A Brownfields-based Solution for Los Angeles County's Housing Crisis

April, 2004

Presented to the Greenlining Institute by the
University of Southern California Center for Economic Development
School of Policy, Planning, and Development

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Executive Summary

This report assesses the extent to which the development of housing on Brownfield sites would alleviate the affordable housing crisis faced by many California communities. The key factual findings are as follows:

- Between 19,000 and 365,000 additional units (beyond current development volumes) could be produced on Brownfield sites deemed suitable for housing. In terms of its human impact, construction of these units would house between about 58,000 to almost 1.1 million people.

- Under the most reasonable scenario involving moderate development densities, slightly more than 209,000 additional units can be produced. This would provide housing for nearly 623,000 people.

- The additional supply of housing provided through Brownfield development would help improve the affordability of housing in Los Angeles County. For example, if high density housing were produced, and the additional units were all rental and reached the market in three years, the last three years of rent increases would be erased and rents would stand at 2000 levels.

- Overall market impact depends critically on the density and speed at which Brownfield sites were developed. The higher the density and the faster the rate of development, the greater the impact will be.

- Brownfield development is likely to indirectly improve the affordability of for-sale homes at the entry level. However, even if Brownfield development were to occur at the highest density and most permissive definitions of housing-suitable, its effect would likely be to reduce the rate of home price appreciation rather than reduce the price of homes outright.

Many of the major impediments encountered by developers in the survey stem from the unpredictability and increased risk of developing housing on Brownfields. Additional incentives or measures are still needed to tip the scales in favor of urban infill housing development. Issues that have been raised by this report are as follows:

- Brownfield development is more expensive than Greenfield development, although costs become more comparable the farther a suburban Greenfield project is from existing infrastructure.

- Brownfield development faces greater development risk, especially at the front

end of the development process, due in large part to a lack of remediation standards and unpredictable costs, including those for Phase II assessments which have been known to range from $5,000 to $300,000.

- Developers, in general, have not developed housing on Brownfields because of liability costs associated with Brownfields remediation, fear of adverse publicity, the threat of potential litigation, and, for non-profits, fear that additional complications could deter the awarding of public subsidies.

- The ability to assemble land for development and to maximize land value, always important in development, is especially critical for Brownfield developers, who tend to build large-scale multifamily developments in order to derive economies of scale.

- Analysis of Brownfield development in the context of housing is hampered by significant challenges. Few cities track such sites, those that do tend to not consider them suitable candidates for housing, and developers are reluctant to openly discuss their housing projects on Brownfield sites.

I. Introduction

In the spring of 2003, the Greenlining Institute, supported by a coalition of financial, insurance, and corporate institutions, solicited proposals for an analysis of the potential effects that a concerted initiative to develop housing on existing "Brownfield" sites might have on the affordable housing crisis facing many California communities. The proposal called for the use of Los Angeles County as a case study.

The University of Southern California Center for Economic Development (CED) responded to the solicitation by designing a study comprised of five tasks:

I. Estimate the number and total acreage of Brownfields in LA County that exist within areas suitable for housing, including average size of each
II. Quantify the potential number of housing units that can be built on these sites through various housing types and densities (i.e. Multifamily, single-family, low/medium/high-density)
III. Determine the effect of these additional housing units, for each scenario listed above, on:
    a. Availability rates of homes and rentals within Los Angeles
    b. Affordability indices of homes and rentals within Los Angeles
    c. Median price of homes within Los Angeles
    d. Homeownership rates of people living in Los Angeles
IV. Identify housing sites that have been built on such properties in L.A. County and determine:
    a. The number of housing units created
    b. Remediation and infrastructure costs
    c. Common contaminants encountered
    d. Sources of funding for remediation
    e. Ownership issues when obtaining land
    f. Cost per unit built
V. Compare (and examine) the core costs of housing units built on Brownfield sites with housing constructed on "clean-suburban land" to determine the variability that can be absorbed by remediation costs[1]

[1] For the purpose of this study, "clean-suburban land" refers to any parcel that exists on urban edges or within suburbs, is 'green' land that has never been developed, other than for agriculture or grazing uses,

Because of the legally restrictive definition of Brownfield sites, in subsequent discussions to further refine the scope of the problem and methodology, CED and the Greenlining consortium agreed to expand consideration of developable lands beyond Brownfields by including "Greyfield" sites and "potential Brownfield sites."

This report details the execution of CED's study plan. The report first establishes the definitions of "Brownfield" and "Greyfield" used by CED researchers. Potential Brownfield sites were added through the inclusion of two databases containing underutilized industrial sites and through the visual field survey conducted in several cities. The purpose was to include sites that were vacant, obsolete, blighted, or underutilized for which we had insufficient data to determine the presence or potential presence of contamination.[2] This initial section also discusses the important concept of "housing suitability," which when taken into account can have the effect of significantly reducing the acreage to be considered.

The ensuing section details how estimates were generated for the number of housing units that could be produced on Brownfield and Greyfield sites deemed suitable for housing, describes estimates generated for various density scenarios, and assesses the expected market impact of the addition of these units on the Los Angeles County rental housing market.

Case study descriptions of housing developments on sites that were previously Brownfields are provided in the next section of the report. These case studies offer perspectives on the potential scale and quality of Brownfield housing developments.

Finally, the report offers an analysis of Brownfield development that explores the question of whether such developments make sense from a financial perspective and then offers suggestions for topics of future research that would contribute to the implementation of housing development on Brownfields.

and has no existing infrastructure.

[2] Obsolete – used here to refer to functional obsolescence, meaning buildings no longer productive for their

II. Background

This section reviews a brief history of Brownfields as a policy focus that highlights key data sources and definitions.

The Superfund program was the historical antecedent to what are now known as Brownfields. Superfund sites were compiled by the Federal government via the Comprehensive Response, Compensation, and Liability Act Information System (CERCLIS). In 1995, as part of the Brownfields Action Agenda, which highlighted Brownfields as opportunities for economic redevelopment, U.S. Environmental Protection Agency (U.S. EPA) Administrator Carol Browner ordered the "archiving" of approximately 24,000 sites from a previous total of 40,000 sites originally in CERCLIS. These archived sites had either been found to be clean by U.S. EPA or were turned over to State cleanup programs. The latter sites were among the first Brownfields, and the intent of the turnover was to encourage cleanup.

In California, the archived Superfund sites were the foundation of CalSites, a list managed by the California Environmental Protection Agency (CalEPA) that includes sites where hazardous substance releases have been confirmed. This database was recently upgraded and expanded into the Site Mitigation and Brownfields Reuse Program (SMBRP) database. In managing the SMBRP database, CalEPA has grouped sites into six categories: CalSites, Properties Needing Further Evaluation, Properties in the School Property Evaluation Program, No Further Action Program Properties, Voluntary Cleanup Program Properties, and Unconfirmed Property Referrals. In October 2003, there were 5,660 sites in the Site Mitigation and Brownfields Reuse Program Database, of which 686 were on the CalSites list, 2,904 were properties with unconfirmed releases, 553 were undergoing cleanup in the Voluntary Cleanup Program, 1128 were existing or proposed school sites under evaluation, and 389 had been determined to pose no problem to the environment or the public.

Despite this longer history, a "Brownfield site" was codified into law only on January 11,

intended use. Gause, Jo Allen. (1996). Washington, D.C.: ULI-the Urban land Institute. p.5.

2002 in Public Law 107-118 (H.R. 2869) - "Small Business Liability Relief and Brownfields Revitalization Act":

> "With certain legal exclusions and additions, the term "Brownfield site" means real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant." [3]

The current research relies on this definition.

Greyfields are another important term for this study. First coined by the Congress for New Urbanism in the 1990s, the term "Greyfield" as applied to developed parcels refers to sites that are **"***old, obsolete, and unprofitable retail and commercial sites."* Greyfield sites are, in many ways, quite similar to Brownfield sites in that they are non-residential, often involve remediation, and typically have structures on them that may require demolition or considerable renovation. In this sense, then, they are a natural candidate for consideration in the context of the task called for by the Greenlining consortium.

For simplicity, Brownfield sites, potential Brownfield sites, and Greyfield sites are collectively called Brownfields for the remainder of the report.

III. Task One: Identification of Brownfield Sites Suitable for Housing

While CalEPA estimates that there are 90,000 sites idle or underutilized because of real or perceived environmental contamination, no one has identified and inventoried the majority of these sites. Thus, the first task was to identify those Brownfield sites suitable for housing in Los Angeles County. This involved two steps: (a) identifying potentially eligible sites; and (b) determining the number and total acreage of Brownfield sites in areas suitable for housing.

[3] http://www.epa.gov/swerosps/bf/glossary.htm#brow

A. Identifying Potentially Eligible Sites

Potentially eligible Brownfield sites were identified using two strategies: survey local governments and conduct a visual field survey of selected cities.

a) Strategy 1: Survey Local Governments

The first method for identifying Brownfield sites suitable for housing involved using a questionnaire to solicit information on such sites from each city in Los Angeles County. The strategy was to have appropriate public sector officials in each city identify sites that might be suitable for housing from a list of Brownfield sites. In addition, cities were asked to supplement this list with other sites that also satisfied study criteria.

A Potential Brownfield list of sites to be included in each city's questionnaire was obtained in the following manner:

1) An initial list of sites was constructed by combining (a) an inventory of underutilized industrial sites that was developed in 2002 by the USC Center for Economic Development for the Los Angeles County Economic Development Corporation and (b) an inventory of potential Brownfield sites developed for the 27 cities in the Gateway Cities Region of Los Angeles County for the Southern California Association of Governments through the Growth Visioning process. Duplicate sites were removed from the list.
2) Sites were removed from this list if the SMBRP database included them on either the No Further Action Property, the Voluntary Cleanup Program Properties, or the Property in the School Property Evaluation Program list. Such sites were either no longer Brownfields, soon to be remediated, or being redeveloped as a school.
3) Non-duplicate sites from the SMBRP database were added from the CalSites, Properties Needing Further Evaluation, or Unconfirmed Property Referrals lists.
4) As a further check, archived CERCLIS sites were reviewed to see if there were any sites not included in any SMBRP database list that should be added.
5) The resulting Potential Brownfields list, which included 790 sites, was separated into sub-lists for each city.

For each of the sites on the Potential Brownfields list, and for any additional Brownfield sites identified by the city as suitable for housing, the questionnaire requested the following information:

- Square footage of buildings/acreage of site
- Current zoning
- Plans for redevelopment
- Is the site suitable for housing?

Moreover, to assist in completing Task 4, the questionnaire asked the city if any housing had been developed on a Brownfield site within the city and, if so, who was the developer of record. A sample questionnaire packet is attached as Appendix I.

A questionnaire packet, including the Potential Brownfield list prepared for each city, was faxed to the City Manager of each city in Los Angeles County. The City and County of Los Angeles were exceptions in that the packet was sent to the planner in charge of each planning region in the case of the City and to each supervisor's office in the case of the County. Follow-up was conducted by phone, email, fax, and a few site visits to maximize the response rate.

Surveys were received from 60 of the 88 cities in Los Angeles County as well as from the County itself. Some of the cities that returned surveys indicated that there were no Brownfield sites within city limits, while others identified such sites. A database was prepared to record all the information collected from the cities.

b) Strategy 2: Conduct Visual Field Survey

In addition to surveying government officials via the written survey, visual field surveys of selected cities were conducted to establish an alternative means for identifying the amount of available Brownfield acreage suitable for housing.

