Thus, to the extent EPS's sample of rents is representative of recent projects in the city, the capitalized cost of those rents may represent a better estimate of affordable unit development costs than EPS's pro forma.

**E. Maximum Lower-Income Household Contribution (II-B): Different Assumptions.** The most important difference here concerns assumptions about financing terms for the lower-income families trying to buy homes. Specifically, KMA assumes that these families pay 20 percent down and thus are not required to purchase private mortgage insurance, while EPS assumes that these families pay 10 percent down and thus must obtain private mortgage insurance. As a result, holding all other factors constant, the maximum household contribution estimated by EPS would be significantly lower than KMA's, and thus its affordability gap estimates would be higher.[31]

### 3.3. RNA Output Study

Based on the significant inter-firm variation in assumptions, calculations, and data sources just described, one would expect there to be significant variation in the inclusionary percentages and in-lieu fees estimated by each firm. Indeed, there is a great deal of such variation. Consider the figure below detailing the range of maximum in-lieu fees from the RNAs studied. Note that fee amounts range from $20,000 to $148,000 per unit and, more importantly, from 5.6 percent to 19.2 percent of unit value.

***Figure 5. Range of Maximum In-Lieu Fees from Residential Nexus Analyses: California, 2009-Present***

| **RNA Information** | | | **Range of Maximum Fees** | | |
|---|---|---|---|---|---|
| **Month/Year** | **Location** | **Analysts** | **$ Amount (k)** | **$ Per Sqft.** | **% of Value** |
| 04/2011 | Mountain View, CA | EPS | 34 – 148 | — | 8.5 – 16.6 |
| 08/2010 | Solana Beach, CA (Draft) | KMA | 39 – 86 | 27.71 – 53.52 | 6.7 – 19.2 |
| 06/2010 | Berkeley, CA | BAE | 20 | — | 7.0 |
| 06/2010 | Walnut Creek, CA (Draft) | KMA | 32 – 76 | 31.67 – 46.67 | 8.5 – 10.4 |
| 04/2010 | Fremont, CA | KMA | 39 – 68 | 27.32 – 38.54 | 9.1 – 10.8 |
| 04/2010 | Hayward, CA | KMA | 32 – 52 | 19.26 – 32.45 | 8.0 – 11.2 |
| 11/2009 | Napa County, CA | KMA | 22 – 67 | 22.41 – 24.08 | 5.6 – 11.9 |
| | | **Overall:** | **20 – 148** | **19.26 – 53.52** | **5.6 – 19.2** |

Some of this variation, however, is the result of actual differences between units or cities, or between easily changeable assumptions (e.g., the capitalization rate used in affordability gap calculations) that different firms adopt. Thus, in order to discern the actual inter-firm variation resulting from an inconsistent methodology, I had to control for as many of these legitimate differences as possible. The methodology detailed below represents my attempt to do just that. After controlling for differences between units and cities and for minor assumptions, there is still a great deal of variation between the outputs of the RNAs studied.

[31] This is because private mortgage insurance can increase monthly housing outlays significantly. For example, a $300,000 loan with a 10% down payment could incur a monthly mortgage insurance premium of $117. See Colquitt & Slawson.

### 3.3.1. Methodology

Using the assumptions, calculations, and actual data (e.g., the estimated affordability gaps) detailed in the seven target RNAs, I was able to reverse engineer two Excel-based models—one for studying inter-firm variation and the other for studying intra-firm variation. Each of these models use the same general formulas employed by each firm, such that entering the raw data from that firm's RNA will produce an output (including job and household creation estimates by income level and maximum in-lieu fees) essentially identical to the firm's, and entering different raw data will produce a proportionally different output. Thus, by equalizing a value that varies between the RNAs (e.g., the initial income infusion from market rate household production), I was able to control for the variation generated by differences in that value. For a more complete picture of the models' respective structures and capabilities, see the actual Excel models used in **Electronic Addendum B**.

### 3.3.2. Findings: Inter-Firm Variation

After controlling for expected inter-unit differences such as (1) income per market rate unit,[32] and (2) affordability gaps[33] as well as minor assumptions such as (3) capitalization rate (4) workers per household, and (5) target income level (i.e., AMI categories), the following inter-firm variation remained:

***Figure 6. Inter-Firm Variation Despite Controls***

| *Controls: Income by Market-Rate Unit, Affordability Gaps, Capitalization Rate, Workers per Household, and Target Income Level (0-80% of AMI)* | **Low (Firm)** | **Middle (Firm)** | **High (Firm)** | **Low-High Change** |
|---|---|---|---|---|
| **Total Jobs Created** | 27.1 (EPS) | 33.1 (KMA) | 49.1 (BAE) | 83.56% |
| **Lower-Income Households Created** | 10.0 (BAE) | 11.8 (KMA) | 12.4 (EPS) | 19.51% |
| **Maximum In-Lieu Fee Supported** | 25,041 (BAE) | 29,478 (KMA) | 31,112 (EPS) | 19.51% |
| **Lower-Income Households as a Percentage of Total Households** | 35% (BAE) | 60% (KMA) | 78% (EPS) | 55.12% |

**A. Total Jobs Created.** While the actual source of this variation is unclear, the low-high distribution—EPS to KMA to BAE—could potentially be explainable by the differences in (1) calculation methods and (2) jurisdictional scope assumptions described in **Section 3.2.2** above. For example, EPS's use of a proprietary model that considers only direct job creation effects (while the other firms employ a commercial model that considers both direct and indirect effects) might pull its job creation estimate below those of the other firms, while BAE's assumption of a nine-county jurisdictional scope might push its job creation estimate above KMA's (since KMA assumes a single-county jurisdictional scope).

**B. Lower-Income Households Created.** The actual source of this variation is also unclear, but it could potentially be explained by differences in the specificity of data sources as described in **Section 3.2.2** above: The lowest estimate (BAE's) uses national-level industry and wage

[32] Since this would vary based on unit-specific characteristics, I used each firm's estimate for 2-bedroom rental units and equalized their income infusion estimates (i.e., the amount of discretionary income each firm estimated would flow into the local economy due to the construction of a 2-bedroom rental unit).
[33] which would vary between cities due to differences in real estate values

distributions from the Public Use Micro-Data Set, while the higher estimates (KMA's and EPS's) use county-specific data from sources like the California Employment Development Department and the Economic Census. To the extent that there is greater income disparity in California than in the country at large, this variation makes sense.

C. **Maximum In-Lieu Fee Supported.** Since (1) firms calculate maximum in-lieu fees by multiplying the number of lower-income households by the affordability gap and (2) this analysis held affordability gaps constant (i.e., set them all at $250,000 per unit), this variation could potentially be explained by the same data source issues described in the paragraph above.

D. **Lower-Income Households (0-80% of AMI) as a Percentage of Total Households.** While a small portion (i.e., 19.51%) of this substantial variation (55.12%) could potentially be explained by the data source issues described in the two paragraphs above (i.e., increasing data specificity increases lower-income household estimates), the balance of this variation (55.12% - 19.51% = 35.61%) remains unexplained.

### 3.3.3. Findings: Intra-Firm Variation

After comparing five recent KMA reports[34] (controlling for income per market rate unit, affordability gaps, etc.), most of the variation between the reports is cancelled out. Any remaining variation is likely the result of differences between various counties, particularly since the controlled estimates from the two reports covering different cities within the same county are nearly identical.

*This space is intentionally left blank.*

[34] i.e., those completed for Fremont, Hayward, Napa County, Solana Beach, and Walnut Creek

# 4. Overall Evaluation: Issues and Potential Impacts

Overall, this effort has uncovered a set of universal issues common among all (or nearly all) of the RNAs studied that call into question the accuracy of the methodology as a whole **(4.1)** and a set of issues arising out of an abundance of inter-firm variation—in assumptions and data sources, but also in vital calculations—the prevalence of which challenge the existence of an industry standard, or even generally accepted principles, for residential nexus analysis **(4.2)**.

## 4.1. Universal Issues

Before describing these specific issues in detail, it is important to briefly discuss what they underscore about the RNA methodology in general. First, to the extent that there is a discernable RNA methodology,[35] it has not been validated by means typically used to validate quantitative methodologies in the social sciences, such as real-world hypothesis testing or peer review. The various firms' housing percentage and fee estimates are products of hypotheses about the causal relationship between market-rate housing supply increases and affordable housing demand increases (and, in turn, the amount of subsidy required to fill that demand). Usually, such hypotheses are tested using real-world data—that is, testing whether an increase in the relevant supply stimulates the relevant demand to the extent hypothesized.[36] The results of this testing are then subjected to a peer review process during which other researchers review the testing methodology and suggest ways to improve it.[37] Here, the literature and nexus report reviews have shown no evidence that the firms in question (or any other researchers) have done either of these things.[38] In fact, the research has not uncovered anything, other than consulting firms' own endorsement of their respective results, indicating that the firms' estimates are accurate. However, as discussed throughout this and the following section, it *has* uncovered substantial evidence to the contrary.

