Westwood Neighborhood Brownfield Redevelopment Opportunities:

A Template for Evaluating Brownfield Site Potential

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DEVELOPMENT RESEARCH PARTNERS

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ABSTRACT: Brownfields are uniquely challenging development sites in the modern urban landscape, as their environmental stigmas make private investors reluctant to engage in such efforts. Brownfield developers are effectively shouldering both extra costs and risks for broader community benefits. This study estimates these additional costs and risks, as well as the broader social benefits, of such redevelopments, using the Westwood neighborhood in Denver as a template for the assessment of such redevelopment efforts. The results suggest that private redevelopment efforts indeed face significant hurdles, yet also create sizable benefits for the local community's economic vitality.

TABLE OF CONTENTS

I. EXECUTIVE SUMMARY

This case study illustrates the economic and fiscal impacts to the local economy of transforming an underutilized brownfield site into a higher and better use, incorporating research findings from a developer survey and a range of statistical analyses. In general, vacant and underutilized sites do not maximize public or private economic opportunities and can negatively affect the community. Site redevelopment is an opportunity to stimulate the local economy and enhance the community by adding more attractive buildings, beautifying neighborhoods, and providing needed goods and services. However, brownfields sites have environmental stigmas associated with past or current uses which can act as barriers to redevelopment.

The analysis assesses the redevelopment potential for brownfields sites in the Westwood neighborhood of Denver. The study's case study example aggregates three underutilized brownfields sites located along the main collector street through the neighborhood and evaluates redevelopment potential for the cumulative acreage. In addition to the detailed analysis of the site-specific costs and benefits of redevelopment, this study evaluates the impacts of neighborhood spillovers and risk premiums required for private-sector investment. The case study thus effectively constructs an economic template for private- and public-sector consideration of redevelopment efforts.

The Westwood findings themselves suggest that significant redevelopment potential exists for the focal site, resulting in direct increases in economic activity in the site itself as well as indirect job creation and increases in neighborhood property values. However, redevelopment depends on narrower rates-of-return calculations by private investors, who must add explicit cleanup costs as well as implicit risk premia to their calculus. Furthermore, site redevelopers derive none of the spillover benefits to neighboring property values indirectly generated by their investment. This divergence between private and community costs and benefits suggests possible roles for the public sector in supporting socially-beneficial brownfield redevelopment opportunities.

II. WESTWOOD:

MATCHING RETAIL GAPS WITH BROWNFIELD OPPORTUNITIES

a) Current Use and Reuse Potential

The Westwood neighborhood has been identified as one of several areas in the City and County of Denver where economic growth is lagging. Recent research (See Appendix C and Weiler et al.) have found the Westwood neighborhood to be underserved in the retail businesses, while also facing significant socioeconomic struggles. The Westwood community would benefit from additional neighborhood serving retailers and personal service providers, in addition to the environmental benefits of cleaning up and reusing brownfields sites. For the purposes of this example, a retail use has been determined to be the highest and best use for redevelopment.

Currently, the one-acre aggregated site uses are automotive service and yard storage related. According to Denver Assessor records there is 42,614 square feet of land with 13,689 square feet of buildings. This equates to building site coverage of about 32%. The site is home to approximately 17 employees earning aggregate wages of about $591,000, or almost $35,000 annually[1]. Business equipment in use and subject to property tax collections amounts to $27,900.

This example evaluates the fiscal and economic benefits from redeveloping the aggregated site to a modern retail/personal service space. Based on Denver zoning for general business, the site can accommodate 30% building coverage or 12,800 square feet of new commercial buildings. Total square footage of buildings under the retail use will be less than current square footage due to varying zoning restrictions for the current and retail uses. Demolition of existing structures and construction of new buildings will entail an investment of about $1 million. Upon redevelopment, the site will house an estimated 32 employees earning aggregate wages of about $860,200, or about $26,900 annually. New businesses will bring an estimated $192,000 of new business equipment to the site.

A review of similar automotive-use sites suggests that contamination issues at the Westwood sties are expected to include gasoline and its chemical constituents (Benzene, Toluene, Ethylbenzine, and Xylene), gasoline additives (MTBE) and other miscellaneous organic compounds used in the cleaning and maintenance of machinery and equipment. Based on the experiences at other similar sites, remediation costs for the Westwood sites are estimated at $770,000.[2]

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[1] Current earnings are figured using a weighted calculation that allows for two NAICS industries: 15% of employees from the Motor Vehicle Parts & Dealers (441) and the remaining 85% from Repair & Maintenance (811).

[2] Cleanup costs for these contaminants can range widely depending on specific contamination type and whether groundwater, soil, or both are being polluted. Other similar cleanups have ranged from around $22 to $68 per cubic yard of affected soil. This study

b) Economic and Fiscal Indicators Considered

Fiscal indicators considered include public revenues from real and personal business property tax and sales tax. Property taxes, which are based on the assessed value of a property and the mill levies set by each taxing entity, generate revenues for the general fund, developmentally disabled fund, social services fund and the school district[3]. General fund revenues finance the city's general administrative functions and activities. Social services collections are designated for Human Services programs like Child Welfare, Food Stamps, Medicaid Eligibility and TANF (Temporary Assistance to Needy Families). The developmentally disabled fund revenues are directed to the State Developmentally Disabled fund which provides services, support and assistance to Coloradoans with developmental disabilities. Estimated sales tax receipts are determined by applying the 3.5% sales tax rate to taxable retail sales at the pre- and post-redevelopment establishments. City and County of Denver sales tax revenues also go towards the General Fund.

Economic indicators considered herein include employment, wages, and new investment in buildings and equipment. Positive impacts on the surrounding neighborhood are considered positive spillovers to the economy accruing from reuse. Such externalities can include increased local employment opportunities, greater property values, and consequently greater capital investment in repairs, maintenance, and renovations.

The summary table below shows the annual impacts of reuse in terms of city and county tax collections, employment, and wages, along with the one-time investment associated with physical redevelopment.

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assumes a cost of $45 per cubic yard for an estimated 15,780 cubic yards of polluted soil, or around $700,000 rounded. To this amount an additional 10% is added for other environmental consulting costs, regulatory compliance, and engineering.

[3] Denver City and County Mill Levies used in calculations per $1000: general fund levy = 8.964, social services levy = 3.885, developmentally disabled levy = .140, school district general fund = 31.106.