Eleven cities were selected for the detailed field survey: Azusa, Bell, Burbank, El Segundo, Huntington Park, La Puente, Maywood, Monrovia, Norwalk, Torrance, and Whittier. Each of these cities was chosen to represent a particular class of cities sharing similar land use profiles. A cluster analysis of the 1993 land use distribution of the 88

cities of Los Angeles County has resulted in the identification of six distinct clusters: Generic Cities, Suburbia cities, Edge Cities, Apartment Cities, Industrial Cities, and Greyfield Cities (Banerjee and Verma, 2003, 2004). As described in Table 1, each cluster represents a particular land use profile.

Table 1: Mean Land Use Percentages for Cities in Each of the Six Clusters

Land Use	Cluster 1: Edge Cities	Cluster 2: Industrial Cities	Cluster 3: Suburbia Cities	Cluster 4: Greyfield Cities	Cluster 5: Apartment Cities	Cluster 6: Generic Cities
Vacant	47.8	5.7	7.8	9.4	0.9	4.08
Agriculture	2.4	2.4	0.6	2.4	1.0	1.0
Med-Low Density Residential	31.3	10.8	62.8	14.9	11.8	41.9
Med-High Density Residential	3.3	2.6	6.1	6.1	48.0	14.4
Commercial	2.8	6.9	8.3	5.5	14.0	11.2
Public Facilities	3.1	2.9	5.9	3.3	5.2	6.0
Open Space & Recreation	3.5	2.2	3.3	3.7	2.1	3.3
Transportation & Utilities	2.7	9.6	2.8	12.7	6.6	6.8
Extraction	0.0	1.0	0.0	15.0	0.0	1.0
Industrial	1.7	56.0	3.0	22.7	10.3	9.4

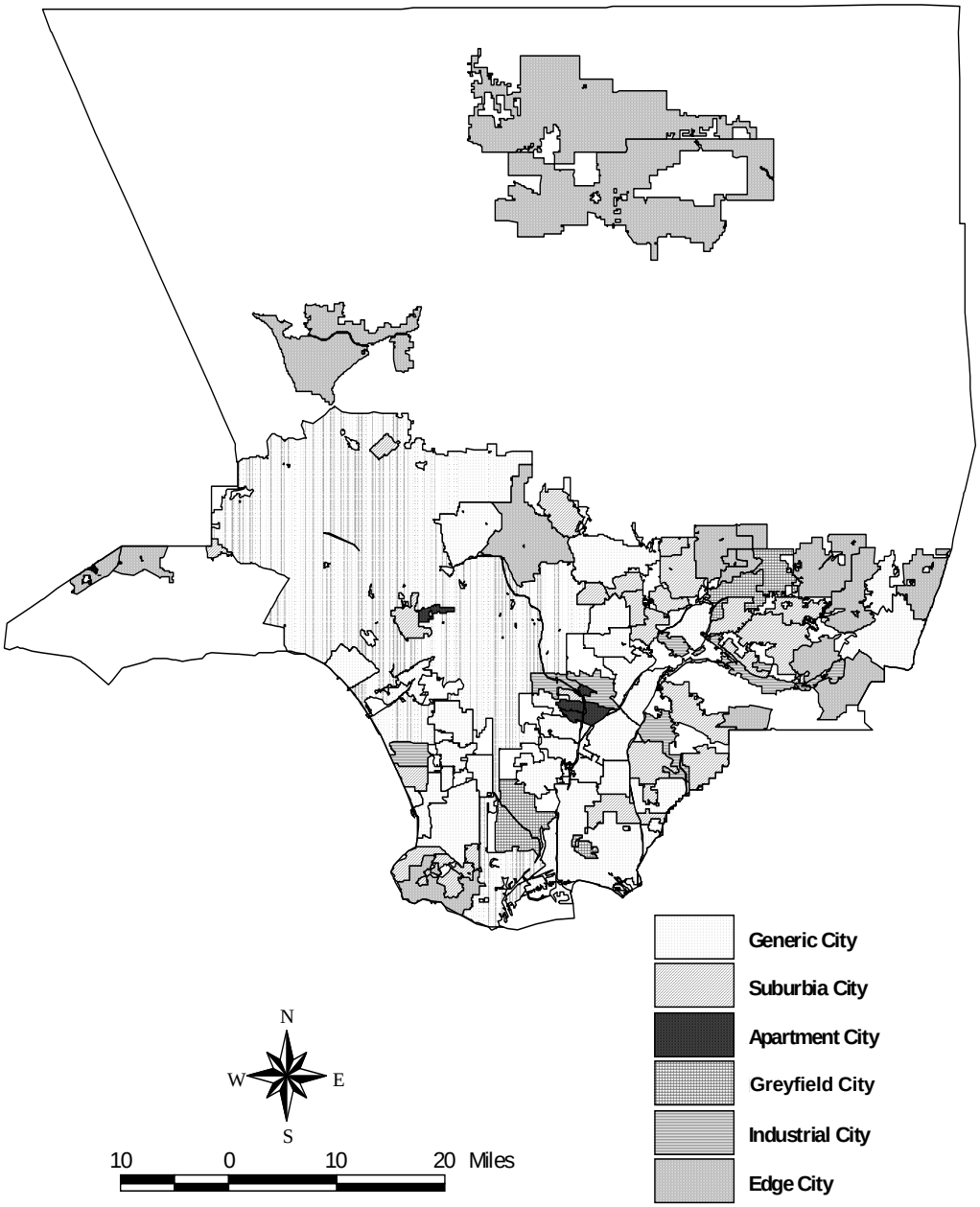
The largest categories are *Generic Cities*, *Edge Cities* and *Suburbia Cities.* *Generic Cities* are the most diversified and multifunctional in their land use portfolios, which have more balanced uses compared to cities in other categories. *Edge Cities* are typically single-family and have a large percentage of vacant land. *Suburbia Cities* are dominated by single-family residential use. *Apartment Cities* are characterized by a concentration of multi-family housing. *Industrial Cities* are typically cities with a significant portion of land devoted to industrial use. *Greyfield Cities* typically are dominated by land devoted to extractive, commercial, and transportation and utilities uses. Table 2 includes a list of cities for different clusters. Note that unincorporated urban areas of the County are included within the *Generic Cities* category. Figure 1 shows the spatial distribution of the cities in various clusters.

Table 2: Cluster Membership of Specific Cities in the Los Angeles County Based on Their Land Use Percentages

Edge Cities	Industrial Cities	Suburbia Cities	Greyfield Cities	Apartment Cities	Generic Cities
Agoura Hills	Commerce	Arcadia	***Azusa***	***Bell***	Alhambra
Bradbury	***El Segundo***	Artesia	Carson	Bell Gardens	Bellflower
Claremont	Industry	Baldwin Park	Irwindale	Cudahy	***Burbank***
Diamond Bar	Santa Fe Springs	Beverly Hills	Signal Hill	West Hollywood	Cerritos
Duarte	South El Monte	Covina			Compton
Glendale	Vernon	Hidden Hills			Culver City
Glendora		La Canada Flintridge			Downey
La Habra Heights		Lakewood			El Monte
Lancaster		La Mirada			Gardena
Monrovia		***La Puente***			Hawaiian Gardens
Palmdale		Lomita			Hawthorne
Rancho Palo Verde		Manhattan Beach			Hermosa Bch
San Dimas		***Maywood***			***Huntington Park***
Santa Clarita		Norwalk			Inglewood
Walnut		Palos Verdes Estates			La Verne
Westlake Village		Rolling Hills			Lawndale
		Rolling Hills Estates			Long Beach
		Rosemead			Los Angeles
		San Fernando			Lynwood
		San Gabriel			Montebello
		San Marino			Monterey Park
		Sierra Madre			Paramount
		South Pasadena			Pasadena
		Temple City			Pico Rivera
		West Covina			Pomona
		Whittier			Redondo Bch
					Santa Monica
					South Gate
					Torrance

Note: Visual field surveys were conducted in cities listed in ***italics***.

Figure 1
Cluster Membership of Specific Cities in the Los Angeles County Based on Their Land Use Portfolios



Graduate students in the School of Policy, Planning, and Development drove through the commercial and industrial neighborhoods of the selected cities and identified potentially suitable sites. Students were instructed to document the existence of Greyfield sites and possible Brownfield sites, which might or might not be in need of environmental mitigation, falling into one of five broad categories based on building type and location.

1. *Vacant:* Sites in commercial or industrial areas without buildings. Most sites showed some sign of former use such as driveway curb cuts or old building pads or foundations.
2. *Industrial:* Sites adjacent to housing with industrial buildings that are obsolete, blighted, or underutilized.
3. *Commercial:* Sites adjacent to housing with commercial buildings that are obsolete, blighted, or underutilized.
4. *Industrial Cluster:* A cluster of sites with industrial buildings that are vacant, obsolete, blighted, or underutilized not adjacent to housing. They could be made suitable for housing if the area were to be redeveloped into two adjacent developments, a modern industrial park and a multi-family residential complex.
5. *Commercial Corridor:* Sites along a block with continuous retail/commercial activity that was at least 50% vacant, obsolete, blighted, or underutilized. These sites did not need to be adjacent to housing. These sites were identified as having the potential for redevelopment into a mixed-use development with housing above office or retail.

Photos were taken of each identified site to document and validate its suitability. Appendix II contains a sampling of photos taken of sites identified in the visual field survey. The acreage of each identified site was found from the Los Angeles County Assessor Maps.

In addition, data was collected on the acreage of vacant land in redevelopment areas within the County of Los Angeles. This land was considered because redevelopment areas, by definition, are blighted and thus are likely to contain Brownfield sites. In this context, the scope was limited to vacant land, which is most easily converted into housing.

A database was prepared with a list of every city in Los Angeles County, the total acreage of each city, and the total acreage of both industrial and commercial land use. For those cities where visual field surveys were conducted, the database included the number and acreage of sites considered to be suitable for housing under each of the five broad categories listed above.

c) Comparing the Two Methods for Identifying Sites

After compiling data using the two methods, a comparison was made of the resultant databases. From this comparison, it became clear that few respondents explicitly conceptualized land jointly in terms of (1) Brownfield status and (2) suitability for housing. As a consequence, this survey of cities in Los Angeles County yielded relatively limited information regarding the acreage of Brownfield sites that could be used to develop housing. This created significant difficulties for the analysis. First, while some cities had information on the presence of Brownfield sites, few had evaluated their suitability as housing sites as defined in this study. Thus, aggregate numbers of Brownfield sites may overstate the extent to which such land is suitable for housing development. Second, almost no cities had information on Greyfield sites potentially suitable for housing – an important item of interest for this report.

Given the disparity in data quality associated with the two methods, the research team decided to rely largely on the data compiled via the visual field survey in completing the empirical tasks. Survey responses were incorporated into the analysis for (1) cities that lacked industrial parcels and reported having no Brownfield sites, (2) cities with Brownfield sites but no housing (Vernon), and (3) cities that reported a significant amount of eligible acreage. Pursuit of survey data from the remaining non-respondent Los Angeles County cities was discontinued. These survey responses, if similar in nature to the responses received from other cities, would have had at best limited usefulness for estimating the number and acreage of Brownfield sites in Los Angeles County.