Also, the inclusionary percentages and in-lieu fees estimated by the various firms are sensitive to changes in assumptions, calculations, and data sources most of which seem to err on the side of inflating these estimates. Thus, as discussed below, adopting any one of several more reasonable assumptions, calculations, or data sources could result in a significant reduction in these estimates (e.g., in-lieu fee reductions between 22% and 96%).

These universal issues and their potential impacts on relevant estimates are as follows:

**A. Overly Broad Jurisdictional Scope.** In addition to the wide inter-firm variation in jurisdictional scope discussed in **Section 4.2(A)** below, it should be noted that all of the RNAs studied estimate job creation effects in what could be considered an overly broad jurisdictional area. Arguably, RNAs should help a jurisdiction determine the affordable housing need generated *within its jurisdictional boundaries*. For this to be true given the city RNAs studied, (1) all jobs created in the county (or, in some cases, even the region) would have to be located in the individual city and (2) all jobs created in the city would have to create new households in the city.

[35] a claim rendered doubtful by the abundance of inter-firm variation discussed in **Section 4.2** below

[36] Moreover, in order to be considered valid, the results of any such testing must be replicable by other researchers. See MacCoun, 265, 277.

[37] Id.

[38] However, at least one firm (EPS) has previously certified the work of another (KMA) as "industry standard." See http://www.ci.sanmateo.ca.us/DocumentView.aspx?DID=1791.

Yet, neither is likely true. (1) is probably false because some of the jobs generated—particularly those generated by indirect and induced impacts—are likely to be located outside of the city. (2) is probably false due to the existence (and abundance) of two groups: the unemployed and commuters. That is, presumably, some of the jobs created will be filled by people looking for work, and many others will be filled by people who live outside the city and commute in for work. Even BAE acknowledged this second point when, in a report drafted for a Florida county, it discounted the number of estimated lower-income households based on commuting rates.[39]

While some might argue that the city is justified in mitigating externalities generated elsewhere in the county by development within its borders, it is important to consider the consequences of this theory. Specifically, assuming such an action was legal, accurately accounting for affordable housing demand generated in other jurisdictions would require cities to (1) consider the affordability gaps common in those jurisdictions[40] and (2) disburse fee revenues to those jurisdictions to mitigate those effects. Since cities do not do (1), they are currently charging developers to mitigate the wrong demand effects. Since they do not do (2), they are likely overcharging developers (and, by extension, new homeowners) for in-lieu fees.

> Potential Impacts: Reducing the percentage of jobs generated in a jurisdiction by, for example, accounting for unemployment and/or commuting would reduce total household and thus lower-income household estimates by a significant amount. For example, accounting for the fact that "56% of Berkeley jobs are filled by 36,000 people who commute from residences outside the City of Berkeley"[41] would reduce the per unit in-lieu fee BAE estimated for a two-bedroom unit in Berkeley from $20,038 to $15,631, a 22% reduction.[42]

**B. Unreliable Affordability Gap Estimates.** Firms' affordability gap estimates are unreliable for several reasons. Most importantly, as discussed in the **Section 4.1(A)** above, they do not account for differences in affordability gaps for units created in neighboring jurisdictions also covered by RNA job creation estimates.

Also, not only did each of the firms estimate affordable housing development using different methods, but each of these methods was questionable. As discussed in **Section 3.2.2(D)** above, KMA used unreliable market-rate rent estimates, EPS used potentially inflated pro forma figures, and BAE used a generic figure from the city's housing element.

> Potential Impacts: The affordability gap estimates in the RNAs studied are likely inflated, and thus the maximum in-lieu fee estimates generated using these figures are likely inflated as well. For example, using "fair market rent" figures generated by the US Department of Housing and Urban Development, instead of the figures consultants

[39] "While new commercial development in Pinellas County is linked to additional employment, not all employees working in new buildings will actually live inside the county, whether for personal, economic, or other reasons. According to the 2000 U.S. Census, 13.3 percent of people who work in Pinellas County live outside the county. As shown in Table 11 above, this factor is used to adjust the gross number of new employees to a net number of new employees expected to demand housing in Pinellas County. This is a conservative assumption that helps avoid the possibility of overstating new household demand in Pinellas County associated with new commercial development." Pinellas County Report, p. 39.

[40] which are likely lower since workers from the city conducting the analysis are choosing to locate there

[41] Nelson/Nygaard, 5-1.

[42] This result is achieved by reducing by 56% the total jobs creation figure of 48.7 from the Berkeley Report and equally distributing this discount across the five income categories identified in that report.

generated via an informal survey of local rents, would reduce the maximum in-lieu fees KMA calculated in the Fremont Report by 30%.[43]

**C. Statistically Improbable Lower-Income Household Percentages.** Both EPS and KMA estimate lower-income household percentages that are statistically improbably. EPS estimates that 78% of newly created worker households will earn less than 80% of area median income. Since (1) EPS estimates all jobs created from a particular income infusion across the entire income distribution and (2) by definition, 80% of values falling below a median represent the bottom 40% of that distribution, EPS's claim that 78% of newly created households fall in the bottom 40% of the income distribution is extremely improbable. Also, KMA's assertion that 60% of new households fall in the bottom 40% is at least questionable.[44]

Potential Impacts: Changes in this percentage have large multiplier effects. For example, reducing the percentage of lower-income households EPS estimated in the Mountain View RNA from 78% to 40% (the more likely figure based on area median income) would lower the estimated in-lieu fee by 96%.[45] Similarly, reducing the same value in the Fremont Report from 60% to 40% would lower that fee by 32%.[46]

**D. Use of Total Economic Impacts.** As discussed in **Section 3.2.2(A)** above, BAE and KMA both use total (direct + indirect + induced) economic impacts generated by IMPLAN. For a discussion of each type of impact, see the excerpt from the Berkeley Report in **Appendix H.**

Potential Impacts: Changing economic impact assumptions significantly affects job creation estimates. For example, KMA reported the following direct and total impacts in the Napa County Report: 26.9 direct jobs created, 46.6 total jobs created. Using only the direct impacts would have cut the estimated inclusionary percentage and in-lieu fee by nearly 50%.

### 4.2. Variation-Related Issues

The variation-related issues discussed below challenge the existence of an industry standard, or even generally accepted principles, for residential nexus analysis. As a result, it is very difficult for a consulting firm to argue convincingly that its particular brand of RNA is accurate or otherwise legally sufficient. The *Kelley/Frye* Doctrine, the dominant standard regarding admissibility of novel scientific evidence in California courts, is illustrative regarding this point. The doctrine is meant to keep "junk science" or methodologies that have not been properly vetted from being used to bolster legal arguments. To this end, it requires "a preliminary showing of general acceptance of the new technique in the relevant scientific community" before it can be offered as evidence.[47] The fact that reasonable

[43] The 2009 monthly fair market rent for a two-bedroom apartment in Fremont was $1,295. Thus, the capitalized cost of such a unit (using KMA's assumption of a 6.5% cap rate) is $239,076.92, a figure significantly lower than the $308,000 KMA estimated. Using that lower figure to calculate the affordability gaps results in a per-unit fee of $22,986 (rather than KMA's $32,799 fee).
[44] However, some of the variation between the 40% expected value and the 60% projection is likely due to the fact that, unlike EPS's proprietary model, the IMPLAN model employed by KMA determines the type of jobs that will be created based on the project type (e.g., construction). This could account for some increase in the proportion of lower-income households.
[45] Changing the number of households earning 0-80% of AMI from 18.0 to 9.2 would change the maximum estimated in-lieu fee for two-bedroom rentals from $50,212 to $25,622 per unit, a 96% reduction.
[46] Changing the number of households earning 0-80% of AMI from 14.2 to 10.8 would change the maximum estimated in-lieu fee for two-bedroom rentals from $32,799 to $24,926 per unit, a 32% reduction.
[47] Fridman & Janoe.

firms differ so widely on key methodological issues and that these differences lead to vastly disparate final estimates is an indication these estimates cannot be trusted. How can there be "general acceptance" of a methodology for completing RNAs when firms cannot even agree on the four fundamental issues discussed below?[48]

**A. Wide Range of Jurisdictional Scopes.** As discussed in **Section 3.2.2(A)** above, the range of jurisdictional scopes used by the firms studied varies from a county-level scope, to a regional scope, to an all-inclusive scope.

> Potential Impacts: Small changes in jurisdictional scope translate to large changes in RNA job creation estimates and, in turn, inclusionary percentages and in-lieu fees. For example, including in Hayward's affordable housing demand calculation a single household that was actually created in another city or county would increase the maximum fee KMA estimates for a two-bedroom condo in Hayward by 8%, or more than $2,300.[49]

**B. Inconsistent Affordability Gap Estimation Methodology.** As discussed in Section **3.2.2(D)** above, each firm uses radically different assumptions, calculations, and data sources to determine affordable unit development costs and thus affordability gaps.

> Potential Impacts: Because of the way in-lieu fees are calculated (i.e., by multiplying lower-income household numbers by affordability gaps), a one-dollar difference in an affordability gap estimate translates to a multi-dollar difference in an in-lieu fee estimate. For example, increasing the affordability gap estimate for 0-80% AMI households in the Mountain View RNA by one dollar increases the estimated in-lieu fee by eighteen dollars.