Table 1:
Summary of Economic and Fiscal Impacts from Redevelopment

	Annual Impact from New Retail Use	Annual Impact from Current Use	Difference between Retail and Current Use	
			Total	Percent
Buildings (Square Foot)	12,800	13,700	($900)	-6.57%
Actual or Market Value (Assessor's)	$1,374,000	$760,000	$614,000	81%
Real Property-Assessed Value	$398,500	$220,400	$178,100	81%
Business Property-Assessed Value	$55,600	$27,900	$27,700	99%
Employment	32	17	$15	88%
Average Wages	$26,900	$34,800	($7,900)	-23%
Total Employee Earnings	$860,200	$590,900	$269,300	46%
Denver City & County General Fund	$4,100	$2,200	$1,900	86%
Denver Sales Tax Revenue	$88,600	$61,300	$27,300	45%
School District Tax Revenue	$14,000	$7,700	$6,300	82%
Social Services Revenue	$1,800	$970	$830	86%
Developmentally Disabled Revenue	$65	$35	$30	87%
Indirect Job Creation	22	---	22	
Indirect Earnings	$856,700	---	$856,700	
New Investment-Construction	$1,048,000	---	$1,048,000	
New Investment-Equipment	$192,000	---	$192,000	
Environmental Service Costs	$770,000	---	$770,000	
Total New Investment	*$2,010,000*	---	*$2,010,000*	

c) Fiscal Impacts of Redevelopment

The property market value per square foot grows by replacing the aging automotive and storage related use with newer and higher value retail use. Site redevelopment increases the total assessed value including land, improvements and personal property by an estimated 83%, which in turn, increases property tax revenues.

Total annual general fund collections would increase by $1,900 or 86%. The current assessed value of $248,300 indicates general fund tax collections of $2,200 while the estimated assessed value under the new retail use of $ 454,100 indicates general fund collections of $3,500.

The Denver school district gains grew by $6,300 or 82% in annual revenue. Current school district tax collections stand at $7,700 but will grow to $14,000 under the new retail use. The social services fund and the developmentally disabled fund receive an additional $860 collectively under the new retail use. Current collections for the social services fund are $970 and

grow to $1800 under the retail use – an 86% increase. Current collections for the developmentally disabled fund grow from $35 to $65 – an 87% increase under the retail use.

Sales tax collections, using the Denver City and County rate of 3.5%, would grow to $27,343 or 45% as the more service-oriented, lower retail sales volume business is replaced by a higher retail sales volume business. The sales tax from the current automotive and storage related use is calculated based on the assumption that 50% of total revenues are labor related and exempt from sales tax. Thus, $1,175,000 of taxable sales amounts to $61,250 in annual sales tax revenue. Based on comparable retail sales data reported in "A Dollars & Cents of Shopping Centers Special Report" by *Urban Land Institute (2000),* retail sales are estimated at $220 per square foot. Assuming all sales are taxable and figuring a 10% vacancy and revenue loss allowance, the estimated annual retail revenues are $2,500,000, which amounts to approximately $88,600 in annual sales tax revenue.

d) Economic Impacts of Redevelopment

Employment is both positively and negatively impacted by the new retail use. While the retail use will employ twice as many workers as the automotive and storage related use, retail jobs are lower skill occupations than automotive related occupations and result in a lower wage per worker[4]. Current average wages are $34,800 fall to $26,880 under the retail use; however, aggregate earnings will grow from $590,900 to $860,200 with the 32 retail employees. The additional employees will likely spend a significant portion of their earnings in the local economy – otherwise known as the induced effect – which is an added benefit to local businesses.

The local economy will also benefit from the multiplier effect of the redevelopment in terms of indirect job creation and increased earnings. Multipliers attempt to gage the indirect impacts of an industry on other industries including local government. Applying BEA RIMS Multipliers (1996) indicate the redevelopment will indirectly create 22 jobs in the Denver Metro for which total earnings will be $856,700.

Finally, the cost of physical redevelopment and environmental clean up will generate an estimated $2,010,000 in revenues for, local construction, remediation and business services companies. Construction services are needed to remove existing structures and to build new retail buildings. Based on comparative cost estimates, demolition of existing structures and site grading costs are estimated at $160,500. Construction costs (including interior finish) for retail and development are estimated at $65 per square foot, thus estimated constructions costs are $830,960. The addition of an 85 space parking lot and landscaping costs are $52,000. In addition, water and sewage tap cost is

[4] The new retail development will employ twice as many workers than automotive related and storage uses, based on the assumption that one full-time worker is employed per 400 sq. feet of retail operations.

assumed to be $5000. Total new investment in construction is $1,048,000. Cleanup costs for existing pollution are estimated at $770,000. New investment includes the fixtures and equipment necessary for the new use. Assuming that personal property, including furniture, fixtures and computer equipment, is approximately $15 per square foot, new investment in equipment is estimated to be $192,000.

e) Neighborhood Impact of Redevelopment

Community impacts considered herein are the positive externalities which improve living conditions within the surrounding neighborhood. The Westwood community will benefit from more convenient access to neighborhood serving retailers and personal service providers. These new businesses can make use of the neighborhood's available surplus labor, with local unemployment rates 1/3rd higher than for Denver as a whole (Census 2000), thus retaining and improving the financial position of neighborhood residents. Providing appropriate facilities to enable local entrepreneurial talent will also enable the neighborhood to capture and retain such critical economic activity.

Brownfields themselves represent surplus land resources in often struggling neighborhoods. Redevelopment can thus generate increased economic activity with relatively low opportunity costs, given the surpluses in local land and labor. Additionally, nearby property values may increase after removing environmental stigma and replacing deteriorating and less visually attractive uses with new construction. Increasing property values can leverage new capital investment in both residential and commercial properties and deepen the market demand for neighborhood properties.

To assess perhaps the most tangible portion of the broader community impacts of site redevelopment, a statistical model was developed to evaluate the effect of brownfield sites on residential property values. The following discussion summarizes the key results, as well as their implications for the focal Westwood redevelopment effort. Technical Appendix A provides more complete details of the data and analyses themselves.