B. Determining the Number and Total Acreage of Brownfield Sites in Los Angeles County

a) Data Definitions

A critical hurdle in this type of exercise is developing a procedure for categorizing properties as either suitable for housing or not. The assumptions behind the site selection standards could create drastically different results. For example, one could include in the definition of sites suitable for housing only those industrial properties that are vacant, had a prior heavy industrial use, but no active use at present, *and* are adjacent to housing as suitable for housing. A justification for this approach is the fact that local land use planning and zoning often tries to insulate residential uses from industrial uses. Such properties would, assuming remediation issues were adequately accounted for, flow relatively seamlessly into the existing land use pattern and would seem to be a natural extension of the adjacent housing. Those advocating this selection standard might prefer to rely on the data collected using the survey of governments, given that city officials identified the sites and that the most restrictive definitions were employed. However, one could view such a definition as overly restrictive, as the requirement that the land be adjacent to housing would limit acreage significantly and perhaps unnecessarily; housing is developed under other circumstances.

Alternatively, one might consider any land falling into one of the five broad categories used for the visual field survey as fitting the definition of suitable for housing. If those sites, understood to include a wide variety of Brownfield sites, were viewed as critical to the redevelopment of underutilized land, then one could argue that all such locales should be included. However, some might object to this definition, arguing that redevelopment rarely involves housing development exclusively. In this alternative view, calculations based on the visual field survey would overstate the development potential of this land.

Given the possibilities for debate on this matter, this study reports estimates under a range of definitions that vary according to which land uses are included. Three principal definitions spanning many different potential perspectives are used. Ranging from the

narrowest (a) to the most comprehensive (c), they are as follows.

a. Any underutilized industrial or commercial land adjacent to housing;
b. Definition (a) plus commercial corridors and clusters of vacant or underutilized industrial land;
c. Definition (b) plus vacant redevelopment land.

Clearly, all definitions, even the first, will include land that some might not consider to be truly suitable for housing. For example, some of the acreage under definition (b) is likely to be composed of isolated vacant or underutilized sites near relatively intensely used industrial properties or industrial transit corridors. Moreover, in trying to be as comprehensive as possible, the broadest definition (c) includes land that, to be developed for housing, might require that housing be built at high densities or through broader redevelopment initiatives that includes housing development along corridors and within vacant or underutilized industrial clusters.

b) Methodology

Because data were not collected from all cities in the County using either strategy for identifying eligible sites, a mathematical method was used to estimate the total available acreage. Data compiled from the visual field surveys and the city responses to the questionnaire were used to impute available acreage for the remaining cities. The sum of this imputed acreage and the acreage obtained from the written and field surveys yielded an estimate of the available acreage of Brownfield sites suitable for housing for the entire County.

The mathematical method involved multiple steps. First, the available Brownfield acreage suitable for housing under the two narrower rules for including land use (definitions (a) and (b)) was calculated for each city for which data existed. With these acreages, a *baseline incidence percentage* representing how much of each jurisdiction's total industrial and commercial acreage this land comprised was calculated. For example, the baseline incidence percentage for Brownfield acreage suitable for housing using definition (a) was calculated by dividing the acreage associated with the identified industrial or commercial land adjacent to housing by the total amount of industrial and commercial land in that jurisdiction.

Next, the baseline incidence percentage for each jurisdiction was used to calculate the available acreage of sites suitable for housing in Los Angeles County. This was done by first grouping the cities according to the six Banerjee-Verma city cluster typologies (see Table 2). Within each city cluster typology group, an average incidence percentage for housing-suitable Brownfield acreage was established by averaging over the baseline incidence percentages of the cities in the cluster typology. These average percentages were then used as a norm and applied to all cities in that cluster for which data were not available. The cluster-specific norms were multiplied by the industrial and commercial acreage in the jurisdiction to produce an estimate of available acreage for each city in the County. Summing over these estimates plus the acreage from the cities for which data existed yielded an estimate for the entire county.

If the analysis of Brownfield acreage suitable for housing is restricted to definition (a) from above, cities in the *Edge Cities* and *Generic Cities* groups had the highest incidence of such land. By contrast, when commercial corridors and industrial clusters are also added, *Greyfield Cities* became those with the highest incidence for this type of development, with *Edge Cities* and *Generic Cities* ranking as the second and third most intensive cities for such development. Regardless, *Generic Cities* still hold most of the commercial and industrial acreage in the County and thus would have to be a vital focus of energies if a Brownfield and Greyfield housing development strategy is to have a material impact.

To generate acreage estimates for the third and most comprehensive rule for including land uses, which includes vacant redevelopment land (definition (c) from above), data from the State of California Community Redevelopment Agencies Annual Report for fiscal year 2001-02 was used. This report indicated the amount of vacant land in the redevelopment area of each city in the County. Given redevelopment patterns in the state, it would not be appropriate to consider all of this land as available for housing development. Rather, the amount of land was reduced by a factor of .20, which corresponds to the share of tax increment that must be set aside for housing by

redevelopment agencies in the state of California.

Given this approach, there remained two additional issues to resolve. The first issue involved the treatment of vacant parcels. In the course of the visual field surveys, data collectors noted scattered parcels that were vacant. While such sites could not definitively be included as Brownfield sites, they undoubtedly would be suitable for housing under some conditions and thus a means was sought for their inclusion using broader definitions. The vacant parcels were identified as either industrial or commercial and their acreage was then incorporated into the category-specific totals. While only results from the above method are presented, results were also generated using two other approaches. In this first of these alternatives, vacant parcels were treated as a separate category and the baseline incidence percentage procedure from above was applied to impute available vacant acreage in commercial and industrial areas for the cities within each cluster group. In the second alternative, vacant parcels were viewed as idiosyncratic to the jurisdictions surveyed and simply added to the acreage identified via the survey and imputation methodology.

The second additional issue arose because a number of respondent cities indicated that they had no Brownfield sites suitable for housing. It was not immediately obvious how to treat these cities. If they are a representative sampling of other cities in Los Angeles County, then their data should be used in calculating average incidence percentages for the city cluster typologies. On the other hand, if they are a complete accounting of the cities in Los Angeles County with no Brownfield sites, then they should be excluded from these calculations.

In order to tease out the possible impact of the two treatment options on the results, this report presents two sets of estimates of available acreage suitable for housing: one that includes responses from these cities that reported no sites in calculating average incidence percentages and one that excludes these responses in making such calculations. The measure of acreage suitable for housing that was derived using the former approach almost certainly understates the potential impact of development on Brownfield sites

suitable for housing. However, the measure that excludes these zero-site cities probably overstates the potential impact.

IV. Task Two: Estimate the Potential Number of Housing Units

Given the estimates of the total acreage of Brownfield sites that are suitable for housing in Los Angeles County, various assumptions about the density of development had to be made in order to calculate the number of housing units that can be produced on this land. The analysis used three density scenarios, based on the development densities outlined in the San Joaquin Valley Growth Response Study (2003), prepared by the USC Center for Economic Development on behalf of the California Department of Transportation. This study outlines the typical residential development densities that have prevailed for recent developments in California. The three density scenarios are:

- 10 units per acre, corresponding to medium-low density residential development;
- 20 units per acre, corresponding to medium density residential development; and
- 35 units per acre, corresponding to medium-high density residential development.

An examination of existing residential densities across Los Angeles County suggests that these are reasonable densities to use as proxies for potential development. As of 2000, of the cities in Los Angeles County, 64 averaged medium-low density development (10 units per acre or less), 20 averaged medium density development (between 11 and 20 units per acre), and three averaged medium-high density development (21 to 35 units per acre). No cities had land use patterns exceeding 35 units per acre.[4]

Moreover, the Southern California Association of Government's inventory of land use in Los Angeles County, updated in 2000, further suggests that these density scenarios are reasonable. According to this analysis, 18.4 percent of Los Angeles County's land,

[4] These estimates are based on data from the Census and the Southern California Association of Governments aerial land use survey. This does not total 88 cities because one city incorporated after 2000.

corresponding to 483,325 acres or 755 sq. miles of land, is used for residential purposes.[5] The 2000 Census indicates that Los Angeles County has 3,270,909 housing units, most of which are single-family residential (attached and detached) units (56.1 percent). Less than 9 percent of the units are in structures of 50 or more units, which suggests a lesser role for presumably higher density development.[6] From a density perspective, this translates to a rather low average density of 6.77 dwelling units per acre. Hence, the three selected scenarios correspond to development at 1.5, 3, and 4.4 times the existing average density, respectively.

The density scenarios emerge from the fact that the trend in California has been toward less, not more, density. Higher-density housing in Los Angeles County, in general, is concentrated in only a few commercial corridors, such as the Wilshire Boulevard and Santa Monica Boulevard corridors in the City of Los Angeles, or in smaller pockets in cities such as Burbank, Glendale, Long Beach, Pasadena, and Santa Monica.

The choice of 35 units per acre as the maximum development density understates what is possible. This conservative assumption recognizes that density, particularly higher density, is often met with political opposition. Negative perceptions of higher density development include increased traffic, loss of property values, and increases in crime. The aversion to higher density manifests itself in resistance to new development (sometimes referred to as "NIMBYism") and has often become a hot potato in local politics.[7] To assume a density higher than 35 units per acre as the maximum likely density would be to assume a fundamental change in development patterns (and attitudes) in the region. While such a change would undoubtedly produce the most new housing development in Los Angeles County, overcoming the myths and fears associated with higher density housing would require a concerted and time-consuming strategy of timely

[5] The broad categories of land use under this area includes: (1) Single-family residential (2) Multifamily residential (3) Mobile home and trailer park (4) Mixed residential and (5) Rural residential.

[6] The remaining breakdown of units by structure size 17 percent of Los Angeles County units in 2 to 9 unit structures, 8 percent in 10 to 19 unit structures, and 8.8 percent in 20 to 49 unit structures.

[7] "NIMBY" is an acronym for "Not in my backyard".

information, outreach, and education that seems infeasible given the development time frame assumed in this report.

For each scenario, all development in the County was assumed to occur at the prevailing density. This will almost certainly not be the case in actuality. Thus, this analysis establishes upper and, perhaps, lower bounds on the number of units that can be produced using Brownfield sites in the County. It also provides a mid-range estimate that can be considered.

The following page presents a few examples of multifamily housing that illustrate the kind of density envisioned for the Brownfield development under the various density scenarios. These sites are drawn from City of Los Angeles Housing Authority's website of innovative housing projects.[8]

[8] http://api.ucla.edu/rhna/HousingStrategiesPlans/HousingDesign/proj_pgs/projects.htm.

Ostego Gardens, San Francisco

13 Units Per Acre

Daybreak Grove, Escondido

15 Units Per Acre

Willowbrook Green, South Central LA

19 Units Per Acre

Sunrise Place, Escondido

23 Units Per Acre

Parkside Condominiums, San Jose

31 Units Per Acre

Kippen Condominiums, Santa Monica

29 Units Per Acre

This report presents a varying estimate of the development potential of Brownfield sites based on a range of assumptions. So as to not inundate the reader with too many estimates, the discussion that follows focuses on two definitions, the most and least restrictive. For each, the available acreage and potential number of units that could be produced are shown, using the approaches described above. Results are shown if one either includes or excludes cities with no Brownfield sites in the calculation of category-specific averages. Also shown are the results if one overlays both the cluster and corridor areas to assess the extent to which this complementary strategy would significantly alter the affordability equation.