**C. Inconsistent Job Creation-Related Calculations, Assumptions, and Data Sources.** As discussed in **Section 3.2.2(A)** above, all three firms use different assumptions, calculations, and data sources to estimate the income distribution of new worker households.

> Potential Impacts: As discussed in **Section 3.3.2(B-C)** above, the variation in data sources may very well be driving significant variation in inclusionary percentage requirements and in-lieu fees. For example, even after controlling for differences between cities and unit types, there is a 19.51% difference between the maximum supported in-lieu fees in the Berkeley Report (BAE) and those in the Mountain View Report (EPS).

**D. Inconsistent Lower-Income Household Percentages.** Finally, as discussed in **Section 3.3.2(D)** above, there is a great deal of unexplained inter-firm variation related to the percentage of lower-income households (i.e., those earning 0-80% of AMI) among newly created households.

> Potential Impacts: As discussed in **Section 4.1(C)** above, changing this percentage has large multiplier effects.

[48] Note that this list is a distillation of multiple variation-related issues discussed in greater detail in **Sections 3.2.2** and **3.3.2**.
[49] Changing the number of households in the 0-50% AMI category from 7.0 to 8.0 increases the maximum estimated fee for a two-bedroom rental by $2,325.

## 5. Conclusion

To date, the use of residential nexus analysis in support of California's inclusionary housing ordinances has yielded highly questionable results. In general, the methodology is untested and has not been vetted by peer review. Consequently, there is no evidence, other than consulting firms' own endorsement of their respective results, that the relevant estimates are accurate.

Moreover, several issues common among residential nexus analyses call into question the accuracy of the methodology as a whole. Estimates by the various firms are sensitive to minor changes in assumptions, calculations, and data sources, most of which seem to err on the side of inflating inclusionary percentages and in-lieu fees. Thus, adopting more reasonable assumptions, calculations, and data sources leads to significant reductions in these estimates.

Finally, the abundance of variation between different firms' interpretation of the methodology (e.g., the assumptions each firm chooses to employ at critical stages of the process) challenges the existence of an industry standard, or even generally accepted principles, for residential nexus analysis. This makes it very difficult for a consulting firm to argue convincingly that its particular brand of residential nexus analysis is accurate or otherwise legally sufficient.

In my opinion, residential nexus analysis, as it has been applied in California to date, is an unreliable means of demonstrating the effects of market-rate residential development on the demand for affordable housing and of justifying the inclusionary housing percentage requirements and in-lieu fees purported to mitigate these effects.

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## Appendix A: Nexus Reports and Firms

(PDFs of each report are included in **Electronic Addendum A**)

| Type | Month/Year | Location | Firm | URL |
|---|---|---|---|---|
| RNA | 04/2011 | Mountain View, CA | EPS | http://www.ci.mtnview.ca.us/civica/inc/displayblobpdf2.asp?BlobID=8221 |
| RNA | 08/2010 | Solana Beach, CA (Draft) | KMA | http://www.ci.solana-beach.ca.us/csite/cms/app_engine/assets/images/cd_affordable%20housing%20nexus%20fee%20study%20public%20review%20draft.pdf |
| RNA | 06/2010 | Berkeley, CA | BAE | http://www.ci.berkeley.ca.us/uploadedFiles/Clerk/Level_3_-_City_Council/2010/06Jun/2010-06-29_Worksession_Item_02_Affordable_Housing_Policy_Impact_Fee_Nexus_Study.pdf |
| RNA | 06/2010 | Walnut Creek, CA (Draft) | KMA | http://www.walnut-creek.org/civica/filebank/blobdload.asp?BlobID=5378 |
| RNA | 04/2010 | Fremont, CA | KMA | http://www.fremont.gov/DocumentView.aspx?DID=3720 |
| RNA | 04/2010 | Hayward, CA | KMA | http://www.cityofhayward-ca.gov/news/pdf/2010/001-002%20-%20Hayward%20Nexus%20Final.pdf |
| CNA | 10/2010 | San Diego, CA | KMA | http://www.sdhc.net/uploadedFiles/Special_Housing_Programs/Final%20Housing%20Impact%20Fee%20Nexus%20Study%2011-2-10[1].pdf |
| RNA | 11/2009 | Napa County, CA | KMA | http://www.google.com/url?sa=t&source=web&cd=11&ved=0CBkQFjAAOAo&url=http%3A%2F%2Fservices.countyofnapa.org%2FAgendaNet%2FDownloadDocument.aspx%3Ftype%3DPlanningAgenda%26doctype%3DATTACHMENT%26id%3D15957&ei=2Ja5TbaSDIe-sQP3msn1Bw&usg=AFQjCNGmpP1C7LoFdD9GqdeZILD5ieHi3w&sig2=apjhT-UDU-jUt6fz4dUCAA |
| RNA | 02/2008 | Bainbridge Island, WA | KMA | http://www.ci.bainbridge-isl.wa.us/documents/pln/housing/nexus_study_feb2008.pdf |
| CNA | 01/2008 | Eagle County, CO | RRC | http://www.economiccouncil.biz/doc/toc.asp?assn_id=12818&link_id=78670 |
| Both | 07/2007 | Pinellas Co., et. al., FL | BAE | http://www.pinellascounty.org/community/pdf/nexus.pdf |
| RNA | 04/2007 | San Francisco, CA | KMA | http://www.sf-planning.org/Modules/ShowDocument.aspx?documentid=8380 |
| CNA | 03/2006 | Sacramento, CA | KMA | http://www.cityofsacramento.org/dsd/planning/long-range/housing/documents/HTF-Nexus-Study_final_3-30-06.pdf |
| Both | 02/2006 | Calabasas, CA | SRH | http://www.cityofcalabasas.com/pdf/agendas/council/2006/040506/item13-d.pdf |
| RNA | 07/2005 | Seattle, WA | KMA | ftp://ftp.ci.austin.tx.us/housing/Affordable%20Housing%20Task%20Force/8-28-06%20meeting/Seattle%20Final%20Residential%20Nexus%20Study.pdf |
| CNA | 07/2005 | Barnstable Co., MA | DC | http://www.capecodcommission.org/housing/CCCNexusStudy.pdf |
| CNA | 12/2004 | Walnut Creek, CA | KMA | http://www.snrpc.org/WorkforceHousing/Development/Jobs_Housing_Nexus_Study_Walnut_Creedk.pdf |
| CNA | __/2003 | San Mateo, CA | KMA | http://www.ci.sanmateo.ca.us/DocumentView.aspx?DID=1791 |
| CNA | 08/2003 | St. Helena, CA (Summary) | KMA | http://ci.st-helena.ca.us/images/city/Docs/Inclusionary_Housing_9-14.pdf |
| CNA | 06/2003 | Long Beach, CA | DPR | http://www.lbhdc.org/span/pdf/HTFIV.pdf |
| CNA | 05/2003 | Martha's Vineyard, MA | DC | http://www.mvcommission.org/doc.php/Nexus%20Study%20-%20Final%20Report.pdf?id=199 |
| CNA | __/2003 | Marin Co., CA (Summary) | DPR | http://www.co.marin.ca.us/depts/BS/Main/BOSagmn/ordinances/ord-3393.pdf |
| CNA | 12/2001 | Sonoma County, CA | EPS | http://www.epsys.com/Client_Site/10310sonoma/10310rpt4.pdf |
| CNA | 09/2001 | Oakland, CA | DPR | http://www.oaklandnet.com/government/hcd/policy/docs/linkage_study.pdf |

## Appendix A (continued)

| Firms | | |
|---|---|---|
| BAE | Bay Area Economics | www.bayareaeconomics.com |
| DC | Development Cycles | n/a |
| DPR | David Paul Rosen & Associates | www.draconsultants.com |
| EPS | Economic and Planning Systems, Inc. | www.epsys.com |
| KMA | Keyser Marston Associates, Inc. | www.keysermarston.com |
| RRC | RRC Associates | www.rrcinfo.com |
| SRH | Stanley R. Hoffman Associates | www.stanleyrhoffman.com |