Using summary measures of housing characteristics for the 133 census tracts in Denver in 2000 as well as brownfield saturation (i.e., the number of brownfields in that census tract or on its border), statistical analysis found that each brownfield in the area reduced the median housing value by $1719. Conversely, this result also implies that each brownfield cleanup in a given census tract could increase area property values by the same amount. Statistical analyses have had difficulties disentangling the brownfield effects from other, potentially unobserved, neighborhood effects on property values, but the findings suggest that brownfield concentrations play a significant role in determining local property values.

While not part of the focal quantitative analyses of this report, further environmental benefits are likely to accrue to the neighborhood through site redevelopment. Removing hazardous materials will alleviate threats to environmental safety and human health. In this example, it is assumed that both

soil and ground water are impacted by pollution. Removing soil hazards will help protect neighborhood residents from long-term exposure, while eliminating sources of groundwater contamination will keep pollution from migrating to other neighborhoods.

f) Risk Premiums as Obstacles to Brownfield Redevelopment

The combination of the higher and better use of the site itself as well as the positive property value effects in surrounding residences creates significant benefits to redevelopment, as underscored by the neighborhood property impacts above. However, such redevelopment depends on the narrower perspective of the investor/developer community, which simply considers such sites as possibilities among many alternatives. Given the stigma associated with such brownfield sites, additional explicit clean-up costs are likely and will add to the site's cost, as noted above.

Perhaps more pernicious are the underlying risk premiums that investors and developers may expect in return for dealing with such contaminated sites. These premiums effectively create a further wedge between the community's desire to have a site redeveloped and the necessarily narrower realities of the private capital market necessary for such efforts. To determine whether such premiums exist as well as their magnitude, a survey was undertaken in early 2003. The key findings are reviewed here, as well as their implications for the focal Westwood redevelopment effort. Technical Appendix B then details the survey's instrument and statistical analyses behind the key findings.

The survey was sent to 900 metro Denver real estate development professionals, including those self-identifying as investors, developers, brokers, and financiers. The survey elicited background information on respondents' development roles, typical property types, and experience with and attitude toward contaminated properties. The core of the survey instrument asked respondents to consider a well-defined property type that was typical for them, and to tell what hurdle rates and other parameters they would set as criteria for the investment decision if the property were clean: overall capitalization rate, reversion or terminal capitalization rate, discount rate, and anticipated investment holding period.

Then, for the same property, respondents were asked to consider the effect on their criteria if the property required known clean-up costs equal to 15 percent of the "clean" purchase price. For each of three cases --- gasoline contamination, dry cleaning contamination, and degreasing/solvent contamination --- respondents were asked:

- Whether they would still consider investing (yes or no);
- What their required capitalization rates and discount rate would be under these conditions;
- What their expected holding period would be;
- Whether these responses would already take into account a purchase price lowered by the expected amount of clean-up cost.

A nearly 20 percent response rate generated a sufficiently large and diverse sample for meaningful data analysis. Descriptive statistics for the sample respondents and their responses are provided in the appendix.

Table 2 shows the summary results concerning differential investment criteria under the clean scenario and the 3 contamination scenarios. The main conclusion is that, even when clean-up costs are netted out, investors and developers still require a significant rate-of-return "premium" for contaminated properties.

Table 2: Developer Survey – Summary of Mean Return Requirements

	If the property is CLEAN	If there is a GASOLINE contamination problem	If there is a DRY CLEANING contamination problem	If there is a DEGREASING /SOLVENT contamination problem
Would you still consider investing?	N/A	98 - Yes 37 - No	66 - Yes 64 - No	70 - Yes 64 - No
Your overall cap rate	10.23%	12.51%	12.83%	13.19%
Your reversion/terminal cap rate	10.95%	12.97%	12.84%	13.49%
The discount rate you would apply	10.28%	15.74%	17.41%	16.78%
Investment holding period?	9.11 years	7.42 years	8.07 years	8.03 years
Would you also deduct the cleanup costs directly from the resulting purchase price?	N/A	98 - Yes 5 - No	76 - Yes 5 - No	79 - Yes 5 - No

More specific conclusions, from the summary in Table 2 and from further investigation, include:

- Respondents are more willing to consider a gasoline problem than a dry-cleaning or solvent problem, require a lower return differential, and expect a shorter holding period.

- The cap rate differential is 2% to 2.5% for dry-cleaning and gasoline contamination, 3% for a solvent problem.

- Sub-sample analysis shows that there is no measurable difference between the rate-of-return differential required by those who develop properties into residential uses, and those who develop them into non-residential uses.

- For gasoline and solvent contamination, those with an "investor" role require higher overall cap rates than non-investors; other role-based comparisons do not give conclusive results.

- For dry-cleaning contamination, "developers" and "investors" require higher cap rate than "brokers" and "financiers"; other comparisons are inconclusive.

- Those who play only a broker role express cap rate differentials measurably lower than those with participation roles: 2% lower for gasoline, 3% lower for dry-cleaning and solvent contaminated properties.

Overall, the conclusion is that there is a premium on the rate of return required by private decision makers considering redevelopment of brownfield properties, a premium that may vary somewhat according to the role of the decision maker, but in general is at least 2 percent. An important aspect is that this premium requirement appears to exist *even when the clean-up costs are known and compensated*. Therefore, the premium seems to be generated by additional factors that do not represent true resource costs, namely "stigma" elements associated with contamination and past contamination. The stigma may stem from undefined perceived risk that goes beyond normal cost risk, perhaps from insecurity or poor information about liabilities, as well as uncertainty regarding the ultimate resale value of the property. A related source of potential stigma is the often indeterminate duration required to address contamination issues, both in terms of science and regulations that are out of the developer's control.

If this stigma is not about the real resource costs of clean-up and redevelopment, then it introduces a wedge between the incentives facing private decision makers and the opportunity costs that are actually relevant for the optimal use of land resources. That is, if the perceived costs exceed the true costs, there is a disincentive to redevelop in the way that is socially rational. The practical impacts of such a wedge on the viability of development in a particular case are elaborated in the section that follows.

III. ARE BROWNFIELDS CASES OF MARKET FAILURE?

An October 2002 survey of Senior Financial Executives conducted by CFO Research Services on behalf of Chubb Environmental Solutions indicate that 59% of corporate real estate transactions that failed due to environmental conditions failed because either the buyer or seller refused to clean up the property. What is the market mechanism that would induce or discourage cleanup activities?