Los Angeles County has between 1,930 and 4,400 acres of housing-suitable Brownfield sites on commercial and industrial land (see Table 3).

Table 3: Estimate of Available Brownfield Acreage in Los Angeles County, Under Selected Suitability Definitions

	Exclude cities with no Brownfields		Include some cities with Brownfields	
Inclusion Rule	Any identified C & I land[1]	C & I land plus corridors and clusters[2]	Any identified C & I land[1]	C & I land plus corridors and clusters[2]
City Classification				
Edge	410.4	765.7	205.2	382.8
Industrial	6.5	216.1	3.3	108.0
Suburbia	267.5	579.3	80.3	173.8
Brownfield	42.6	389.8	42.6	389.8
Apartment	1.6	7.6	1.6	7.6
Generic	1602.9	2454.4	1602.9	2454.4
Total	2331.6	4412.8	1935.8	3516.5

[1] C & I land is defined as commercial and industrial land adjacent to housing identified either via the windshield survey or questionnaire response.

[2] Corridors and clusters are commercial corridors and industrial clusters.

Not surprisingly, the highest estimates are those in which cities reporting no Brownfield sites are excluded from the category-specific calculations. Omitting these cities has its greatest effect among Generic, Edge and Suburbia Cities, all of which see their acreage

increase considerably (all more than 100 percent). Other city categories show no changes in their estimated acreage. In all cases, a majority of the available Brownfield acreage suitable for housing is located among Generic Cities, which include the City of Los Angeles and unincorporated Los Angeles County. In one case, Generic Cities account for more than 80 percent of the available housing-suitable Brownfield acreage.

Table 4 reports estimates of the number of housing units that development of this acreage could potentially produce. There is a wide range, from 19,000 to just less than 365,000 units, depending on the rule for including particular land uses and the density scenario one chooses. Use of the more inclusive rule for including land uses increases the estimates considerably.

In terms of its human impact, construction of these units would house between about 58,000 to almost 1.1 million people. This estimate assumes that the households who take residence in these units are average sized. If, however, we adjust the estimate to reflect the fact that lower-income, minority, and immigrant households tend to be larger, the impact becomes even bigger, with almost 1.5 million people gaining a home at the higher end.

From these estimates, it is clear that the approach for development Brownfield sites will involve a significant focus on vacant land in redevelopment areas, much of which we expect will involve Brownfield sites. The more than 6,000 acres yield a considerable number of units above and beyond that which can be produced on the commercial and industrial land, in the industrial clusters, and along commercial corridors.

Table 4: Estimate of Potential Number of Units via Brownfield Development in Los Angeles County

	Density Scenario (units per acre)		
Inclusion rule	Medium-low (10)	Medium (20)	Medium-high (30)
Include some cities reporting no Brownfield sites			
C & I land adjacent to housing[1]	19,358	38,716	67,754
Add corridors and clusters[2]	35,165	70,329	123,076
Add vacant redevelopment land	67,754	191,100	334,426
Exclude cities reporting no Brownfield sites			
C & I land adjacent to housing[1]	23,316	46,631	81,604
Add corridors and clusters[2]	44,128	88,257	154,449
Add vacant redevelopment land	104,514	209,028	365,799

[1] C & I land is defined as commercial and industrial land adjacent to housing identified either via the windshield survey or questionnaire response.

[2] Corridors and clusters are commercial corridors and industrial clusters.

That said, the estimates also suggest that development of commercial corridors and industrial clusters can increase the estimated number of units by significant amounts. In all cases, incorporating these locations into the development effort nearly doubles the number of units that will be produced. The increase is virtually identical across the three density scenarios and does not vary much whether one includes or excludes cities that reported having no Brownfield sites.

V. Task Three: The Market Impact

In considering the impact of these units on the County's housing market, one must first assess current market dynamics. Based on a recent U.S. Census Bureau report on in-migration to Los Angeles County during the 1990s, a conservative estimate suggests that the County needs about 47,000 new units annually to house these new immigrants. However, during the 1990s, the County issued permits at the rate of about 18,000 units per year. If these trends are to continue, it suggests an on-going annual shortfall on the

order of 30,000 units per year. This annual shortfall is one important reason why housing prices and rents have risen so rapidly and steadily over the past few years.

This section assesses the market impact of developing the units as projected in the previous section and detailed in Table 4. The first section assesses impact assuming that all the units reach the market at one time. A more realistic assessment which assumes that units reach the market gradually over time follows this initial analysis. Both sections discuss, separately, the analysis that includes survey results from cities that reported no Brownfield sites suitable for housing and the analysis that excludes the results from these cities.

A. The Estimated Market Impact – How Much of the Shortfall Is Filled?

The first issue to consider in determining the market impact is to establish how production of housing on Brownfield sites suitable for housing compares to the annual structural shortfall of 30,000 units, which is the defining characteristic of the Los Angeles County rental market. The estimates in Table 4 provide an initial sense of the market impact of such development and highlight the key levers that will maximize the impact of this strategy.

This part of the discussion implicitly assumes that all the units produced would reach the market at the same time and thus inundate the market with new capacity. Under this assumption, any projection exceeding the 30,000 unit threshold would, assuming no changes in economic conditions and demographic trends, fully offset the structural production shortfall. Production close to 30,000 units would result in a stabilization of housing prices (i.e., there would not be an appreciable increase or decrease in rents). Production far above the 30,000 threshold could result in significant declines in rents. Production below 30,000 units would serve to reduce the rate by which rents increased, but would not lead to rent decreases.

The top panel of Table 4 shows the production estimates that are obtained when city cluster percentages are calculated including cities that reported no Brownfield sites.

Focusing first on development of industrial and commercial land adjacent to housing only (first row, Table 4), it is clear that if development were limited to a lower density, current market dynamics suggest that development of Brownfield sites that are suitable for housing would serve to reduce the existing shortfall.

A different conclusion is reached if development were to occur at higher densities. Under these scenarios, the number of units that is estimated to be produced exceeds the 30,000 unit threshold, sometimes by a considerable amount. In these cases, production would do more than just reduce the annual shortfall; the market would begin "catch up" and cover some of the shortfall from prior years.

Expanding the definition of what land uses one considers leads to larger estimates of the market impact of development on these lands. Adding industrial clusters and commercial corridors significantly increases the estimated number of additional housing units that would be available. The estimates suggest that the inclusion of these land uses in the overall development strategy would increase the number of units produced by more than 84 percent. Finally, the addition of vacant land in redevelopment areas further boosts the estimate of the number of units that could be produced, sometimes by considerable amounts.

As noted above, the exclusion of cities that reported no Brownfield sites when calculating baseline incidence percentages increases the estimated amount of Brownfield acreage suitable for housing. It comes as no surprise then that the estimated number of units and, by extension, the market impact is greater under this scenario (bottom panel, Table 4). The increase in the number of units ranges from about 10 percent to 55 percent, with the most common increases falling in the range of 20 percent. All estimates save one – low density development on commercial and industrial land adjacent to housing – exceed the basic 30,000 unit threshold identifying the level of production needed to hold rents steady.

In both panels of Table 4, it is clear that the inclusion of industrial clusters, commercial

corridors, and vacant redevelopment land is quite important. The number of new units produced by the model always exceeds the 30,000 unit threshold when these land categories are included. Moreover, the addition of the redevelopment land provides a very large boost in terms of the number of units that would be brought to market. These estimates suggest that for the strategy to have maximum effect, the most comprehensive conception of developable land should be implemented.

Further, strategic effects are maximized if development densities are as high as possible. Across the board, high density development is projected to result in the market starting to "catch up" and compensate for the development shortfall the market has seen in recent years. Indeed, a combination of high density development and a comprehensive notion of developable land under this initiative would have striking effects. It is estimated that such an approach would yield nearly 366,000 additional housing units in Los Angeles County.

B. Estimating More Realistic Effects on Rent: Introducing Time Horizons

The preceding discussion assumed that all the units produced under a scenario would reach the market at the same time, so that any projection exceeding the 30,000 unit threshold would work against the structural production shortfall. However, it is unlikely that all units would become available on the market at once. Rather, because of different production schedules and the delays that hit every development effort, a more likely outcome is that the units would gradually reach the market over some time horizon. In assessing market impact, then, it is more useful to incorporate this directly into the analysis.

This exercise is shown in Table 5, which presents the effect on market rents if the units produced were to reach the market over a 3-, 5-, or 10-year time frame, respectively. In each case, for simplicity, it is assumed that the units are introduced evenly over time. That is, the three-year time horizon estimates assume that one-third of the units reach the market in each year, the five-year estimates assume one-fifth become available each year, and so on.. Table 5 reports the market rent impact for the unit estimates, based upon data

that excludes those cities reporting no Brownfield sites. The market impact of the estimated development that would occur based on data that includes these cities is similar, though slightly lower.

Table 5: Projected Rent Levels After All Units Were to Reach Market Using Various Time Horizons

Density scenario Inclusion rule	Total number of units[1]	Time horizon (years) 3	5	10
Medium-low (10 units/acre)				
C & I land adjacent to housing[2]	23,316	$1,446.75	$1,625.78	$2,175.87
Add corridors and clusters[3]	44,128	$1,389.36	$1,561.83	$2,090.81
Add vacant redevelopment land	104,514	**$1,231.31**	$1,387.40	$1,860.45
Medium (20 units/acre)				
C & I land adjacent to housing[2]	46,631	$1,381.29	$1,552.86	$2,078.91
Add corridors and clusters[3]	88,257	$1,274.08	$1,434.36	$1,922.23
Add vacant redevelopment land	209,028	**$990.30**	**$1,126.16**	$1,519.82
Medium-high (35 units/acre)				
C & I land adjacent to housing[2]	81,604	$1,289.41	$1,451.23	$1,944.47
Add corridors and clusters[3]	154,449	**$1,113.40**	**$1,258.88**	$1,692.23
Add vacant redevelopment land	365,799	**$689.50**	**$807.69**	**$1,111.10**
MEMO: Projected rent level with no additional production		$1,511.40	$1,698.21	$2,272.59

[1] Unit production estimates are those obtained when category-specific baselines were calculated using cities for which survey or questionnaire data were available excluding those cities which reported having no Brownfields.

[2] C & I land is defined as commercial and industrial land adjacent to housing identified either via the windshield survey or questionnaire response.

[3] Corridors and clusters are commercial corridors and industrial clusters.

NOTE: Bold rent levels indicate nominal reductions in rent from current levels. The baseline average monthly rent level used is $1269, which was the average rent for Los Angeles County for the fourth quarter of 2003.

C. Market Impact Using a Three-Year Time Horizon

Starting with medium-low density development and the least inclusive approach for considering developable land (first row, Table 5), the estimates suggest that 23,000 total units would be produced. Assuming a three year time horizon, this implies that slightly less than 8,000 additional units would be produced each year, which would reduce the annual shortfall from nearly 30,000 units to about 22,000 units. Using a simple linear assumption regarding the relationship between the unit shortfall and the rate of rent increases, and abstracting away from significant changes in supply propensities or in the macro- and regional economy, this would reduce the rate of rental increases by slightly less than one-third. Since 2000, the average rent level in Los Angeles County has increased by approximately 6 percent a year.[9] With the addition of these units, then, it is estimated that rent increases would be limited to just under 4.5 percent annually. At the end of the three years, the rent level is projected to be $1,446.75, which is above the current rent level for the County but below the $1,511.40 it would be if the full 6 percent increase took hold in each year.