## APPENDIX B: Review Queries by Database/Search Engine

| **EBSCOhost**<br>*search.ebscohost.com* | **Google (Literature Review)**<br>*www.google.com* | **Google (Nexus Analysis Review)**<br>*www.google.com* |
|---|---|---|
| Residential AND Nexus AND Analysis<br>Residential AND Nexus AND Study<br>Housing AND Nexus AND Analysis<br>Housing AND Nexus AND Study<br>Jobs AND Housing AND Nexus<br>Jobs AND Affordable AND Housing AND Nexus<br>Jobs AND Affordable AND Housing AND Linkage<br>Development AND Linkage AND Fee<br>Housing AND Linkage AND Fee<br>Linkage AND Fee<br>IMPLAN | Residential Nexus Analysis<br>Residential Nexus Study<br>Jobs Housing Nexus<br>Jobs Affordable Housing<br>Nexus Analysis<br>Nexus Study<br>Development Linkage Fee<br>Housing Linkage Fee<br>IMPLAN<br>Inclusionary Housing California | Residential "Nexus Analysis"<br>Residential "Nexus Study"<br>Economic Study of Affordable Housing Need "Jobs Housing Nexus"<br>Housing "Nexus Analysis"<br>Housing "Nexus Study"<br>Commercial "Nexus Analysis"<br>Commercial "Nexus Study"<br>Commercial Development Linkage Fee<br>"Jobs Housing Linkage Fee"<br>Affordable Housing Linkage Fee<br>Workforce Housing Linkage Fee |
| **Google Scholar**<br>*scholar.google.com* | **ISI Web of Knowledge**<br>*apps.isiknowledge.com* | **Social Science Research Network**<br>*www.ssrn.com* |
| Residential "Nexus Analysis"<br>Residential "Nexus Study"<br>"Jobs Housing Nexus"<br>"Housing Nexus"<br>Development "Linkage Fee"<br>IMPLAN | Residential Nexus Analysis<br>Residential Nexus Study<br>Jobs Housing Nexus<br>Jobs Affordable Housing<br>Nexus Analysis<br>Nexus Study<br>Development Linkage Fee<br>Housing Linkage Fee<br>IMPLAN | Residential Nexus Analysis<br>Residential Nexus Study<br>Jobs Housing Nexus<br>Housing Nexus<br>Jobs Affordable Housing<br>Nexus Analysis<br>Nexus Study<br>Development Linkage Fee<br>Linkage Fee<br>IMPLAN |

# Appendix C: Inter-Firm Comparison of RNA Methodology

| | KMA | BAE | EPS | Notes |
|---|---|---|---|---|
| **I. Afford. Housing Demand** | ↓ | ↓ | ↓ | ↓ |
| **A. Stimulus Estimate** | | | | |
| 1. Market-Rate Prototypes | Own: Citywide Survey (p. 14)<br>Rent: Citywide Survey (p. 14) | N/A | N/A | While KMA creates prototypes of market-rate units likely to be built in the city, neither BAE nor EPS does so. |
| 2. Market-Rate Unit Prices | Own: Citywide Survey of 14 projects (p. 14)<br>Rent: Citywide Survey of 8 projects (p. 15) | Own: N/A (p. 16)<br>Rent: Citywide survey of 4 projects (p. 16); average of 1-2 bedroom, 1 bath units (p. 33) | Own: Posited (p. 12)<br>Rent: Citywide survey of 3 projects (p. 14); [Annual Rent – (Operating Expenses + Taxes)]/Cap rate (p. 14) | BAE did not address ownership units in the RNA reviewed. Also, while KMA and BAE estimate prices of new market rate ownership units based on actual developments in the city, EPS simply generates posited values for comparison. |
| 3. Market-Rate Household Income | Own: HH Income x .35 = Mortgage [30yr, Prevailing Rate, fixed, 20% down] + Maintenance or HOA + Taxes + Insurance (p. 16)<br>Rent: HH Income x .30 = Rent - Utilities (p. 17) | Own: N/A<br>Rent: HH Income x .30 = Rent + Utilities (p. 16) | Own: HH Income x .35 = Mortgage [30yr, Prevailing Rate, fixed, 20% down] + Maintenance or HOA + Taxes + Insurance (p. 16)<br>Rent: HH Income x .30 = Rent + Utilities (p. 17) | KMA calculates household incomes based on 30% of rent *excluding* utilities, while BAE and EPS calculate these incomes based on 30% of rent *including* utilities. As a result, given equal rents, KMA's estimates of market rate household income are slightly higher than those of BAE and EPS. |
| 4. Market-Rate Household Spending | IMPLAN: HH Disposable Income = Household Income - Income Taxes (State & Federal) - Medicare & Social Security Taxes - Personal Savings (p. 26) | → (Presumed) | MRHH expenditures by income level from the 2008 Consumer Expenditure Survey (pp. 15-16) | KMA and presumably BAE (though it is unclear from the report reviewed) both use IMPLAN to estimate disposable income (and thus household spending) for market rate households, but EPS extrapolates this information from the Consumer Expenditure Survey ("CES") published by the Bureau of Labor Statistics instead. |
| **B. Jobs Estimate** | HH Spending → IMPLAN Model for County→Total Jobs by Industry Sector (p. 26) | HH Spending → IMPLAN Model for 9-County Region→Total Jobs by Industry Sector (p. 17) | For each industry, Jobs = [(MRHH Income x CES % Spending per HH) / Economic Census Gross Receipts to Wages] / Economic Census Avg. Wage (pp. 16-17) | While KMA and BAE both use IMPLAN to calculate jobs created, EPS (1) uses the CES to determine the percentage of household income spent within industry sectors, (2) converts those expenditures into wages using a gross-receipts-to-wages ratio from the Economic Census ("EC"), and (3) converts industry wages into jobs using EC average wage data. |

| Appendix C (continued) | KMA | BAE | EPS | Notes |
|---|---|---|---|---|
| **C. Households Estimate** | Total Jobs/Average Workers per Household in County according to 2008 ACS (p. 29) | (p. 19) | (p. 17) | |
| **D. Lower-Income Households Estimate** | | | | |
| 1. Occupational Distribution | Match industry sectors on IMPLAN output to national NAICS job codes/distribution from 2008 OES (p. 29) | BAE does not consider occupation-level income; instead, it considers income by industry sector. (19-20) | CES % Spending per HH (p. 16) | KMA distributes newly created jobs across industries at the job level, while BAE simply computes distributions at the industry level. As described in (I-B) above, EPS bases the occupational distribution of new households on Consumer Expenditure Survey data. |
| 2. Income Distribution | Match NAICS job codes with county wage and salary data from California Employment Development Dept. (p. 30) | Match industry sectors on IMPLAN output to national income distribution by industry from 2000 PUMS (pp. 19-20) | Economic Census Avg. Wage (County) (p. 16) | All three firms use different data sources to calculate the income distribution of the worker households generated. |
| 3. Household Size | Estimate workers per household by household size w/ 2008 countywide ACS data (p. 30) | (p. 20) | (p. 17) | |
| 4. No. of Lower-Income Households | Compare data on number, income distribution, and size of newly created households with City's inclusionary housing criteria (p. 30) | (p. 19) | (p. 18) | |
| **II. Affordability Gaps** | | | | |
| **A. Affordable Housing Development Costs** | Own: Price of MR unit (49)<br>Rent: (Ann. MR rent - $7,000 opp. exp.) x Cap Rate (p. 65) | Own: N/A<br>Rent: Assume cost based on the City's housing element (p. 22) | Own: Land Costs + Construction Costs (p. 8)<br>Rent: Land Costs + Construction Costs (p. 9) | Each firm uses different methods to determine affordable unit development costs. KMA uses market-rate prices (from a survey) for ownership units and a Net Operating Income x Cap Rate formula for rental units. BAE, which only analyzes rental units, uses development costs from the city's housing element (which cannot be found using BAE's citation). EPS uses a pro forma method that produces cost estimates (for rental units) significantly higher than the capitalized cost of units surveyed earlier. |

| Appendix C (continued) | KMA | BAE | EPS | Notes |
|---|---|---|---|---|
| 1. Unit Type | Same as market-rate units: 0-80% AMI = Apartment; 81-120% AMI = Townhome (p. 65) | Unknown (because it is unclear from the report what type of unit the city uses to calculate affordable housing development costs) | Own: High-density, multi-family development; 2-bedroom units (p. 7)<br>Rent: Same | While KMA bases affordable unit cost estimates on the values of the market-rate units estimated earlier in the analysis, EPS instead creates a rough pro forma based on generalized cost estimates. |
| **B. Max. Lower-Income Household Contribution** | Own: If HOA <$250/mo., then 3.5 x 110% AMI; If HOA >$250/mo., then Income x .35 = Mortgage [30yr, 5.5%, fixed, 20% down] + Maintenance or HOA + Taxes + Ins. (p. 63)<br>Rent: HH Income x .30 = Rent + Utilities (p. 64) | Own: N/A<br>Rent: HH Income x .30 = Rent (p. 22) | Own: Income x .35 = Mortgage [30yr, 6.0%, fixed, 10% down] + HOA + PMI + Taxes + Ins. (p. 10)<br>Rent: Rent: HH Income x .30 = Rent + Utilities (p. 10) | The most important difference here involves household contributions for ownership units. Specifically, KMA assumes 20% down and no private mortgage insurance, while EPS assumes 10% down and mortgage insurance. As a result, holding all other factors constant, the maximum household contribution estimated by EPS would be significantly lower than KMA's, and thus its affordability gap estimates would be higher. |
| **C. Gap Calculation** | Gap = Affordable Development Cost - Max. Contribution (p. 65) | Gap = Affordable Development Cost - Maximum Loan Amount [i.e., Max. Contribution - (Max. Contribution x .35) - (Max. Contribution x .5) ] (p. 22) | Gap = Affordable Development Cost - Max. Contribution (p. 10) | **Instead of calculating the gap between affordable housing development cost and maximum lower-income household contribution (like the other firms), BAE calculates the difference between maximum affordable loan amount and maximum lower-income household contribution. If the city calculates affordable housing development costs based on actual land acquisition and construction costs (Like EPS), then this difference has no practical significance. If, however, the city equates construction cost with capitalized value (like KMA), then BAE is double counting the 35% and 5% allowances for operating expenses and vacancy, respectively. This would increase the size of the gap and, consequently, the maximum in-lieu fee. Since EPS's citation to Berkeley's housing element is incorrect, however, it is unclear at this time which method the city uses.** |
| **III. Maximum In-Lieu Fee** | For each income level, Lower-Income Households x Affordability Gap (p. 65) | For each income level, Lower-Income Households x Affordability Gap (p. 23) | For each income level, Lower-Income Households x Affordability Gap (p. 21) |  |
| | | | | |