There is a notable value loss due to environmental conditions, over and above the cost of cleanup. The Investor Survey conducted for this study indicates that overall capitalization rates can rise by more than 300 basis points depending on the environmental situation, leading to a value loss of over 22%, simply due to stigma. Additionally, potential buyers use environmental conditions as a screening criteria; approximately 27% would simply drop out of the market for that property if the latter was contaminated.

Table 3: Contamination Effects on Property Values

Per Square Foot	Clean	Gasoline Contamination	Dry Cleaning Contamination	Solvent Contamination
Net Rental Income	$10	$10	$10	$10
Capitalization Rate	10.23%	12.51%	12.83%	13.19%
Property Value	$97.75	$79.94	$77.94	$75.82

Sometimes, the cost of cleanup alone causes brownfields properties to be "upside down," that is the cost to resolve environmental issues are greater than the value of the property. The current value of the Westwood properties is estimated at $760,000 compared to an estimated cleanup cost of $770,000. There is little incentive for a buyer to purchase the property, and there is little incentive for the current property owner to clean the property for a buyer. In fact there is a disincentive to invest in the property, either to upgrade what is currently there or to redevelop to a new use. The phrase "pouring good money after bad" comes to mind. Brownfields properties tend toward obsolescence with little capital improvements.

Typically, real estate value is a function of anticipated future annual revenues; current property values rise and fall with quality and expected durability of future income streams. As properties age and obsolesce over time, both the income quality (tenant creditworthiness) and durability (subject to property condition and repair needs) can suffer. A classic example is the horse buggy factory; although the facility may be well designed for efficient production of horse buggies, it is not well suited for other modern uses so new occupants are tough to find. Absent environmental conditions, market forces such as higher rental income in a new use, will usually push the site to a higher and better use; however, with contamination, investment for reuse may not occur.

Highest and best use is that use which is physically possible, financially feasible, and most profitable. In the Westwood example, there is a quantified need for new retail uses. As an investment and based on current market factors, the existing automotive uses on the brownfields assemblage might be expected to yield annual net income of around $78,000 compared to annual net income of around $140,000 if redeveloped for modern retail use. Clearly, the retail use generates a greater profit and so the question becomes one of feasibility.

Feasibility depends on the value of the redevelopment being sufficiently greater than the cost of redevelopment. That is, a spread equal to or greater than the developer's required rate of return. This then highlights two issues particular to brownfields sites: (1) the cost of cleanup increases redevelopment cost and (2) the investor survey shows that a higher rate of return is required even after considering costs of cleanup. A developer would likely value the site as if vacant land if it were a clean site, and likely assign zero value to the site as dirty. In this particular case, a deal may fail altogether because the $770,000 cost of cleanup is so much greater than the $138,000 value of the land as vacant and clean.

Table 4: Redevelopment Profits/Losses

Item	Clean	Contaminated
Land Value:	$138,000	$0
Construction Cost:	$1,050,000	$1,050,000
Environmental Cleanup Cost:	$0	$770,000
TOTAL Development Costs:	$1,188,000	$1,820,000
Value as Redeveloped:	$1,374,000	$1,374,000
Spread	$186,000	($446,000)
Percent Spread:	15.7%	negative
Internal Rate of Return (hurdle):	10.3%	15.8%

These brownfields properties will continue to age and obsolesce over time. Imagine the buggy whip factory whose lubrication and repair of machinery along with the liberal use of pesticides such as DDT has left an environmental cost along with its obsolescence. Without upgrading or capital investment into the existing improvements, the property can increasingly lead to marginal uses. That is, low value-added commercial enterprises squeezing profit margin by minimizing costs, including wages and rent. A collection of these marginal businesses can establish the business environment for an entire neighborhood.

As cited earlier, real estate transactions tend to fail when the buyer or seller declines to undertake cleanup costs. In the case of a marginalized neighborhood like Westwood, the financial returns on redevelopment in the form of higher rental income alone are insufficient to induce the buyer to undertake cleanup. Cleaning the property would severely reduce the risk wedge that investors place on contaminated property. Similar to many secondary and tertiary locations, the cost of the cleanup will be borne by the seller either through direct costs or through reduced transaction price.

There are approaches that specifically address brownfields obstacles to move these properties toward reuse and creating positive externalities for the neighborhood. Environmental regulators need to keep evaluating risk and toxicity models to ensure that environmental cleanups achieve safety standards in the most cost effective manner. Scientists and technologists need to keep exploring cost effective cleanup methodologies. Many secondary and tertiary locations, the market's knowledge of opportunities and the willingness to expend resources seeking those opportunities are limited. Local governments can take steps to explore and publicize investment opportunities in often passed-over locations, such as in the retail gap study outlined in Appendix C.

The market doesn't fail, but actually works quite well in signaling the private sector to avoid investment. The consequence of this market force, however, is that public benefits from redevelopment don't accrue. Fortunately, there are identifiable environmental issues in which the public sector can invest to yield those benefits. Economists and public policy officials need to carefully evaluate public investment and benefits to identify the appropriate levels of investment as a partner with the private sector. This report provides precisely such benefit-cost perspectives for the focal case study, effectively creating a template to help other communities weigh the private and public tradeoffs of site redevelopment.

IV. SUMMARY

Brownfields development supports infill development as opposed to urban sprawl and directly addresses the needs of local residents. Brownfields redevelopment can also serve as a catalyst for economic prosperity in the local area. Generally speaking, redevelopment to a higher and better use offers the surrounding community many positive outcomes. In this example, the increase in market value, despite smaller building square footage, illustrates these positive effects. Yet such redevelopment efforts are rare, and private sector interest in such investments remains inconsistent at best. As shown in this report, the fundamental hurdle to socially-beneficial brownfield redevelopment is the fact that the costs and risks fall narrowly on the site redevelopers, while the benefits accrue to the wider community. Such divergences between narrow risks and broad benefits can make critical "pioneering" redevelopment investments particularly challenging, even when overall benefits to society are large (Weiler, 2000).

Redevelopment not only increases public tax revenues but also increases economic activities in the local economy. Net earnings are positive even though retail workers replace higher skilled workers. The community also benefits from the property value effects of the environmental clean up as well as the addition of convenient goods and service providers. The replacement of the automotive and storage related use implies job and wage loss for current employees; however, the potential exists for the current use to relocate to a more appropriate site in the community. Thus, job and wage loss are not necessarily considered a negative consequence of redevelopment. The combination of higher and better use of the site as well as property value spillovers to the surrounding community can create sizable benefits. However, these benefits need to be considered in light of the higher hurdle rates demanded by investors to handle such properties.