Adding industrial clusters and commercial corridors to the pool of Brownfield land suitable for housing has a greater impact on rent appreciation, but again does not exceed the 90,000 units needed to begin to cut into the longer term unit shortage. Rent appreciation is slowed further, as rents reach $1,389.36 at the end of year three. Under low density development, the structural shortfall is only completely offset when vacant redevelopment land is introduced into consideration. In this case, 5,000 extra units beyond the 30,000 needed to fill the shortfall are produced, and rents actually fall slightly from current levels.

Assuming a higher density of development yields a similar conclusion. The market impact of estimated development when using less inclusive approaches for considering land uses reduces the rate of rent appreciation, while the market impact of development on lands included under a more comprehensive approach leads to actual rent reductions.

[9] Source: Author calculations using data purchased from MPF Research, Inc.

Under the more comprehensive approach and assuming medium density development, almost 70,000 new units would be produced in each of the three years. This would quickly fill the market with units and average monthly rents would fall below $1,000, to levels not seen since the end of 1998.

Clearly, medium-high density development will have the greatest market impact. In this case, even the least inclusive rule produces housing that would virtually offset the structural housing shortage in today's Los Angeles County rental market and thus keep rents relatively stable. The most comprehensive definition of land uses suggest that rents would fall with the introduction of housing. For example, medium-high density development on industrial and commercial land as well as in industrial clusters and along commercial corridors would result in the average rent falling to close to $1,100 at the end of three years. Put another way, after these units were brought to market, rents would have returned to the average rent level that prevailed at in the middle of 2000. Nearly three years of rent increases would have been rolled back.

As with the preceding analysis, this three-year impact analysis suggests that there are two important dimensions for maximizing the market impact of housing development on Brownfield sites. The first dimension involves being as broad and creative as possible in considering land that is suitable for housing. Adding industrial clusters, commercial corridors, and especially vacant redevelopment land significantly increases the positive effects on rents in terms of affordability. The second element is to promote higher density development where possible. Higher densities yield higher numbers of units, which in turn leads to larger reductions in market rent levels.

The most productive case – high density development on land including vacant land in redevelopment areas – combines these two general conditions. The nearly 366,000 units projected implies over 120,000 extra units per year and a reduction of the structural deficit by 90,000 units per year. Such a large volume of additional development would flood the market with units and rents would plummet by almost 20 percent a year. Such large price declines, if they were to occur, would draw allusions to an apartment market

"depression."

D. Estimated Impact Using Longer Time Horizons and Other Issues

It is important to recognize that these estimates are quite sensitive to the horizon one uses in estimating the time it will require for these units to reach the market. If the arrival of units is extended over longer periods, the market impact of the Brownfield development declines. As shown in Table 5, changing the time horizon from 3 years to 5 years results in a smaller rent decline, and sometimes the difference in expected rents is quite large. Moving to a 10-year horizon has even more dramatic effects, as here rents would be reduced in only 1 of the 9 cases examined. This analysis thus highlights the importance of the timely production of these units, which points to the importance of competent project management, streamlined entitlement processes, and skillful handling of local community interests. That said, the additional units always do have an impact, as the estimated rent levels are in every case lower than the rents that would prevail absent their production (see Memo).

It must be noted that the declines in rent, as conceived here, are transitory. Unless development patterns or demographic trends change appreciably, after these units reached the market the 30,000 unit imbalance would return in future years and housing prices would begin to rise anew. That said, the addition of the Brownfield units would offer considerable short-term relief to families facing severe housing burdens.

This analysis has assumed that the housing development on Brownfield sites would be exclusively rental. This seems reasonable, as developers might balk at trying to market long-term residence on land that may have had some prior environmental issues and homebuyers would likely shy away from such product given the availability of a reasonable alternative that lacked such issues. Renters, by contrast, will often not be as concerned about the implications of long-term residence in housing on prior Brownfield sites, as they are likely to move sooner than homeowners usually will.

In spite of this, emerging developments in rental markets can and often do have an impact on the homeownership market. New rental product provides an alternative for prospective homebuyers who may have a level of resources that makes them a borderline ownership candidate. The introduction of new rental developments, particularly if it helps to reduce rent levels, can be a moderating force for prices in the ownership market. This would certainly be the case in Los Angeles County, where house prices are already quite high. However, the extreme excess demand in the regional housing market suggests that any impacts will reduce the rate of home price appreciation rather than reduce the price of homes outright.

VI. Task Four: Identification of Housing Built on Brownfield Sites

A. Background and Methodology

Identifying housing built on Brownfield sites in Los Angeles County is challenging, as the developer community has generally been reluctant to share such information. Developers are more often willing to share information about retail uses built on Brownfield sites than housing built on such locations. Based on interviews and discussion, most developers view housing on Brownfield sites as an anathema – an uncertain, complicated, and risky investment. There are several reasons why many developers do not view the development of housing on Brownfield parcels with enthusiasm, including the liability costs associated with Brownfield remediation, a fear of adverse publicity, and the threat of potential litigation. Moreover, these issues have been further compounded by a maze of legislations, ambiguous state clean-up standards, and the lack of a comprehensible roadmap to Brownfield redevelopment.

Initially, the project's scope of work called for the identification of housing developments built on Brownfield sites in Los Angeles County. However, due to limited developer response, the geographic coverage was expanded to the entire state of California. Developers were contacted through a variety of methods, including but not limited to telephone, mail, and e-mail. Initial contact was followed by sending developers a survey

designed to detail their experiences with housing development on Brownfield sites. The survey was sent to both for-profit and non-profit developers, land developers, real estate consultants, lawyers, and redevelopment agencies. The recipient list was based primarily on databases maintained by the USC Lusk Center for Real Estate and the Southern California Association of Non-Profit Housing, and secondarily on information provided by Region IX of the EPA, the California Department of Toxic Substances Control (DTSC), public agencies, and "word-of-mouth" from other developers. A copy of the survey is available in Appendix III.

B. Initial Findings

Thirteen developers provided feedback on 19 projects in California. The level of information received on the survey varies from sketchy to quite detailed. Since the sample size is rather small, no statistical inferences can be made. However, the developer responses are instructive and informative. It is possible to make some general and tentative observations about the patterns and trends in the Brownfield rehabilitation process. The following presents an overview of the findings. Please refer to Table 6 for individual project details.

a) Major Impediments

Some of the major impediments encountered in developing housing on Brownfield sites include:

- Remediation costs (higher than expected due to unforeseen circumstances such as expense needed to recap an improperly capped well)
- Excessive time required to develop the site
- Seller reluctance to disclose contamination
- Lack of coordination in completing investigation within lender timeframe requirements
- Performing remediation in accordance with a construction schedule
- Fronting the costs prior to cost recovery
- Lack of clarity regarding agency has jurisdiction once contaminants are discovered

b) Costs

In the survey, developers were asked for information on acquisition costs (per lot or unit), infrastructure costs (onsite and offsite), and sales price (per lot or unit). Most of the developers were extremely reluctant to share cost data for their projects. Some of this was attributed to confidentiality issues surrounding pricing, while in other instances the complexity of the deal precluded them from isolating components of costs requested. Hence, no generalizations can be made regarding acquisition, infrastructure, or cost/sales price per unit built.

c) Geography

Housing on Brownfield parcels is dispersed throughout California. Survey responses include examples of projects in Los Angeles County (Carson, Long Beach, Los Angeles, Pomona, Santa Clarita), Orange County (Huntington Beach), San Diego, and northern California (Emeryville, Oakland, Sacramento, San Francisco).

d) Project Type

Most of the residential developments in the study consist of multifamily housing. Three projects are single-family housing developments. However, the sample was primarily made up of multifamily housing often with affordable, senior and mixed-use components. Eight of the projects were mixed-use developments including retail, office or other services within the project. One reason for this may be that the addition of retail can offset incremental costs associated with remediation.

e) Number of Housing Units

The number of housing units on a Brownfield site ranges from four (EPA/Habitat for Humanity) to 3,000 (Whitaker-Bermite). Eleven of the 19 projects have 100 or more units in the development, and 14 projects having 50 or more units. It appears from the survey sample and developer interviews that Brownfield developers tend to build large-scale developments in order to derive economies of scale.

Table 6: Common Contaminants

Acronym	Name	Description
ACM	Asbestos containing materials	
LBP	Lead Based Paint	
DCE	Dichloroethylene	An industrial solvent used in the manufacture of a number of products, including perfume. It is also a breakdown product of TCE.
PAH	Polynuclear Aromatic Hydrocarbon	A class of organic compounds that have multiple adjacent benzene rings.
PCB	Polychlorinated Biphenyl	A class of organic compounds consisting of two benzene rings and varying numbers of chlorine atoms. Due to its excellent insulating properties, it was widely used in transformer oil until it was discovered to be a potent carcinogen.
PCE	Percholorethylene or Tetrachloroethene	A solvent used extensively in dry cleaning. Its breakdown products include TCE and DCE.
TCE	Trichloroethylene or Trichloroethene	A common industrial solvent used to clean aircraft components, among other things.
TPH	Total Petroleum Hydrocarbons	
UST	Underground Storage Tank	
VOC	Volatile Organic Compound	A chemical compound with carbon as a main constituent, and that evaporates readily at room temperature and have a high vapor pressure

f) Contaminants

Typically, major sources of soil contamination include oil wells, underground storage tanks (USTs), and volatile organic compounds (VOCs). Other contaminants cited by the respondents include arsenic, cadmium, lead, PCBs, PCEs (and its breakdown products, TCEs and DCEs) and heavy metals. See Table 6 for a summary of contaminants.

g) Remediation Type

A variety of techniques, such as offsite disposal and onsite cap; soil removal, capping, and treatment; removal of USTs; onsite installation of vapor barriers; aeration; onsite groundwater treatment; and use of contaminated soil for road base, have been adopted to remediate contaminated soil.

h) Remediation Cost

Remediation costs range from $300,000 to $9 million. As expected, the costs vary with the size of the development, nature of contamination, remediation standards, and the type of remediation used. One cost that is not reflected in the numbers presented is ongoing costs such as maintenance costs associated with some of the projects. For instance, projects that deal with methane contamination require both barriers (an onsite development cost) as well as monitors (an ongoing maintenance cost).

Several developers mentioned the common use of cost-saving measures during development that were specific to the circumstances of Brownfield development. These included using contaminated soil as the road base, thereby cutting the cost of soil disposal, and performing the remediation concurrently with development processes such as grading, thus reducing the overall amount of time spent on construction.

i) Remediation Funding Source

Approximately half of the projects in the sample funded the remediation solely through private financing. The remaining half used a mix of public and private funding. Public assistance was in the form of funds to the developer, assistance in land assembly, and site

remediation before conveyance of the property. Developers who did use public funding commented on the difficulty of applying those funds to the project due to myriad requirements and obligations.

j) Phase I and II Environmental Assessment Costs

Phase I costs do not exceed $5,000 for any of the developments. However, Phase II costs vary significantly depending upon site, contaminants, and desired standards of remediation for the proposed use. Phase II costs vary from just over $5,000 to over $300,000 depending both on the size of the project and the level of contamination. Generally, for those developments that listed Phase II costs there was very little "middle ground." The projects were either on the low end, $5,000 to $20,000, or on the high end, $100,000 and above.

k) Total Time Spent

The total time spent from project initiation to the "Issuance of Declaration of No Further Action (NFA)" ranged between five months to 5 years. The issuance of declaration of NFA is contingent upon a variety of factors.