## Appendix D: Detailed Analysis of the Fremont Report

(Excerpt: Memo from Adam Cray to the Berkeley Program on Housing and Urban Policy, 14 August 2010)

### 1. Estimate Sale/Rental Prices for New Market-Rate ("MR") Units

KMA begins by selecting prototypical unit types and estimating the prices each would garner if sold or rented in the current market. It bases these selections and estimates on a "survey of residential units sold or recently marketed throughout the City" and on "input from City staff."[50] For the Fremont Report, KMA identified the following prototypes and associated prices:

| *Summary of Prototypes* | | | | | |
|---|---|---|---|---|---|
| | *Large Lot SFD* | *SFD* | *Townhomes* | *Condominiums* | *Rental* |
| Avg. Unit Size | 2,500 sf | 2,000 sf | 1,500 sf | 1,300 sf | 850 sf |
| Avg. No. of Bedrooms | 4 bedrooms | 3 bedrooms | 3 bedrooms | 2 bedrooms | 2 bedrooms |
| Avg. Rent/Sales Price | $750,000 | $680,000 | $540,000 | $500,000 | $2,230/mo. |
| Avg. Rent/Sales Price per sf | $300 | $340 | $360 | $385 | $2.62 |

**NB**: "SFD" stands for "Single-Family Detached"

### 2. Estimate Annual Gross Income for Households Occupying New MR Units

KMA estimates annual gross income for the households occupying each of the unit types identified above by dividing the annual housing costs per unit by the percentage of income KMA assumes households are spending on housing-related costs: 30% for renters and 35% for owners.[51] For ownership units, KMA calculates annual housing costs as an estimated annual mortgage obligation—assuming 20% down, a 5.50% fixed interest rate, and 30-year amortization—*plus* other costs, including estimated annual "HOA Dues/Maintenance" and annual property taxes equal to 1.11% of sales price.[52] For the annual cost of rental units, KMA simply sums the estimated monthly rent. Based on these calculations and assumptions, KMA derived the following incomes for households occupying the prototype units in Fremont:

| *Household Income* | | | | | |
|---|---|---|---|---|---|
| | *Large Lot SFD* | *SFD* | *Townhome* | *Condominium* | *Rental* |
| Gross Household Income | $153,000 | $138,000 | $110,000 | $104,000 | $89,000 |

[50] p. 14.

[51] p. 17.

[52] pp. 16-17.

### 3. Estimate Annual Disposable Income for Households Occupying New MR Units

In order to convert its estimate of "new" gross household income (Step 2) to an estimate of total jobs created (Step 5), KMA employs the IMPLAN Model. The Fremont Report explains the initial stage of this process as follows: "The IMPLAN Model first converts household income to disposable income by accounting for State and Federal income taxes, Social Security and Medicare (FICA) taxes, and personal savings."[53] As this statement is the extent of the explanation KMA provides regarding Step 3, any further inquiries about specific calculations and assumptions presumably should be directed to the Minnesota IMPLAN Group, Inc., the company that supports the model software.

This is, however, a good time to identify an assumption that underlies all of KMA's estimates, including those generated by the IMPLAN Model—the "Net New Underlying Assumption."[54] In short, KMA's analysis assumes that every market-rate unit created in Fremont introduces new income into Fremont equal to the household income of the family occupying the new unit.

### 4. Estimate New Households' Average Annual Expenditures on Goods/Services

After determining disposable income, the IMPLAN Model "distributes spending among various types of goods and services (industry sectors) based on data from the Consumer Expenditure Survey and the Bureau of Economic Analysis Benchmark input-output study."[55] As in Step 3, the precise calculations and assumptions the IMPLAN Model employs—in this case, to convert new disposable income to new expenditures by industry sector—are not clear from KMA's report.

### 5. Estimate Number of Jobs Created by New Average Annual Expenditures

Finally, by means equally as unclear as those employed in the two previous Steps, the IMPLAN Model calculates the number of jobs generated by the addition of every 100 households exhibiting the average annual expenditures calculated in Step 4.[56] KMA then breaks these figures down by housing prototype:

| *Jobs Generated per 100 Units* | | | | | |
|---|---|---|---|---|---|
| | *Large Lot SFD* | *SFD* | *Townhome* | *Condominium* | *Rental* |
| Gross Household Income, per unit | $153,000 | $138,000 | $110,000 | $104,000 | $89,000 |
| Total Jobs Generated, 100 units | 61.8 | 57.5 | 45.8 | 43.3 | 37.2 |

[53] p. 26.

[54] p. 12.

[55] p. 26.

[56] *See* **[APPENDIX F]** for the IMPLAN Model's breakdown, by industry sector, of employment generated.

While most of the IMPLAN Model's underlying methodology is unclear from KMA's discussion, the report addresses one very important methodological issue that bears mention: The IMPLAN Model relies on a data set covering Alameda County as a whole. As a result, it estimates the total number of jobs generated in Alameda County—not just in Fremont—by the addition of 100 market-rate residential units.[57] As discussed in Section III(B)(1) below, this is important because KMA claims to be estimating developers' impact on Fremont and not on its neighbors.

### 6. Estimate Number of Households Created by New Jobs

KMA then estimates the number of worker households created by the new jobs identified in Step 5, dividing the number of jobs created per prototype (e.g., 61.8 for the first prototype category) by the average number of workers per worker household in Alameda County (1.57, according to 2006-2008 American Community Survey data):[58]

| | *Large Lot SFD* | *SFD* | *Townhome* | *Condominium* | *Rental* |
|---|---|---|---|---|---|
| Households Created per 100 New Jobs | 39.2 | 36.5 | 29.1 | 27.5 | 23.6 |

This calculation is based on an important assumption regarding the link between new jobs and new households; specifically, it assumes that all new jobs in Fremont help to create new households in Fremont. As discussed in Section III(B)(2) below, the prevalence of commuting and Fremont's high unemployment rate both cast considerable doubt on this assumption.

### 7. Estimate Occupational Distribution of Newly Created Households

Next, "[t]he IMPLAN output is paired with data from the Department of Labor, Bureau of Labor Statistics May 2008 Occupational Employment Survey (OES) to estimate the occupational composition of employees for each industry sector."[59] That is, KMA matches each general industry type from the IMPLAN output (*See* **[APPENDIX F]**) with several job types from the OES, distributing the newly created jobs among these job types based on a pro-rated version of national distribution data. This calculation depends on at least three crucial assumptions, all of which are identified in Section III(B)(4) below.

[57] p. 25.

[58] p. 29.

[59] Id.

### 8. Estimate Income Distribution of Newly Created Households

KMA translates jobs into income using "recent Alameda County wage and salary information from the California Employment Development Department"[60] and then compares these figures to the following area median income categories from the City's inclusionary housing ordinance:

| *2009 Income Limits* | | | | | | |
|---|---|---|---|---|---|---|
| | **Household Size (Persons)** | | | | | |
| | *1* | *2* | *3* | *4* | *5* | *6* |
| 50% of AMI | $31,250 | $35,700 | $40,200 | $44,650 | $48,200 | $51,800 |
| 80% of AMI | $46,350 | $53,000 | $59,600 | $66,250 | $71,550 | $76,850 |
| *Area Median Income* | *$62,500* | *$71,450* | *$80,350* | *$89,300* | *$96,450* | *$103,600* |
| 120% of AMI | $75,000 | $85,700 | $96,450 | $107,150 | $115,700 | $124,300 |

### 9. Estimate Size of Newly Created Households

In this step, KMA uses data on the distribution of household sizes in Alameda County, derived from the American Community Survey ("ACS"), to estimate the sizes of the newly created households in the inclusionary income categories.[61]

### 10. Estimate Number of New Households Meeting Inclusionary Housing Criteria

After estimating both the number and size of these new lower-income households, KMA calculates, for each of the prototypes, the number of total new households created at each of the inclusionary income levels:[62]

| *New Worker Households by Income Level per 100 Market Rate Units* | | | | | |
|---|---|---|---|---|---|
| | *Large Lot SFD* | *SFD* | *Townhome* | *Condominium* | *Rental* |
| Under 50% AMI | 14.4 | 13.4 | 10.7 | 10.1 | 8.7 |
| 50% to 80% AMI | 9.4 | 8.6 | 6.8 | 6.5 | 5.5 |
| 80% to 120% AMI | 8.4 | 7.7 | 6.1 | 5.8 | 5.0 |
| **Total, Less than 120% AMI** | **32.2** | **29.6** | **23.6** | **22.3** | **19.2** |
| Greater than 120% AMI | 7.0 | 6.6 | 5.3 | 5.0 | 4.4 |
| **Total, New Households** | **39.2** | **36.3** | **28.9** | **27.3** | **23.6** |

[60] p. 28.