In sum, this report provides an economic template for public and private sector evaluation of brownfield redevelopment opportunities, using the Westwood neighbhorhood and the retail sector as vehicles for a sample redevelopment scenario. This report/template will be disseminated through the Center for Research on the Colorado Economy as well as the City of Denver. Initial results were shared in several conference settings, including the November 2002 Regional Science Association meetings and the January 2003 American Real Estate and Urban Economics sessions. Appendix C provides details from the most recent presentation at the Colorado Brownfields Foundation conference in September 2003. Project staff remain ready to assist interested private and public officials with the application of the results to local situations. This report, along with related materials, can be found at

http://www.colostate.edu/Programs/CRCE/

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VI. TECHNICAL APPENDIX A
NEIGHBORHOOD SPILLOVER ANALYSIS

Appendix A1: Data and Statistical Analysis

Appendix A2: Notes on Brownfield Definitions and Data Sources

Appendix A1

Data and Statistical Analysis

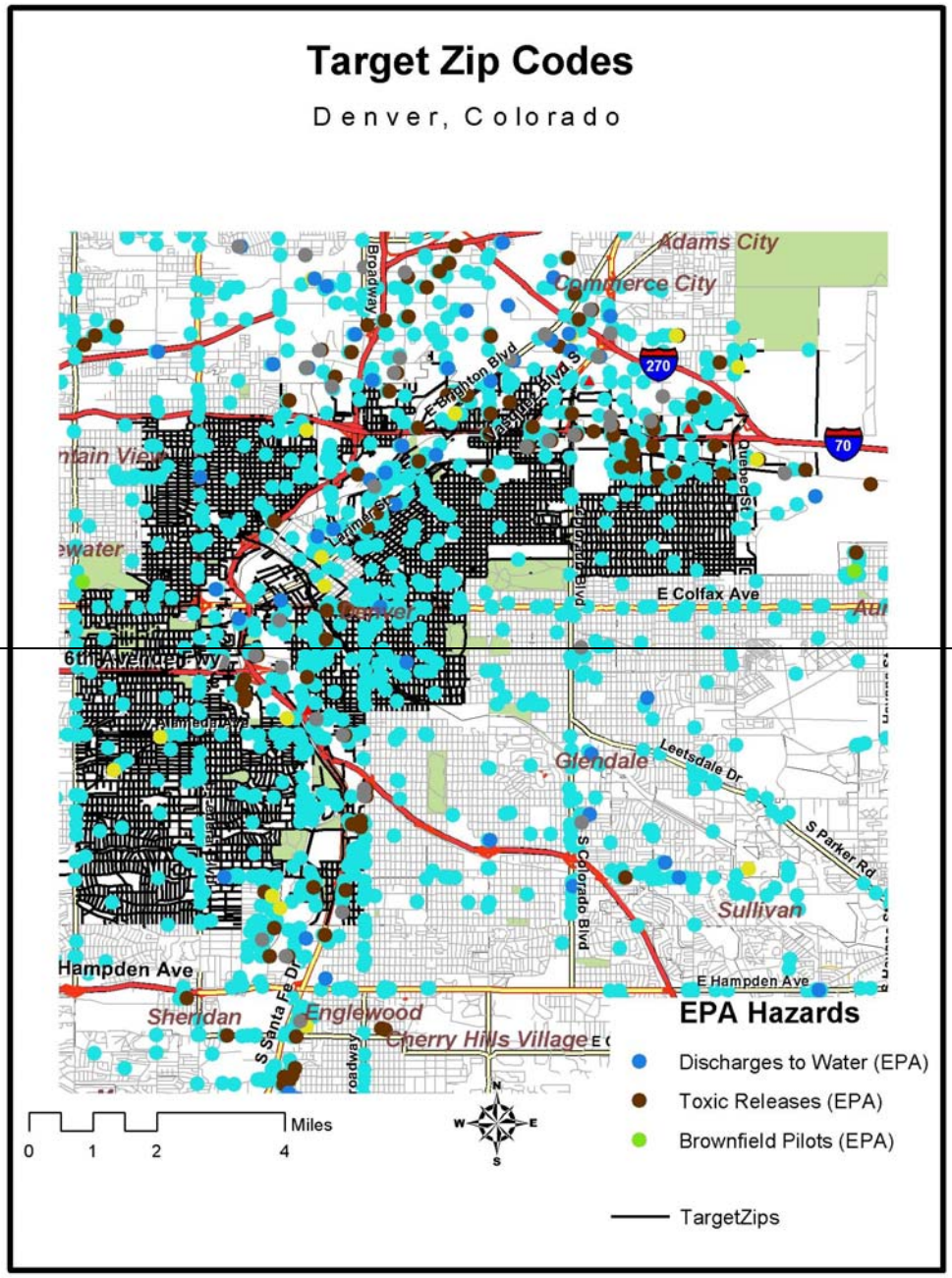
Data on housing prices and characteristics was assembled from the Denver Assessor's Office. Information on brownfield sites has been synthesized from the four most widely tapped sources on such contaminated properties:

(1) EPAEnviroMapper (LandView),
(2) HUD's Environmental Mapper [EPA data],
(3) EPA's Landfill, and
(4) Environmental Scorecard.

The data sources above are all derived from the EPA's hazardous data set and are included in the EPA's Brownfield tools site. Each source is publicly available and most have websites where the user can quickly map out hazards in their area. When conducting initial data source searches all sources eventually pointed back to the EPA. The sites used by development agents describe the typical boundary set of information researched on each property. Inquiries were made to development agents and they responded with a list of sites. These sites where researched and then traced back to their data sources. In addition a web search was conducted as well as a series of other sources were investigated. After consolidating the multiple data options the 4 listed above were chosen for the following reasons:

(1) EPA data source (EPA is responsible for tracking these properties)
(2) Free public access – all data provided is free of charge and easily accessible
(3) Above data sources are among the first checked by development agents and financial institutions conduction a Phase I assessment of the property.

The following maps provide a graphical summary of the brownfield spatial presence in the city of Denver as well as the focal study area of Westwood in southwest Denver. The concentration of brownfield sites is in a clear half-circle spanning the areas outside the CBD from southwest to northeast Denver. These areas also comprise the neighborhoods with the lowest socio-economic indicators of the city, largely populated by ethnic minorities. Not coincidentally, these were also the focal areas for the noted initial retail gap analysis, as those neighborhoods which are facing the most difficult economic circumstances are also those who are most under-retailed.