C. Case Studies: Housing Developments on Brownfield Sites in California

a) 101 Market Street - San Diego, CA

The apartments at 101 Market Street in San Diego consist of 151 multifamily units and 11,000 square feet of ground-floor retail on a 1.36-acre site. The unit size ranges from 500 square feet to 2,000 square feet. Unit types were walk-up style townhomes, traditional apartments, and lofts.[10] As with many downtown projects, the site offers convenient access to retail and restaurants.

The project was built with the goal of being the most luxurious apartment building in downtown San Diego. Former uses of the site include a bus maintenance yard and a

[10]http://www.sandiegometro.com/2001/oct/coverstory5.html

parking lot. In order to redevelop the property the San Diego Redevelopment Agency worked in partnership with developer, The Morgan Group, to clean up contaminants remaining from the site's previous usage. Contaminants found on the site included petroleum, diesel and lead that were removed by excavation and disposal. A vapor barrier was installed onsite. Total remediation costs were estimated at $1.5 million, estimated to be $10,000 - $15,000 per unit. The Centre City Development Corporation, supplied $400,000 up front for remediation expenses and later recouped the costs from Greyhound, which as the party responsible for the contamination paid for most of the remediation cost. In total, it took over two years to clean the site.

Both the location and the "high-end" nature of the development made 101 Market Street an ideal candidate for Brownfield redevelopment.

A lawyer with Opper & Varco, a law firm representing the San Diego Redevelopment Agency, commented on the challenges associated with this project. Their comments touched on the difficulty of performing remediation in accordance with a construction schedule. They mentioned the difficulty of fronting costs associated with remediation prior to cost recovery. The success of this project may well be a function of the ability to ultimately recover costs from the responsible party.

b) Avalon Courtyard - Carson, CA

Avalon Courtyard, a 92 unit low-income senior housing project located south of the City of Los Angeles in Carson encountered a number of problems during the development phase. Located on the 0.69-acre site of a former metal-plating plant, workers had to dig 65 feet below the ground to remove contaminated soil from a 5,000-gallon underground fuel tank that leaked.

The developer of Avalon Courtyard, Tom Safran of Tom Safran and Associates, credits

the successful completion of the project to the development of a niche market in the infill development of senior housing made affordable through use of public subsidies. The use of such subsidies requires the securing of a complicated web of financing involving various government agencies and financial institutions. Sources for the $9 million project included $2.5 million from the City of Carson, $2.5 million from the California Community Reinvestment Corporation and $4 million from Mission Housing Investments, a subsidiary of Southern California Edison.

The amount of remediation involved in the project was not significant. It included the removal of gasoline, four DOT drums, oily surface material and an old septic tank. The total cost of remediation was $300,000, one-third of which ($100,000) went to aerating the soil. Further constraints included the need to have Los Angeles County health agencies approve the remediation work before building on the site could begin. Ultimately, the project took over five years to complete.

c) Plaza Almeria - Huntington Beach, CA

Plaza Almeria is a mixed-use project with 42 townhomes, office and retail components, located in the heart of downtown Huntington Beach just three blocks from the City's famous pier and the ocean. The 1.84-acre site was targeted by the city's redevelopment agency for development.

Two corners of the site previously existed as gas stations. Although the storage tanks had been removed, environmental studies showed hydrocarbon contamination at one of the corners.

The agency's cost to assemble the site and clear the site of existing structures exceeded $6 million. The agency took on all risk. It funded the relocation of occupants, demolished the existing improvements, remediated the site and removed hazardous materials.

The developer chosen to develop the site, JT Development, accepted the site "as-is" subject to a $250,000 cap on remediation costs to the developer. Remediation included soil aeration for one year. The developer also agreed to an inclusionary housing obligation as part of the development agreement.

During construction, a previously undiscovered gasoline tank was unearthed. The tank was removed, but soil and groundwater contamination remained in the soil. The agency filed suit against Wells Fargo Bank, Texaco Inc., and the property owners as well as other potential responsible parties for the clean up of sub–surface hydrocarbons on the site.

The city saw direct gains from the development. Plaza Almeria has an estimated completion value of approximately $27 million, providing $270,000 in annual property tax increment to the agency. In addition, the businesses that occupy the commercial space supported 300 employees and were expected to generate approximately $260,000 in annual sales tax revenue to the city.

JT Development's only comment was that the one-year period of soil aeration had a negative impact on the construction schedule.

The resulting development consists of 30,000 square feet of retail space on the ground floor with 10,000 square feet of office space above. Forty-two townhomes are located on the upper levels of the development. Tenants include a residential realty office, restaurants and a pet store on the ground floor, an oil trading company, and the Huntington Beach Visitor's Bureau on the second floor.

d) Bayshore Place - Long Beach, CA

Bayshore Place consists of 51 single-family homes located on a 7-acre site that had previously been used for oil production and storage for nearly 100 years. Approximately 30 wells existed on the site that needed to be capped, although only five remained active immediately prior to development.

The developer, New Urban West, bore the entire cost of the project, estimated to be $30 million. The redevelopment agency at the City of Long Beach provided site assembly assistance through the use of eminent domain, but the agency provided no financial assistance and the city did not waive any development fees. The assistance in land assembly allowed the developer, New Urban West, to achieve the necessary scale to make environmental cleanup feasible.

The estimated remediation cost for the development is $2.5 million. Overall, the project took more than five years to complete.

Oil production sites often have active oil and methane seepage that must be dealt with through ventilation and other remediation. Many of the abandoned oil wells at Bayshore had leaked, causing hydrocarbon contamination of the soil.

The abandonment of oil wells is subject to state building codes and must be approved by the California State Division of Oil, Gas & Geothermal Resources. The process of abandonment includes locating the wells and plugging them, or drilling out the existing plugs where required (usually of older caps) and replacing them with new plugs, and then properly venting the underground structure.

In addition to capping the five active oil wells, all 25 of the inactive oil wells had to be re-capped and abandoned in order to comply with current building codes. Many of the previously abandoned wells had been capped with telephone poles or cable, creating the need to drill 2,000 to 6,000 feet below the surface and install plugs at various depths to be certain no leaking would occur.

One oil well, while properly capped, could not be abandoned according to current regulations. As a result, all residential structures had to be at least 10 feet from the well, reducing the number of units to 51 from 52 single-family homes.

In addition, the soil needed to be treated or removed to a depth of 10 feet below the surface. This required the removal of underground pipelines, tanks, and miscellaneous debris.

The removed soil was relocated to another part of the site, compacted and graded. In order to reduce the costs associated with remediation, the soil was reused where possible. For instance, soil with chemical levels in excess of 10,000 parts-per-million could remain on the site but only for use as subsurface soils under pavement. This reduced the cost of bringing in new soil and by reducing soil removal costs. The remediation effort was handled concurrently with the construction process to reduce the impact of remediation on the overall project timeline.

Final remediation costs were significantly higher than projected, in part because abandonment costs for the oil wells was higher than expected. Further, although much of the soil could be reused following remediation, it needed to be moved from one part of the site to another.

In order to finance the development, New Urban West took on an equity partner, Institutional Housing Partners, an investment arm of CalPers.

The agency submitted Bayshore Place as a California Redevelopment Association Award of Excellence nominee and submitted the project for this survey. New Urban West opted not to participate in the survey although when asked the project manager associated with Bayshore Place expressed frustration with the project's long development timeline and the additional costs incurred as result of mitigation efforts.

e) Cherokee Investment Partners - Denver, CO

Cherokee is a private real estate equity group that acquires, remediates, and then sells Brownfield sites for development. Currently, Cherokee is the largest and most active Brownfield and redevelopment investment firm in the world, with equity commitments and committed leverage totaling more than $1 billion in capital.

Operating under this structure, Cherokee acquires properties "as-is, where-is" for cash and indemnifies the seller from future environmental liability through various risk transfer methods. Once the property is remediated and entitled, Cherokee then sells the property to a developer as clean land. At this point, the property is no longer considered a Brownfield and the developer is under no obligation to treat it as such (which may be one reason why it has been difficult to identify these sites).

Generally, all of Cherokee's sites are cleaned to the highest environmental standards to allow for unfettered future residential development. Under Cherokee's development model, due diligence at the time of land purchase (environmental assessment and

remediation cost estimates) allows the cost of remediation to be built into the land price and borne by the seller. The costs vary greatly depending on the type of contamination. Integrating and customizing the remediation plan is one way to minimize those costs.

The Cherokee business model capitalizes on what Cherokee regards as an "inefficient system" of regulation and policy regarding Brownfield development. As such, comments provided by Cherokee were not centered on the same topics of concern expressed by other developers. However, Cherokee officials expressed a desire to see more public funding for up-front costs such as initial studies and due diligence. In addition, there were concerns over current liability standards and a belief that the lack of integration among public agencies makes it difficult for firms that do not specialize in risk management to be successful. One suggestion was clearer, more concise standards and a "fast track" process for quicker resolution.

Cherokee sees two new directions in Brownfield redevelopment. First, the privatization and closure of military bases has created a land market that previously did not exist. Cherokee has approached several branches of the military in hopes of acquiring bases in the San Francisco area. Second, growth in cities' urban cores, especially secondary cities, has shifted urban land costs in favor of development on infill sites that were previously abandoned in favor of cheaper "greenfield" land in the suburbs.

VII. Task Five: The Cost of Brownfield Development: Does it Make Sense?

Although it has been established that the development of Brownfield sites can yield a considerable number of housing units, a key question is whether it makes economic sense to do so. For example, if the cost of developing these sites is so high as to preclude profitable development, then developers will look elsewhere for development opportunities. One potential alternative is the suburban fringe, where land is often plentiful, inexpensive, and available.

This section explores the question of how Brownfield development compares with

development on the metropolitan suburban fringe. From a cost perspective, in comparing the development of Brownfield sites that are suitable for housing with the development of undeveloped sites located toward the fringe of the metropolitan area (standard suburban-type development), one must explicitly recognize the different challenges each type of development faces. For this exercise, the base assumption is that the type of project is identical and that material, labor, legal, and other costs are the same. Given this, the main cost differences will involve project characteristics that are unique to either the Brownfield or suburban development situation:

A. Remediation

All Brownfield sites will involve some degree of remediation, and this process will involve costs.

a) Infrastructure Costs

While Brownfield sites will typically already be embedded in the existing infrastructure grid, many suburban developments will be located on sites lacking road, gas, electric, sewer, and water connectivity. Thus, suburban developments will require expenses to connect the development to the existing infrastructure system.

b) Entitlements

The more arduous the entitlement process, the more costly it will be to develop housing projects. However, in thinking about systematic differences in obtaining entitlements between Brownfield and suburban developments, it is not clear that one exists. The entitlement process is very jurisdiction-specific, and the local context plays a significant role in determining the ease or difficulty of navigating the process. As a result, entitlements can be very easy or very difficult, but the variance will occur across jurisdictions and within area types. Thus, there may be some cases where the entitlement process for a Brownfield project is easier than, more difficult than, or comparable to the entitlement process for a suburban project. Therefore, an entitlement component is not incorporated in the estimates.