[61] p. 30.

[62] p. 31.

### 11. Estimate "Supported Inclusionary Percentage"

Next, KMA calculates each prototype's "supported inclusionary percentage,"[63] the percentage of new units a city would be justified (from an impact perspective) to require a developer to set aside for lower-income households:

| *Supported Inclusionary Percentage – Cumulative Through* | | | | | |
|---|---|---|---|---|---|
| | *Large Lot SFD* | *SFD* | *Townhome* | *Condo* | *Rental* |
| 50% of Median Income | 12.6% | 11.8% | 9.6% | 9.2% | 8.0% |
| 80% of Median Income | 19.2% | 18.0% | 14.9% | 14.2% | 12.4% |
| 120% of Median Income | 24.3% | 22.9% | 19.1% | 18.3% | 16.1% |

The percentages above are calculated to include both market-rate and affordable units; for example, 14.4 affordable units per 100 market rate units (the top left figure in the table in Step 10) translates to a project of 114 units, and 14.4 affordable units *divided by* 114 total units *equals* 12.6% inclusionary units required (the top left figure in the table immediately above).

In the case of Fremont, KMA concluded that the City's inclusionary percentage requirements for new ownership units were justified because they required developers to set aside 15% of new units for households at or below 120% of AMI, a figure lower than the lowest supported inclusionary percentage at that income level (i.e., 18.3% for condominiums).[64] In the case of rental units, however, KMA employed the same logic and concluded that the City's inclusionary percentage requirements were not justified.[65]

### 12. Estimate "Affordability Gaps"

In order to assess in-lieu fees, KMA first calculates "affordability gaps" for each income level,[66] the difference between the estimated sale price of each prototype unit (termed "Development Cost" in the table below) and the maximum price households at the inclusionary income levels could be expected to pay (termed "Affordable Sale Price/Unit Value" in the table below).[67]

[63] Id.

[64] p. 32.

[65] Fremont's inclusionary program for rentals required developers to set aside 9% of units for households with incomes at or below 50% of AMI and 6% of units for households with incomes of 51-80% of AMI; both of these required reserves are higher than the supported inclusionary percentages at the relevant levels. Id.

[66] These calculations are explained on page 50, but the table is from page 69.

[67] Again, these calculations assume that households spend 30% of annual income to rent and 35% to own.

| *Affordability Gaps* | | | |
|---|---|---|---|
| *Unit Type* | *Affordable Sale Price/ Unit Value* | *Development Cost* | *Affordability Gap* |
| *For Nexus Analysis Mitigation Costs* | | | |
| Rental-Low Income | $96,000 | $304,000 | $208,000 |
| Rental-Very Low Income | $59,000 | $304,000 | $245,000 |
| Affordable Townhome (2BR) | $309,000 | $470,000 | $161,000 |
| *For In-Lieu Cost Equivalent to Current Onsite Requirements* | | | |
| Large Lot Single Family | $371,000 | $750,000 | $379,000 |
| Small lot Single Family | $344,000 | $680,000 | $336,000 |
| Townhomes (3BR) | $344,000 | $540,000 | $196,000 |
| Stacked Condominiums | $309,000 | $500,000 | $191,000 |

A few issues regarding both "Affordable Sale Price/Unit Value" and "Development Cost" bear mention. As for the former, KMA estimated maximum affordable costs and tenure types based on Fremont's inclusionary housing guidelines.[68] Consequently, only households earning 120% of AMI are assumed to own new units (rather than rent), and two-bedroom townhomes are the only prototype units these homeowners are assumed to occupy.[69] These guidelines set maximum sale prices and rent levels for lower-income households as follows:

| *Maximum Sales Prices and Rent Levels* | | | |
|---|---|---|---|
| *Income Group* | *Unit Tenure* | *Household Size* | *Maximum Housing Costs* |
| Under 50% AMI | Rental | 3 persons | $901 / month |
| 50% to 80% AMI | Rental | 3 persons | $1,102 / month |
| 80% to 120% AMI | Ownership | 3 persons | $309,000 |

"Development Cost" is based on KMA's "survey of residential units sold or recently marketed throughout the City"[70] and thus includes developer profit. For ownership units, KMA estimates this value using the average sale prices observed in the survey. For rental units, however, it converts the average rents observed into a capitalized value by assuming $7,000 in annual operating expenses per unit and a capitalization rate of 6.5%; these two assumptions are particularly important for reasons discussed in Section III(B)(5) below.

[68] p. 50.

[69] For this reason, the shaded figures in the "Affordability Gaps" table are not considered for the purpose of assessing in-lieu fees.

[70] *See* Step 1 above.

### 13. Estimate "Maximum Nexus per Market Rate Unit"[71]

Finally, KMA calculates the maximum in-lieu fee that the city could charge a developer by (1) multiplying the affordability gap for each inclusionary income level by the number of households created at that income level for every hundred new market-rate units and (2) summing the resulting values. For example, $245,000 (the affordability gap for "Very Low Income" households, those at or below 50% of AMI, from the table in Step 12) *times* 14.4% (the number of households at or below 50% of AMI per 100 Large Lot SFDs, from the table in Step 10) *equals approximately* $35,200 (the intersection of the "Very Low Income" and "Large Lot SFD" categories in the table below); summing these resulting values yields the "Total Nexus Costs" per prototype unit:

| ***Maximum Nexus Per Market Rate Unit*** | | | | | | |
|---|---|---|---|---|---|---|
| *Income Category* | *Affordability Gap* | *Large Lot SFD* | *SFD* | *Townhome* | *Condo* | *Rental* |
| Very Low Income | $245,000 | $35,200 | $32,800 | $26,100 | $24,700 | $21,200 |
| Low Income | $208,000 | $19,500 | $17,900 | $14,200 | $13,500 | $11,500 |
| Moderate | $161,000 | $13,600 | $12,400 | $9,800 | $9,300 | n/a |
| **Total Nexus Costs** | | **$68,300** | **$63,000** | **$50,200** | **$47,500** | **$32,800** |

Based on this analysis, KMA argues that—from an impact perspective—in-lieu development fees as high $68,300, or $27.32 per-square-foot,[72] are justified in Fremont.

[71] p. 51.

[72] "Should the City decide to pursue an impact fee on a per square foot basis, the *lowest* nexus cost per square foot is the ceiling under which the fee level can be set. For example, if the City wished to set one fee for all single family detached units, the fee should be set at less than $27.32, the total supported by the large single family detached unit." [emphasis in original] p. 52.

# Appendix E: Output from EPS Job Creation Estimate

Table A-1
Household Expenditures and Employment Generation - $250,000 Unit
City of Mountain View Nexus-Based Housing Fee, EPS #20063