Target Zip Codes
Denver, Colorado
Adams City
Commerce City
Broadway
E Colfax Ave
Glendale
Leetsdale Dr
S Parker Rd
Sullivan
Hampden Ave
E Hampden Ave
Sheridan
Englewood
Cherry Hills Village
S Colorado Blvd
S Santa Fe Dr
Quebec St
270
70
Miles
0 1 2 4
N
W E
S
EPA Hazards
Discharges to Water (EPA)
Toxic Releases (EPA)
Brownfield Pilots (EPA)
TargetZips

Westwood Neighborhood Focal Area

Two separate analyses were attempted, the first involving Denver assessor data, with the second using Census data. Given the data weaknesses involved in the former approach, the latter Census data became the basis for the final statistical results.

Data collected from the Denver assessor office was in a comma-separated variable format. To convert the data into a workable format a combination of Access and Excel was used. The data was then separated out by neighborhood as denoted by the assessors' neighborhood category. Some data which was improperly labeled had to be deleted. The neighborhood data was further refined by only using sales data from the last 5 years (1997-2002). This was accomplished by doing multiple sorts and extractions.

However, the large amount of missing and mis-assigned data led to concerns regarding the statistical integrity of any resulting analysis. Therefore, we opted to use Census data for Denver's 133 census tracts (CT) to provide maximum confidence and transparency in both the data and results, although such a choice necessarily reduced the number of explanatory variables that could be applied. Brownfields were defined as those within or on the borders of each Census Tract, based on the 4 key data sources discussed above. After testing a range of functional forms focusing primarily on housing characteristics as independent variables, the simplest equation seemed to best summarize the brownfield effect:

Median House Value = F [# of Brownfields in CT, Median Number of Rooms]

The key results for the Median House Value as a dependent variable are:

	Coefficient	t-statistic
Intercept	-178,367.1	5.97
Median Number of Rooms	6319.9	1.13
# of Brownfields	-1718.8	-2.72

Equation's F-statistic: 5.05

- Probability that all coefficients together significantly explain housing values > 99%

Equation's R-squared: 0.072

- Equation explains 7.2% of housing value variation, which is not atypical in such cross-sectional analyses with a parsimonious statistical model

Appendix A2:

Notes on Brownfield Definitions and Data Sources

The EPA defines a brownfield site as any property where redevelopment or reuse is complicated by real, potential or perceived contamination, pollution or hazardous substance. There are some exceptions to this where contamination may exist but the site is not considered a brownfield. Specifically, any site where planned or ongoing removal is occurring, any site that is on the National Priorities List, and any site that may be overseen by another act such as the solid waste disposal act or the water pollution control act. The EPA has listed all such exceptions on their brownfields redevelopment website. The EPA brownfields website also has information on the tax incentive provided for redevelopment, including who is eligible, where the property must be located, and what contaminants are allowed on the property. This website provides useful information on brownfield redevelopment and the resources available to the individual and corporation looking to reuse these valuable properties. However, actually finding the brownfields located in an area is not possible using this website but must be done using another source.

The National Priorities List (NPL) is a list of hazardous material facilities that fall under the EPA's superfund program. Superfund is the code name for the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980. This act gave the federal government the ability to respond to releases or threats of releases of hazardous materials into the environment. Also created at that time was the Comprehensive Environmental Response, Compensation, and Liability Information Systems (CERCLIS). This is the database where information on hazardous waste sites is kept. A site that falls under the superfund program is not considered a brownfield, and is therefore, not eligible for the tax incentive. Superfund sites are the most severe cases of hazardous waste contamination. Several of those sites are in the Denver area, including the Denver Radium plant and the I-70/Vasquez blvd intersection. Included on the website is a list of all current NPL sites as well as sites that were removed from the NPL when cleanup was completed.

The EPA also regulates facilities that release toxic chemicals into the environment. The facilities must report releases to the EPA, who then lists them in the Toxic Release Inventory (TRI). The TRI is a publicly accessible database containing the information on toxic releases and the waste management activities of those facilities required to report. By entering a zip code, one is able to see what facilities in the zip code area are releasing toxic chemicals. The database allows one to see either the facility reporting or the amount of chemicals being released in the area. There is also information available for previous years and which chemicals are being tracked.

Mostly the information found has been on what is or is not considered a brownfield, but very little exists on how to actually find the brownfields. The best

source of information has been the EPA and Housing and Urban Development (HUD) Enviromapper applications. These websites allow the creation of maps which can include superfund, brownfield tax incentive zones, TRI data and other environmental hazards. The HUD site also allows for the input of census data including population and number of houses in an area. Another interesting detail of the HUD site is that one can find out exactly what each site is by clicking on the map. The other promising mapping application that has been found is the Landview data set compiled by the EPA. This has the location of the site as well as other environmental data.

A matrix of these most frequently used brownfield information websites is appended to this section. Of particular note is the Environmental Defense Scorecard website, which includes the following useful definitions:

> Air releases: Releases including TRI pollutants from a plant's smoke stack or leaking valves.
>
> Land releases: All chemicals disposed of on land within the facility grounds.
>
> Off site transfers: Chemicals in waste that are removed by the facility to other locations including landfills or other treatment facilities.
>
> On-site: Chemicals within a facility, either stored, treated or disposed of on the facility grounds.
>
> Total environmental releases: All facility reported release, not including those transferred off site.
>
> TRI: The toxic release inventory; established by the Emergency Planning and Community Right-to-know Act of 1986. This act requires the reporting of the releases of one of any 650 chemicals into the environment.
>
> Water releases: Any releases into a body of water.

Additional websites:

www.epa.gov/brownfields/ is the EPA Brownfields Economic Redevelopment Initiative website. It provides background information on what the federal government is doing about brownfield redevelopment as well as information on state pilot programs and tax incentives.

www.epa.gov/enviro/html/fii/prog_sys.html This site contains all the program system definitions used by the EPA. It lists them by name and acronym, and gives information regarding the use of each.

www.denvergov.org/ This is the city and county of Denver website. It contains information on Denver's brownfield redevelopment program as well as other programs the Mayor's office is involved in regarding redevelopment of the city's underdeveloped areas.

www.cdphe.state.co.us/hm/hmhom.asp This is the Colorado Department of Public Health and Environment website. Specifically, this is the location of the hazardous materials and waste management division. Information regarding the brownfield tax incentive, the voluntary cleanup program, and the Geographical Information System (GIS) files can be found here.

www.epa.gov/enviro/index.html This is the Envirofacts data warehouse homepage. Contained here is all the facility information for the EPA's different databases such as the TRI and the Resource Conservation and Recovery Act (RCRA). By entering a zip code, one is again able to find the environmental information for an area and locate any facilities required to report to the EPA.