Given these key distinctions, this cost exercise compares the costs of remediating Brownfield sites to the costs of connecting suburban developments to the existing infrastructure grid. These estimates of the cost of remediation are based on the surveys of completed development projects on Brownfield sites. Information was obtained for 11 such developments across California, whose cost distribution is shown in Table 7. The average cost of remediation for these sites was $1.7 million. However, this belies a significant variation across projects, with some requiring less than $300,000 in remediation while others required more than 10 times that amount. This fact highlights an important point, that *each project is idiosyncratic* and that *one must be cautious in the extent to which one makes generalizations* from these cost conclusions.

Table 7. Remediation Costs for Survey Respondents

Remediation cost category	Number of projects
Less than $500,000	5
$500,000 - $2 million	3
More than $2 million	3

Conversations with developers experienced in building at or near the suburban fringe suggest that a reasonable rough estimate of the cost to connect a project to a city's existing infrastructure is $400 per linear foot of distance between the project and existing infrastructure.[11] Given this, an assumption must be made regarding the distance a project lies from the existing infrastructure. Most developers will shy from developments too far from existing infrastructure. For this exercise, three scenarios are presented: one-tenth of a mile away, half a mile away, and one mile away.

The results of these estimates are shown in Table 8. As is clear, the cost associated with linking a project varies considerably with the distance the infrastructure must be run. In addition, given the estimate of the average cost of remediation, Brownfield development makes economic sense only when compared to suburban development at a further distance from existing infrastructure. If suburban development is within roughly eight-tenths of a mile from the existing grid, then the costs of remediation will, on average,

[11] In making this estimate, we realize that there will be substantial variation across jurisdictions and projects, depending on the zoning codes in place and requirements placed on the development.

outweigh the costs associated with linking the development to a city's existing infrastructure grid.

Table 8. Cost of Linking Suburban Project Site to Existing Infrastructure

Distance to infrastructure (miles)	Cost
.1	$211,200
.5	$1,056,000
1	$2,112,000

The vast majority of current developments fall beneath this eight-tenths-of-a-mile threshold, and only very few are considerably more than one mile away. This suggests that, more often than not, incentives and subsidies will be required to promote development of housing on suitable Brownfield sites.

VIII. Topics of Future Research

1. Investigate the types of incentives and code reform that might make it more feasible for developers – particularly affordable housing developers, both for-profit and non-profit – to target Brownfield sites for future housing projects.
2. Investigate how the negative community perception of contaminated sites can be changed through a greater awareness of the available mitigating measures and thereby decreasing resistance to in-fill developments on existing Brownfield sites. This may include documentation of existing best practices, and possibilities for alternative configurations of housing and mixed-use development.
3. Work with the environmental community to identify mitigating measures that would be acceptable for the development of housing and mixed-use development on Brownfield sites.
4. Develop a methodology for forecasting home ownership resulting from affordable housing on Brownfields sites, which will include analysis of neighborhood attributes, density, and housing mix.
5. Investigate the possible institutional roles of local and regional agencies and of state policies in actively identifying, facilitating, and brokering Brownfield development sites for affordable housing.

6. Study aspects of community perception of density, and how that might be changing with pressures of a growing population. This study could also focus on how or whether good site planning and design criteria developed with smart growth or "new urbanist" principles might increase the public awareness, and ultimately, acceptance of higher density Brownfields development.
7. Expand the current work using the methodology developed in this Los Angeles County study to estimate Brownfield acreage suitable for housing in other counties with high demands for affordable housing and a shortage of buildable urban land. In the immediate future this type of study could involve Orange and San Diego counties, and could be extended to Riverside, San Bernardino, and Ventura counties.

IX. Appendices

A. Appendix I: Brownfield and Greyfield Survey

USC
UNIVERSITY
OF SOUTHERN
CALIFORNIA

September 3, 2003

School of Policy, Planning, and Development

USC Center for Economic Development

Leonard Mitchell
Executive Director

Deepak Bahl
Associate Director

Dion Jackson
Associate Director

Dear City Managers, Planning Directors, and/or Community Development Directors,

Unproductive industrial and commercial sites and the housing shortage are two issues many of you are dealing with today. The Greenlining Institute, in an effort to alleviate L.A. County's housing crisis, has asked the USC Center for Economic Development to estimate the number and total acreage of brownfield sites in Los Angeles County within areas suitable for housing. By compiling a comprehensive list of unproductive industrial and commercial sites, which may be brownfield sites, we can quantify the potential number of housing units that can be built and determine the effect of these additional housing units on the housing crisis. We are also developing case studies on housing projects built on known brownfield sites throughout the county to compare the costs of infill versus suburban development. The end result will trigger policy changes that support the remediation and redevelopment of brownfield sites, and hopefully, provide one more tool toward resolving the housing crisis.

We request your assistance in identifying unproductive industrial and commercial sites in your district that would be suitable for housing based on their location (and if properly remediated should contamination be found), for example an old gas station or a warehouse.

If you have any questions, please contact me at (213) 740-6868.

Sincerely,

Dion Jackson
Associate Director

University of
Southern California
Los Angeles,
California 90089-0626
Tel: 213 740 1487
Fax: 213 740 0373
http://www.usc.edu/
sppd/ced/main.html

LOS ANGELES COUNTY
A BROWNFIELDS-BASED SOLUTION FOR THE HOUSING CRISIS

Conducted by the
University of Southern California Center for Economic Development
For the
Greenlining Institute

Please take time to answer the following questions. You will receive a copy of all data collected for your city when the project is complete in January 2004.

A 'Brownfield site' is real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of environmental contamination.

1. ***Attached is a list of Brownfield sites in your city (see definition). Please verify as many of the details provided as known and add the following:***
   - Square footage of buildings/acreage of site
   - Current zoning
   - Plans for redevelopment
   - Suitable for housing?

2. ***Please identify unproductive industrial and commercial sites that are suitable for housing and provide as many of the following details as known:***
   - Current environmental condition/status
   - Square footage of buildings/acreage of site
   - Current zoning
   - Current use: are they being productively used or underutilized
   - Historic use(s)
   - Plans for redevelopment?

3. ***Greyfields are old, obsolete, and unprofitable retail and commercial sites that appear in cities and suburbs throughout the country. Please attach a list of Greyfields in your city by address, site name, acreage, zoning, and percent occupied.***

4. ***Has your city had any housing developed on a Brownfield site? If so, who was the developer?***

Name _____

Address _____

_____

Phone number _____

PLEASE FAX INFORMATION TO (213) 740-0373 OR EMAIL TO dljackso@usc.edu.
If you have any questions, please call Melissa Fertig at (213) 740-9494

USC Center for Economic Development
384 Von KleinSmid Center
Los Angeles, CA 90089
Tel: (213) 740-6868. Fax: (213) 740-0373. Website: http://www.usc.edu/schools/sppd/ced

CARSON

Site Address	Site Name	Contamination*	Status as of**	Please add as much information as you have about each site, especially if it is suitable for housing: Suitable for Housing?	Current Condition	s.f. bldgs/ # Acres	Zoning	Plans for Redevelopment?
100 W. TORRANCE BLVD	GARDENA VALLEY DUMP #5		G					
16122 MAIN ST	DE-BEST MANUFACTURING CO INC	Aq, Oil, S	D-REFOA (06/01/95)					
1622 E. Sepulveda	Demolished		G					
16627 Avalon Blvd								
16627 AVALON BLVD	MOEN FOAM COMPANY		A-BKLG, G					
16914 S. BROADWAY	ALCO PACIFIC	A, Aq, Ca, L	A-AWP, G					

CARSON

				Please add as much information as you have about each site, especially if it is suitable for housing				
Site Address	**Site Name**	**Contamination***	**Status as of****	**Suitable for Housing?**	**Current Condition**	**s.f. bldgs/ # Acres**	**Zoning**	**Plans for Redevelopment?**
1801 E. SEPULVEDA BLVD	ARCO PETROLEUM PRODUCTS COMPANY - WA		D-SWRCB, RCRA, G					
18903 S. MAIN ST	VENUS LABORATORIES	A, Ak, Aq, CS, S	D-REFOA (06/01/95),ON CORTESE LIST (01/01/88), G					
189TH ST TO 168TH ST	WILMINGTON-GRAMERCY							
20300 S. MAIN ST	SOUTHWEST CONSERVATION		E-PEAR, G					
20400 S. MAIN ST	CAL COMPACT LANDFILL	A, Ak, S	A-AWP					
20402 S. MAIN ST	WERDIN DUMP	H						

CARSON

				Please add as much information as you have about each site, especially if it is suitable for housing				
Site Address	**Site Name**	**Contamination***	**Status as of****	**Suitable for Housing?**	**Current Condition**	**s.f. bldgs/ # Acres**	**Zoning**	**Plans for Redevelopment?**
20720 S. Wilmington								
2100 E. 223RD ST	MONSANTO CHEMICAL COMPANY	S	A-AWP					
21100 S. Alameda								
2112 E. 223RD ST	STAUFFER CHEMICAL, CARSON	P, Sludge Waste	A-AWP, G					
21243 S. AVALON BLVD	OLD QUAKER PAINT CO	Aq, Paint Sludge	D-RCRA					
21502-21526 PERRY ST			C-VCP					

CARSON

				Please add as much information as you have about each site, especially if it is suitable for housing				
Site Address	**Site Name**	**Contamination***	**Status as of****	**Suitable for Housing?**	**Current Condition**	**s.f. bldgs/ # Acres**	**Zoning**	**Plans for Redevelopment?**
2160 E. DOMINGUEZ STREET	SOULE STEEL COMPANY							
2315 E. Dominguez St								
23320 S. ALAMEDA ST	AIR PRODUCTS & CHEMICALS INC	LW, S, Oil	D-REFRW (06/15/95), G					
241-259 E. LOMITA BL.	OIL TRANSPORT CO.		C-VTERM					
24501 SOUTH FIGUEROA	L.A.COUNTY JOINT WATER POLLUTION CONTROL	A	D-SWRCB, RCRA, G					
24700 SOUTH MAIN ST	TURCO PRODUCTS INC. #1	A, Ak, L, S	D-RCRA					

CARSON

				Please add as much information as you have about each site, especially if it is suitable for housing				
Site Address	**Site Name**	**Contamination***	**Status as of****	**Suitable for Housing?**	**Current Condition**	**s.f. bldgs/ # Acres**	**Zoning**	**Plans for Redevelopment?**
24721 S. MAIN ST	FLETCHER OIL AND REFINING CO -WILMIN	Ak, FCC, Ol, Oil	D-RCRA					
2848 E 208Th St	World Express							
2850 E. DEL AMO BLVD	TREE ISLAND STEEL	A	D-RCRA, G					
BTW DEL AMO, TORRANCE, MAIN, FIGUEROA ST	GARDENA VALLEY LANDFILL 1 & 2	CS, H, PW	A-AWP					
CHICO AND DOMINGUEZ ST	GARDENA VALLEY LANDFILL NO. 6	C, L	A-BKLG					
EAST OF ALAMEDA & NORTH OF SEPULVEDA	TED HAMMETT (CARSON)	Oil/Water Seperation Sludge	D-REFOA(0101/86), NFA for DTSC(10/26/94), G					

CARSON

				Please add as much information as you have about each site, especially if it is suitable for housing				
Site Address	**Site Name**	**Contamination***	**Status as of****	**Suitable for Housing?**	**Current Condition**	**s.f. bldgs/ # Acres**	**Zoning**	**Plans for Redevelopment?**
WILMINGTON AVE & LOMITA BLVD	SOIL MANAGEMENT METHOD, INC		D-REFOA(05/01/94), NFA for DTSC(10/27/94), G					

POTENTIAL/CONFIRMED CONTEMINATION*

A: Acid Solution
Ak:Alkaline Solution
Aq: Aqueous Solution
C: Chromium (VI)
Ca: Cadmiumn
CS: Contaminated Soil
FCC: FCC Waste
H: Household Waste
L: Lead
LW: Laboratory Waste
Ol: Organic Liquid
P: Polymeric Resin Waste
PW: Pesticide Wastes
S: Solvent

STATUS**

A: CalSites Properties from CalSites Database
AWP: Annual Workplan-Active Site
C: Voluntary Cleanup Program Properties from CalSites Database
BKLG: Backlog-Potential AWP Site
D:Unconfirmed Properties Referred to Another Local or State Agency from CalSites Database
DTSC: Department of Toxic Substances Control
G : Archived Superfund Site
NFA: No Further Action
REFOA: Property/Site Referred to Another Agency
RCRA: Listed on the Resource Conservation and Recovery Act Information (RCRAInfo) database
REFRW: Property/Site Referred to Regional Water Quality Control Board (RWQCB)
SWRCB:Active Regulated Facility by State Water Resources Control Board
VCP: Voluntary Cleanup Program
VTERM: Voluntary Cleanup Agreement Complete

Unproductive Industrial and Commercial Sites

Site Address	Site Name	Current Condition	s.f. bldgs/ # Acres	Zoning	Current Use	Historic Use	Plans for Redevelopment?	If Grey-field - % occupied?