| Item | % of Household Income Spent per Category [1] | % of Category Expenditure per Type of Business [2] | 2008 Expenditures [3] | 2002 Expenditures [4] | 2002 Expenditures per 1000 Households | Gross Receipts to Wages | 2002 Total Wages | 2002 Avg. Wage | # of Workers | Workers/ HH [5] | Total Worker HH | 2002 Avg. Worker HH Income |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Calculation* | *a* | *b* | *c* | *d* | *e = d * 1000* | *f* | *g = e / f* | *h* | *i = g / h* | *j* | *k = i / j* | *l = h * j* |
| **Food at Home [6]** | 6.7% | 100% | $4,208 | $3,645 | | | | | | | | |
| Food & Beverage Stores | | 100% | $4,208 | $3,645 | $3,645,472 | 8.50 | $428,642 | $29,583 | 14.5 | 1.57 | 9.2 | $46,440 |
| **Food Away From Home [6]** | 4.8% | 100% | $3,008 | $2,606 | | | | | | | | |
| Food Services and Drinking Places | | 100% | $3,008 | $2,606 | $2,606,130 | 3.28 | $793,676 | $14,388 | 55.2 | 1.57 | 35.1 | $22,587 |
| **Housing Maintenance, Repairs, Insurance, Other expenses** | 2.1% | 100% | $1,295 | $1,122 | | | | | | | | |
| Personal and Household Goods Repair and Maintenance [7] | | 45% | $583 | $505 | $504,758 | 3.36 | $150,394 | $25,154 | 6.0 | 1.57 | 3.8 | $39,487 |
| Building Material and Garden Equipment and Supplies Dealer | | 45% | $583 | $505 | $504,758 | 7.64 | $66,094 | $30,821 | 2.1 | 1.57 | 1.4 | $48,384 |
| Real Estate and Rental and Leasing | | 10% | $129 | $112 | $112,168 | 6.27 | $17,892 | $38,815 | 0.5 | 1.57 | 0.3 | $60,933 |
| **Fuel oil and Other fuels [8]** | 0.3% | | $188 | $163 | | | | | | | | |
| Nonstore Retailers [7] | | 100% | $188 | $163 | $162,855 | 7.92 | $20,558 | $39,199 | 0.5 | 1.57 | 0.3 | $61,536 |
| **Water and Other Public Services [8]** | 0.8% | 100% | $508 | $440 | | | | | | | | |
| Waste Management and Remediation Services [7] | | 100% | $508 | $440 | $440,073 | 4.15 | $106,101 | $39,830 | 2.7 | 1.57 | 1.7 | $62,526 |
| **Household Operations Personal Services** | 0.7% | 100% | $418 | $362 | | | | | | | | |
| Nursing and Residential Care Facilities [7] | | 40% | $167 | $145 | $144,922 | 2.24 | $64,562 | $21,795 | 3.0 | 1.57 | 1.9 | $34,214 |
| Social Assistance [7] | | 60% | $251 | $217 | $217,383 | 2.88 | $75,521 | $20,553 | 3.7 | 1.57 | 2.3 | $32,265 |
| **Household Operations Other Household Expenses** | 0.9% | 100% | $574 | $498 | | | | | | | | |
| Services to Buildings and Dwellings | | 100% | $574 | $498 | $497,713 | 2.41 | $206,400 | $21,577 | 9.6 | 1.57 | 6.1 | $33,872 |
| **Housekeeping Supplies** | 1.1% | 100% | $665 | $576 | | | | | | | | |
| Building Materials and Garden Equipment and Supplies Dealers | | 10% | $67 | $58 | $57,640 | 7.64 | $7,547 | $30,821 | 0.2 | 1.57 | 0.2 | $48,384 |
| Food & Beverage Stores | | 35% | $233 | $202 | $201,738 | 8.50 | $23,721 | $29,583 | 0.8 | 1.57 | 0.5 | $46,440 |
| General Merchandise [7] | | 35% | $233 | $202 | $201,738 | 11.21 | $17,994 | $19,020 | 0.9 | 1.57 | 0.6 | $29,858 |
| Miscellaneous Store Retailers | | 20% | $133 | $115 | $115,279 | 6.58 | $17,522 | $18,693 | 0.9 | 1.57 | 0.6 | $29,345 |

[1] Percent of income spent per category is based on the 2008 U.S. Consumer Expenditure Survey data for households at this income level. Note that the sum of the categories included in this analysis is well below the total expenditures of households at this income level, and thus represent a conservative estimate of job creation and housing impacts. Expenditure categories not incorporated due to data constraints include taxes, housing and lodging, most utilities, tobacco, health insurance, personal/ life insurance, cash contributions, and financing charges.

[2] Where multiple business types are likely to provide goods and services in the expenditure category, EPS has estimated the proportion accruing to each business type.

[3] 2008 expenditures are based on the estimated household income distributed based on the percent of income spent per the 2008 U.S. Consumer Expenditure Survey. Per Table 4 the purchase of a $250,000 Unit requires a household income of $62,642.

[4] 2008 expenditures converted to 2002 dollars using the CPI for the San Francisco MSA from the BLS.

[5] Based on ACS data current as of 8/17/2010.

[6] Half of the expenditures in the "Alcoholic Beverages" category of the Consumer Expenditure Survey is included in "Food At Home" and the remaining half is included in "Food Away From Home".

[7] Santa Clara County data not available from 2002 Economic Census. Gross receipts to wages and 2002 average wage thus based on statewide data.

[8] Part of the Utilities, Fuels, and Public Services category, which also includes natural gas, electricity, and telephone services. Natural gas, electricity, and telephone services not estimated because data was not available in the 2002 Economic Census.

# Appendix F: KMA IMPLAN Output

TABLE B-1
IMPLAN MODEL OUTPUT
EMPLOYMENT GENERATED
RESIDENTIAL NEXUS ANALYSIS
CITY OF FREMONT

| *Per 100 Market Rate Units* | Large Lot Single Family Detached | % of Jobs | Small Single Family Detached | Townhome | Condominium | % of Jobs | Rentals | % of Jobs |
|---|---|---|---|---|---|---|---|---|
| **Gross Income of New Residents**[1] | $15,252,000 | | $13,800,000 | $11,000,000 | $10,400,000 | | $8,920,000 | |
| **Employment Generated by Income Differential by Industry**[2] | | | | | | | | |
| Food services and drinking places | 5.7 | 9% | 5.8 | 4.6 | 4.3 | 10% | 3.9 | 11% |
| Offices of physicians, dentists, and other health practitioners | 3.0 | 5% | 3.0 | 2.4 | 2.2 | 5% | 2.2 | 6% |
| Real estate establishments | 2.7 | 4% | 2.9 | 2.3 | 2.2 | 5% | 2.4 | 6% |
| Private hospitals | 3.2 | 5% | 2.7 | 2.2 | 2.1 | 5% | 1.8 | 5% |
| Wholesale trade businesses | 1.8 | 3% | 2.6 | 2.1 | 1.9 | 5% | 1.8 | 5% |
| Private household operations | 2.8 | 5% | 2.4 | 1.9 | 1.8 | 4% | 1.0 | 3% |
| Retail Stores - Food and beverage | 2.0 | 3% | 2.1 | 1.7 | 1.6 | 4% | 1.3 | 4% |
| Retail Stores - General merchandise | 1.8 | 3% | 1.8 | 1.5 | 1.4 | 3% | 1.2 | 3% |
| Nursing and residential care facilities | 2.0 | 3% | 1.6 | 1.3 | 1.2 | 3% | 0.8 | 2% |
| Retail Stores - Motor vehicle and parts | 1.3 | 2% | 1.3 | 1.1 | 1.0 | 2% | 0.8 | 2% |
| Retail Nonstores - Direct and electronic sales | 1.2 | 2% | 1.3 | 1.0 | 0.9 | 2% | 0.8 | 2% |
| Retail Stores - Clothing and clothing accessories | 1.2 | 2% | 1.3 | 1.0 | 0.9 | 2% | 0.8 | 2% |
| Retail Stores - Miscellaneous | 1.2 | 2% | 1.2 | 1.0 | 0.9 | 2% | 0.8 | 2% |
| Private elementary and secondary schools | 1.8 | 3% | 1.0 | 0.8 | 0.8 | 2% | 0.5 | 1% |
| Insurance carriers | 1.2 | 2% | 1.0 | 0.8 | 0.8 | 2% | 0.6 | 2% |
| Individual and family services | 1.6 | 3% | 1.0 | 0.8 | 0.8 | 2% | 0.6 | 2% |
| Retail Stores - Building material and garden supply | 1.0 | 2% | 1.0 | 0.8 | 0.7 | 2% | 0.6 | 2% |
| Other private educational services | 1.1 | 2% | 0.9 | 0.7 | 0.7 | 2% | 0.5 | 1% |
| Retail Stores - Health and personal care | 0.9 | 1% | 0.9 | 0.7 | 0.7 | 2% | 0.6 | 2% |
| Medical and diagnostic labs and outpatient and other ambulatory care services | 0.9 | 2% | 0.8 | 0.7 | 0.6 | 1% | 0.6 | 2% |
| Employment services | 0.9 | 1% | 0.8 | 0.7 | 0.6 | 1% | 0.6 | 1% |
| Civic, social, professional, and similar organizations | 1.0 | 2% | 0.8 | 0.6 | 0.6 | 1% | 0.5 | 1% |
| Automotive repair and maintenance, except car washes | 0.9 | 1% | 0.7 | 0.6 | 0.6 | 1% | 0.5 | 1% |
| Retail Stores - Sporting goods, hobby, book and music | 0.7 | 1% | 0.7 | 0.6 | 0.6 | 1% | 0.5 | 1% |
| Monetary authorities and depository credit intermediation activities | 0.7 | 1% | 0.7 | 0.6 | 0.5 | 1% | 0.5 | 1% |
| Child day care services | 1.1 | 2% | 0.7 | 0.6 | 0.5 | 1% | 0.4 | 1% |
| Personal care services | 0.7 | 1% | 0.7 | 0.5 | 0.5 | 1% | 0.4 | 1% |
| Services to buildings and dwellings | 0.7 | 1% | 0.6 | 0.5 | 0.5 | 1% | 0.4 | 1% |
| Securities, commodity contracts, investments, and related activities | 0.5 | 1% | 0.5 | 0.4 | 0.4 | 1% | 0.4 | 1% |
| All Other | 16.1 | 26% | 14.1 | 11.2 | 10.6 | 25% | 9.2 | 25% |
| | 61.8 | 100% | 57.5 | 45.8 | 43.3 | 100% | 37.2 | 100% |

[1] The IMPLAN model tracks how increases in consumer spending creates jobs in the local economy. See Tables A-6 and A-7 for estimates of the gross income of residents of the prototypical 100 unit buildings.

[2] For Industries representing more than 1% of total employment for either ownership or rental units.