Website	Geographic Scope and coding (ctiy, zip, census tract)	Contamination Type	Contamination Source (type of business or activity)	Valuation	File Format	Data Source	Other info
EPA Toxic Release Inventory http://www.epa.gov/tri/	zip code	toxic releases	chemicals used, stored, created		Adobe	EPA	
EPA List of databases http://www.epa.gov/opptintr/dsalpha.htm	NA						links to other impt EPA websites
Additional EPA databases http://www.epa.gov/epahome/Data.html	NA						
HUD environmental mapper http://www.hud.gov/offices/cio/emaps/index.cfm	County, city, census tract	all (toxic, hazardous, water and air releases)			html	EPA, census	business info regarding contamination
EPA EnviroMapper http://map3.epa.gov/enviromapper/index.html	state, county, zip code	hazardous waste (Superfund)	industrial and manufacturing		html	EPA, census, USGS	map5.epa.gov has brownfield tax zones
EPA Superfund Locator http://www.epa.gov/superfund/sites/locate/index.htm	county, city	Superfund	businesses with haz waste		html, Adobe	EPA	
Environmental Defense's Environmental Scorecard http://www.scorecard.org/	zip code, census tract	all	manufacturing, and households		Java	EPA	Has maps
EPA Landfill databases http://www.epa.gov/epaoswer/non-hw/muncpl/landfill/index.htm	city	solid waste landfill	household trash		Adobe	EPA	

VII. TECHNICAL APPENDIX B
DEVELOPER SURVEY

Appendix B1: Survey Instrument

Appendix B2: Summary Sample Statistics

Appendix B3: Statistical Analysis Output

Appendix B4: Focus Group Interview Notes and Analysis

Appendix B1

Survey Instrument

The 4-page survey that follows, with cover letter, insert, and consent form, was sent to 900 real estate development professionals in the Metro Denver area. The mailing list was developed from the membership of professional associations including the CCMI, Counselors of Real Estate, the Society of Industrial and Office Realtors, and the Denver Metro Commercial Association of Realtors, supplemented by the commercial real estate developer directory maintained by the Colorado Real Estate Journal.

The survey was designed and implemented under the approval of Colorado State University's Office of Regulatory Compliance and its Human Subjects Research Committee.

A total of 155 surveys were returned, thus a response rate of 17.2%. Of these, 149 contained sufficient basic information to be maintained in the database used for analysis. Not all of these respondents answered all questions, so more restricted subsamples served as the basis for analyses involving certain questions.

SURVEY COVER LETTER

Dear Participant:

As a real estate professional, you have been selected to participate in a research study regarding the impacts of environmental conditions on real estate transactions. The study is intended to sample a cross-section of the real estate investment community. We are therefore interested in your response regardless of your specific experience, and regardless whether you seek, avoid, or are neutral to such "brownfields" investments. This survey is completely voluntary; all we ask is that you complete and return the enclosed survey, which should take only 5 minutes for your time. There is no risk to this survey and all individual responses will remain confidential. The overall survey results should benefit the broader real estate community by clarifying possibly overlooked opportunities for redevelopment at brownfield sites.

Enclosed in the survey is a separate sheet for you to provide optional contact information, which can be returned in the same stamped envelope as the survey. This information will allow us to mail you an advance copy of the summary results shortly after the survey is tabulated. We will also solicit a few follow-up phone or in-person interviews of approximately 10-15 minutes. Only participants who indicate an interest in such a conversation will be interviewed, and any comments will remain completely confidential. Finally, you can also opt to be entered in a random drawing for a round of golf for four at the Englewood Golf Course on the same sheet.

This study is being jointly conducted by the Center for Research on the Colorado Economy (CRCE) at the Economics Department at Colorado State University, and Development Research Partners Inc. of Littleton, Colorado. The study is funded with a grant from the U.S. Economic Development Administration to study urban opportunities with regard to brownfields sites, as part of a larger "Matching Retail Gaps with Brownfield Opportunities"project. At the conclusion of the research project in late 2003, research reports on brownfield redevelopment opportunities and impacts will be available to all participants and the wider public on CSU's Center for Research on the Colorado Economy website (http://www.colostate.edu/programs/CRCE/).

If you have any questions regarding the survey questions, intent, confidentiality, or any other related issue, please contact Jesse Silverstein, Development Research Partners, 303-991-0074, jesse@DevelopmentResearch.net. Questions about participants' rights may be directed to Celia S. Walker (CSU) at (970) 491-1563.

Thank you very much for your help in completing this important project.

Sincerely,

Stephan Weiler, Robert Kling, and Jesse Silverstein

Stephan Weiler – CSU Economics Department
Robert Kling – CSU Economics Department
Jesse D. Silverstein – Development Research Partners

Thank you for participating in this research effort. Your professional experience and judgement are important to us. Please answer the following questions as thoughtfully as possible; be as specific as possible even if you see ambiguities in a question; and please answer from your own personal perspective as a real estate professional.

1. Would you describe yourself as a . . . ? (check all that apply)
- ❑ broker
- ❑ developer
- ❑ financier
- ❑ investor

2. What types of property do you typically deal in? (choose all that apply)
- ❑ single-family residential
- ❑ multi-family residential
- ❑ retail
- ❑ office
- ❑ industrial

3. What size transaction do you typically seek? (choose all that apply)
- ❑ smaller than $250,000
- ❑ $250,000 to $1 million
- ❑ $1 million to $5 million
- ❑ larger than $5 million

4. Have you ever purchased a property with environmental contamination issues (excluding asbestos & lead based paint)?
- ❑ No
- ❑ Yes, bought it unknowingly
- ❑ Yes, bought it intentionally

5. Which best describes you? (answer one)
- ❑ Will not ever buy contaminated property
- ❑ Try to avoid contamination, but will invest if the economics makes sense.
- ❑ Invest in contaminated (“brownfields”) properties as well as “clean properties.
- ❑ Only invest in contaminated (“brownfields”) properties.