B. Appendix II: Sampling of Photos of Potential Brownfield and Greyfield Sites

Vacant Site
La Puente

Vacant Site
Azusa

Industrial Site
Monrovia

Industrial Site
Burbank

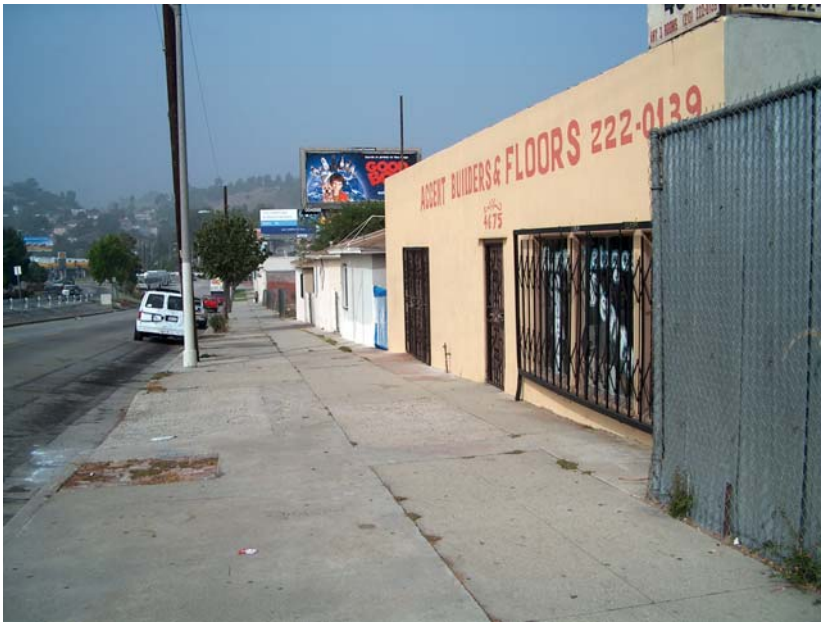
Commercial Site
Whittier

Commercial
Torrance

Industrial Cluster Site
Azusa

Industrial Cluster Site
Huntington Park

Commercial Corridor
Norwalk



Commercial Corridor
Los Angeles

C. Appendix III: Developer Survey

H O U S I N G D E V E L O P M E N T O N B R O W N F I E L D S
D E V E L O P E R S U R V E Y

Name: _____ **Company:** _____

Address: _____ **City, State, Zip:** _____

Tel.: _____ **Fax:** _____

1. Name of Project/Development: _____
_____

2. Type of Development (check all applicable)
Single Family [Average unit size (sq. ft.)]: _____ Affordable Housing _____
Multi-Family [Average unit size (sq. ft.)]: _____ Reuse/Conversion _____
Land Assembly/Subdivision/Site Preparation [Acreage]: _____
Mixed Use (briefly describe composition): _____
Other (please describe): _____

3. Number of Housing Units: _____ **Number of Lots:** _____ **Other Uses (if applicable)**: _____

4. List common contaminants encountered: _____

5. Nature of remediation involved (please attach an additional sheet if necessary): _____

6. Total project remediation costs: $_____

7. Infrastructure costs
Onsite per unit built: **$**_____ Onsite per lot developed: **$**_____
Offsite per unit built: **$**_____ Offsite per lot developed: **$**_____

8. Total time spent (in months)
from project initiation to the issuance of "*Declaration of No Further Action*": _____

9. Remediation funding source(s) and amount(s)
Public: **$**_____ Private: **$**_____
Other (please describe): _____

10. Describe any ownership issues encountered while obtaining land
Phase I costs: **$**_____ Costs to the buyer: **$**_____
Phase II costs: **$**_____ Costs to the seller: **$**_____
Other (please describe): _____

11. Please list
Acquisition cost per unit built: **$**_____ Acquisition cost per lot developed: **$**_____
Remediation cost per unit built: **$**_____ Remediation cost per lot developed: **$**_____
Sales price per unit built: **$**_____ Sale prices per lot developed: **$**_____

12. Identify major impediments encountered in developing housing on brownfields (please attach an additional sheet if necessary)
_____
_____

13. We would appreciate it very much if would also send us any marketing literature or brochure that provides additional information on the project/housing development.

Thank you for completing the survey.
Please return the completed survey by **FAX 213.740.0373** or **E-mail** to **bahl@usc.edu** or
Mail to: Deepak Bahl, VKC 385, School of Policy, Planning, and Development, USC, Los Angeles, CA 90089-0041

D. Appendix IV: Developer Survey Results

Survey Results

Developer	Project Name	Location	Project Type	No. of Housing Units	No. of Lots	Acres	Contaminants	Remediation Type	Remediation Cost	Source (public or private)
Westar Associates		Santa Maria	Mixed-use	150		150 total; 30 single-family	Oil well	Cap well; use contaminated soil for road base	$2-3 million	Private (oil co. and developer)
JT Development	Plaza Almeria	301 Main Street, Huntington Beach	Mixed-use	42		1.84	Hydrocarbon (UST) 500 gallons of leaking gasoline on top of ground water	Aeration (1 year)	$300,000	Public (in terms of DDA)
Renova Partners	Curtis Park Village	Sacramento	15% Affordable housing/ mixed-use	568		65	Lead, arsenic, TCE, PAH's	Excavation of soil, groundwater treatment on site	$9 million	100% private
AMCAL	Portofino Villas	121 West Philips Blvd., Pomona	Affordable housing	174	3	4.7	Heavy metals (cadmium, arsenic, lead)	Haul and dispose	$220,000	100% private
AMCAL*	Ave 26	330 North Avenue 26, Los Angeles	Mixed-use	121 family, 102 senior, 150 for sale	3	6.6	TCE, PCE, DCE, heavy metals, TPN, VOCs	Off site disposal or onsite with cap	$750k-1 million*	100% private
Catellus	Bridge Court Apartments	Emeryville	Low income housing	200		4	VOC, Petroleum	Soil removal, capping, and treatment	$1 million	100% private
New Urban West	Bayshore Place	Long Beach	Single family	51 homes		7	Oil wells	Abandoned, removal of underground tanks, relocated, compacted and graded soil	$2.5 million	Private, Redevelopment agency helped assemble parcels with eminent domain

Survey Results (continued)

Developer	Project Name	Location	Project Type	No. of Housing Units	No. of Lots	Acres	Contaminants	Remediation Type	Remediation Cost	Source (public or private)
TSA Housing	Avalon Courtyard	Carson	Multifamily, affordable, senior	92		0.69	Gasoline, drums oily surface material, old septic tank	Aeration	$300,000	Mix between the city, the California Community Reinvestment Corp., and So. Cal. Edison
Redev. Agency, City of San Diego (from Opper & Varco)	101 Market Street	San Diego	Multifamily/ mixed-use	151		1.36	Petroleum, diesel, lead	Mostly excavation, disposal, vapor barrier installed on-site	$1.5 Million	Mix - public $400,000; private $2 million; costs put up by Center City Dev Corp. but were recovered from petroleum companies (the responsible parties)
EPA/City of Oakland Habitat site	2662 Fruitvale Ave	Oakland	Single family	4			Removal of USTs			Mix - of public funding (EPA, City)
AMCAL Multi-Housing, Inc.	Las Brisas Apartments	8760 Main Street, Los Angeles, CA	Multifamily, affordable	66		1.12	ACM/LBP, PCBs	Hazardous disposal of ACM/LBP contaminated building structures	$175,000	Funded as project cost
Inclusive Homes, Inc.	Villa Los Robles	473 North Los Robles Ave, Pasadena	Multifamily	8	1	0.3	None	Former gas station site	$0	Public: $250,000

Survey Results (continued)

Developer	Project Name	Location	Project Type	No. of Housing Units	No. of Lots	Acres	Contaminants	Remediation Type	Remediation Cost	Source (public or private)
Inclusive Homes, Inc.	Casa Heiwa	231 East Third Street, Los Angeles	Multifamily, day care centers, and services office	100	1	2.78	Petroleum - naturally occurring	Removal	$300,000	
A Community of Friends	Willow Apartments	1916 E. 126th Street and 12612 S. Wilmington Ave, Los Angeles	Affordable Housing	24	2	0.73	Gasoline TPH-g, Benzene, Ethyl-Benzene Toluene	Soil vapor extraction	$500,000	$320,000 public with the request of an additional $150,000 from LA County CDC
W.O.R.K.S	Court Street Apartments	1301 Court Street, Los Angeles	Affordable Housing	24	1	0.43	Methane gas, one previously undetected oil well (more could be detected during grading currently underway)	Methane barrier (Liquid Boot); passive ventilation system (vent pipes, gravel); mechanical ventilation system in subterranean garage and community room;, dewatering system so that vent pipes under building do not become filled with water or silt; proper abandonment of at least one previously undetected oil well	$190,000	$1.4 M residual receipts loan from Los Angeles Housing Department; $25K grant from the California Center for Land Recycling; $118K grant from AHP; and the balance comes from equity raised from Low Income Housing Tax Credits and conventional financing.

Survey Results (continued)

Developer	Project Name	Location	Project Type	No. of Housing Units	No. of Lots	Acres	Contaminants	Remediation Type	Remediation Cost	Source (public or private)
Cherokee	Campus Bay	1200 S. 47th Street and 1415 S. 47th Street, Richmond	Mixed-use	1,300						
Cherokee	Mission Bay	1400 7th Street, San Francisco	Mixed-use and multifamily	400						
Cherokee	Ascon	21641 Magnolia Street, Huntington Beach	High/low density single family	502	38					
Cherokee	Whitaker-Bermite	22116 Soledad Canynon Road, Saugus	High/low density single family	3,000	1,000					
Brookfield Land Company	Coyote Hills Imperial Golf Course Birch Hills Rose Drive									