Keyser Marston Associates, Inc.
\\Sf-fs1\wp\12\12850\12850.013\Updated Nexus model 03-18-10.xls; B-1 IMPLAN model; 5/6/2010; hgr

# Appendix G: EPS Affordable Unit Cost Calculation

**Table 3**
**Affordability Gap Analysis -- Rental Product Type**
**City of Mountain View Nexus-Based Housing Fee, EPS #20063**

| | 3 - 4 Stories Multifamily Building With Podium Parking | | | |
|---|---|---|---|---|
| | Extremely Low Income (30% AMI) | Very Low Income (50% AMI) | Low Income (80% AMI) | Moderate Income (120% AMI) |
| **Development Program Assumptions** | | | | |
| Density/Acre | 40 | 40 | 40 | 40 |
| Gross Unit Size | 1,100 | 1,100 | 1,100 | 1,100 |
| Net Unit Size | 950 | 950 | 950 | 950 |
| Number of Bedrooms [1] | 2 | 2 | 2 | 2 |
| Number of Persons per 2-bedroom Unit [2] | 3 | 3 | 3 | 3 |
| Parking Spaces/Unit | 2.30 | 2.30 | 2.30 | 2.30 |
| **Cost Assumptions** | | | | |
| Land/Acre [3] | $3,484,800 | $3,484,800 | $3,484,800 | $3,484,800 |
| Land/Unit | $87,120 | $87,120 | $87,120 | $87,120 |
| Direct Costs | | | | |
| Direct Construction Costs/Net SF [4] | $209 | $209 | $209 | $198 |
| Direct Construction Costs/Unit | $198,531 | $198,531 | $198,531 | $188,100 |
| Parking Construction Costs/Space | $15,084 | $15,084 | $15,084 | $15,084 |
| Parking Construction Costs/Unit | $34,692 | $34,692 | $34,692 | $34,692 |
| Subtotal, Direct Costs/Unit | $233,223 | $233,223 | $233,223 | $222,792 |
| Indirect Costs as a % of Direct Costs [5] | 40% | 40% | 40% | 35% |
| Indirect Costs/Unit | $93,289 | $93,289 | $93,289 | $77,977 |
| Total Cost/Unit [6] | $413,632 | $413,632 | $413,632 | $387,889 |
| **Maximum Supported Home Price** | | | | |
| Household Income [7] | $28,650 | $47,750 | $76,400 | $114,600 |
| Income Available for Housing Costs/Year [8] | $8,595 | $14,325 | $22,920 | $34,380 |
| Less Utility Costs [9] | $1,488 | $1,488 | $1,488 | $1,488 |
| Income Available for Rent Payments | $7,107 | $12,837 | $21,432 | $32,892 |
| Operating Expenses per Unit/Year [10] | $5,000 | $5,000 | $5,000 | $9,655 |
| Net Operating Income | $2,107 | $7,837 | $16,432 | $23,237 |
| Capitalization Rate [11] | 5.5% | 5.5% | 5.5% | 5.5% |
| Total Supportable Unit Value [12] | $38,309 | $142,491 | $298,764 | $422,497 |
| **Affordability Gap** | $375,323 | $271,141 | $114,869 | $0 |

[1] 2-bedroom units are the most representative unit type in multifamily housing.

[2] A 2-bedroom unit can accommodate a 2-5 person household - an average of 3 persons is used for this analysis based on Census data indicating the average family size in Mountain View is approximately 3 persons, and State law (Health and Safety Code Section 50052.5) indicates that a 2-bedroom unit should be assumed to be occupied by a 3-person household.

[3] Based on residential-zoned improved land sales in the Silicon Valley in 2009.

[4] Includes on-site work, offsite work, vertical construction, general requirements, overhead and developer fees. Assumes a for-profit builder of moderate-income homes can build a unit for 5% less per square foot than can a non-profit builder.

[5] Includes costs for architecture and engineering; entitlement and fees; project management; appraisal and market study; marketing, commissions, and general administration; financing and charges; insurance; developer fee and contingency. Assumes a for-profit builder of moderate-income homes can build a unit for lower indirect costs than can a non-profit builder.

[6] As is typical for rental projects, the developers' profit is received through the operation and eventual sale of the property rather than through a "profit margin" line item in the costs, as would be required in a for-sale project.

[7] Based on 2008 State income limits for a three person household in Santa Clara County.

[8] Assumes housing costs to be 30% of gross household income.

[9] Based on Santa Clara County Housing Authority 2010 Utility Allowance Table assuming a low-rise garden apartment and natural gas for heating and cooking.

[10] Moderate income units generate rents similar to market-rate units, so EPS assumes that any moderate income units would be subject to property tax. Units for lower income levels are assumed to be produced by non-profit builders and thus not taxable.

[11] The capitalization rate is used to determine the current value of a property based on estimated future operating income, and is typically a measure of estimated development risk. Capitalization rates assumed herein are based on Korpacz Real Estate Investor Surveys from recent years.

[12] The total supportable unit value is determined by dividing the net operating income by the capitalization rate.

Source: City of Mountain View; HUD; Korpacz; Economic & Planning Systems, Inc.

## Appendix H: BAE Explanation of Direct, Indirect, and Induced Multiplier Effects

(Excerpt from the Berkeley Report)

***Multipliers***. IMPLAN combines this data to generate a series of type-SAM multipliers for the local economy. The multiplier measures the amount of total economic activity that results from an industry (or household) spending an additional dollar in the local economy. Based on these multipliers, IMPLAN generates a series of tables to show the economic event's *direct*, *indirect*, and *induced* impacts to gross receipts, or output, within each of the model's 500 industries. These outputs are described below:

- **Direct Impacts**. Direct impacts refer to the dollar value of economic activity available to circulate through the economy. In the case of new residential development, the direct impacts are equal to the new households' discretionary spending. The direct impacts do not include household savings and payments to federal, state, and local taxes, as these payments do not circulate through the economy.

  It should be noted that impacts from retail expenditures differ significantly between the total economic value of retail and the amount available to circulate through the local economy. The nature of retail expenditures accounts for this difference. The model assumes that only the retail markup impacts the local economy, particularly for industries heavily populated with national firms such as gas stations and grocery stores. Since local stores buy goods from wholesalers and manufacturers outside of the area, and corporate profits also leave the local economy, only the retail markup will be available for distribution within the local economy. To the extent that retailers' headquarters are located within the county or region, the model allocates their portions of the impacts to the local economy.

- **Indirect Impacts.** The indirect impacts refer to the "inter-industry impacts of the input-output analysis."[31] In the new housing example, indirect impacts results from spending by the local and regional companies that the new households buy goods and services from. Retail establishments, restaurants, personal service providers, and other firms use the payments they receive from new households to buy equipment and supplies, rent space, pay their employees, etc. These expenditures have an impact on the economy.

- **Induced Impacts.** The induced impacts refer to the impacts of household spending by the employees generated by the direct and indirect impacts. In other words, induced impacts result from the household spending of employees of business establishments that the new households patronize (direct) and their suppliers (indirect). The model accounts for local commute patterns in the geography. For example, if 20 percent of construction workers who work in the region live outside of the region, the model will allocate 80 percent of labor's disposable income into the model to generate induced impacts. The model excludes payments to federal and state taxes and savings based on the geography's average local tax and savings rates. Thus, only the disposable incomes from local workers are included in the model.

*About Us*

## Adam F. Cray, JD, MPP

Adam Cray is a consultant specializing in housing and urban policy issues. In addition to his work with the California Homebuilding Foundation, he has conducted research and analysis for several public, non-profit, and private organizations, including: the U.S. Department of Housing and Urban Development, the City and County of San Francisco Planning Department, the Fisher Center for Real Estate and Urban Economics, the Center for Resource Efficient Communities, the Institute for Research on Labor and Employment, and various private real estate interests. A policy analyst and lawyer by training, Cray holds an MPP from the Goldman School of Public Policy at the University of California, Berkeley and a JD from Emory University School of Law.

## California Homebuilding Foundation

The California Homebuilding Foundation (CHF) is the scholarship, research and education center for California's homebuilding and construction industries. Founded in 1978 we invest in the future of the industry by providing scholarship awards, research grants, educational and professional development programs. The Foundation is the presenter of California's top industry award, Hall of Fame.

**SCHOLARSHIPS**

The Foundation has raised nearly $3 million in scholarship endowments through the generosity of our benefactors. We work with secondary learning institutions, from community colleges to private universities, assisting the next generation of bright minds interested in making the homebuilding industry their career. To date, the Foundation has awarded nearly $1.5 million in scholarship awards to students enrolled in industry-related programs such as construction management or architecture. Our goal is to assist these students in completing their degrees and begin working within the building industry.

**RESEARCH**

Research funded through the Foundation assists in educating lawmakers and the public about the economic benefits of new home construction, a crucial step in meeting the state's need for housing. Our goal, through our research endowment, is to provide balance to the public-policy debate on housing issues by sponsoring independent, university-based research on issues critical to the development of new housing and communities in California.

**EDUCATION**

At the California Homebuilding Foundation, individual success and the improvement of the building industry workforce is one of our core principles. We are dedicated to our mission of encouraging lifelong learning by developing and providing opportunities for personal and professional growth.