6. Do you intentionally seek contaminated property as an investment?
- ❑ Yes
- ❑ No

7. Have you ever walked away from a potential deal solely because environmental contamination was present?
- ❑ Not always; I will gladly evaluate the potential cost of remediation.
- ❑ No, but I have a limited tolerance for such issues.
- ❑ Yes, immediately upon the appearance or disclosure of environmental issues.
- ❑ Yes, after further investigating the extent of environmental problems.
- ❑ Yes, but only after I determined that remediation cost made the deal infeasible.

Continued ⇒

8. Have you ever dealt with a property that had a “No Further Action” letter from a state Voluntary Cleanup program?

- ❑ I don’t know what a “voluntary cleanup program” is.
- ❑ No, have never been in that situation
- ❑ No, I don’t deal with contaminated properties.
- ❑ Yes, it lowered my risk and my required rate of return.
- ❑ Yes, but it did not lower my risk or my required rate of return.

9. Have you ever used Environmental Insurance for a property transaction? (Answer all that fit)

- ❑ No, I don’t deal with contaminated properties.
- ❑ No, have never been in a situation that warranted it.
- ❑ No, it’s not worth the cost.
- ❑ Yes, but at someone else’s request, i.e.- a lender
- ❑ Yes, it lowered my risk and my required rate of return.
- ❑ Yes, but it did not lower my risk or my required rate of return.
- ❑ Yes, but it increased my required rate of return.
- ❑ I don’t know what “environmental insurance covers, never dealt with it.

10. When initially evaluating an investment, do you screen for on-site environmental issues (the most fitting answer)

- ❑ As part of initial property inspection.
- ❑ A phase I environmental investigation is always done prior to seeking funding.
- ❑ Only if requested by lender or other financial partner.
- ❑ Only invest in contaminated property

11. If a Phase I environmental investigation shows potential problems <u>on-site</u>, do you further investigate and continue to pursue the investment?

- ❑ Yes.
- ❑ No.

12. If a Phase I environmental investigation shows potential <u>off-site</u> contamination originating from the property, do you continue to pursue the investment?

- ❑ Yes.
- ❑ No.

13. If a <u>Phase II</u> environmental investigation shows potential on-site contamination, do you typically continue to pursue the investment?

- ❑ Yes.
- ❑ No.

Continued ⇒

14. Considering again your answer or answers to Question 2, please mark the <u>one</u> type of investment that you <u>most often</u> deal in:

- ❑ Multi-family residential
- ❑ Retail
- ❑ Office
- ❑ Industrial

Please consider a fully typical property that you would consider for investment in this category, in terms of property characteristics, price, intended holding period, etc., assuming no contamination problems.

Now, what if an environmental investigation finds a hazardous materials problem contained on-site, with a cleanup cost equal to 15%* of what the initial purchase price would be if the property were clean? Please tell us how this would affect your decision-making, depending on whether the contamination is related to gasoline, dry cleaning, or degreasing solvents. Using a **single point value**, or a **range of values**, please indicate your investment criteria under each condition (write **NA** if the question or criterion does not relate to your decision process):

	If the property is CLEAN	If there is a GASOLINE contamination problem	If there is a DRY CLEANING contamination problem	If there is a DEGREASING /SOLVENT contamination problem
Would you still consider investing?	❑ Yes ❑ No	❑ Yes ❑ No	❑ Yes ❑ No	❑ Yes ❑ No
Your overall cap rate	___%	___%	___%	___%
Your reversion/terminal cap rate	___%	___%	___%	___%
The discount rate you would apply	___%	___%	___%	___%
Investment holding period?	___ years	___ years	___ years	___ years
Would you also deduct the cleanup costs directly from the resulting purchase price?	N A	❑ Yes ❑ No	❑ Yes ❑ No	❑ Yes ❑ No

* for example 15% equates to a $37,500 cleanup cost on a $250,000 investment; $150,000 on $1 million investment; $750,000 on $5 million investment.

Continued ⇒

15. If you marked more than one investment type in Question 2, now please indicate the second most common type that you deal in:

- ❑ Multi-family residential
- ❑ Retail
- ❑ Office
- ❑ Industrial

Please consider a fully typical property that you would consider for investment in this second category, in terms of property characteristics, price, intended holding period, etc., assuming no contamination problems.

Now, what if an environmental investigation finds a hazardous materials problem contained on-site, with a cleanup cost equal to 15%* of what the initial purchase price would be if the property were clean? Please tell us how this would affect your decision-making, depending on whether the contamination is related to gasoline, dry cleaning, or degreasing solvents. Using a **single point value**, or a **range of values**, please indicate your investment criteria under each condition (write **NA** if the question or criterion does not relate to your decision process):

	If the property is CLEAN	If there is a GASOLINE contamination problem	If there is a DRY CLEANING contamination problem	If there is a DEGREASING /SOLVENT contamination problem
Would you still consider investing?	❑ Yes ❑ No	❑ Yes ❑ No	❑ Yes ❑ No	❑ Yes ❑ No
Your overall cap rate	___%	___%	___%	___%
Your reversion/terminal cap rate	___%	___%	___%	___%
The discount rate you would apply	___%	___%	___%	___%
Investment holding period?	___ years	___ years	___ years	___ years
In addition to the above, Would you also deduct the cleanup costs directly from the resulting purchase price?	N A	❑ Yes ❑ No	❑ Yes ❑ No	❑ Yes ❑ No

* for example 15% equates to a $37,500 cleanup cost on a $250,000 investment; $150,000 on $1 million investment; $750,000 on $5 million investment.

This is the end of the survey. Please return it to us in the postage-paid envelope provided. Thank you!

Are you interested in the results of this survey?

If you would like to receive a summary of the results of this survey, we would be happy to send it to you when ready. Please provide the information requested below, and include this sheet with your survey or in a separately mailed envelope. If you return this results request sheet with your survey, the sheet will be immediately and permanently separated from the survey booklet and the anonymity of your survey answers will be fully protected.

On this sheet, please also indicate whether you would be willing to participate in a brief follow-up interview to gain further information on the issues we are studying. If such a follow-up conversation occurs, the confidentiality of your responses will be completely protected.

Finally, please let us know if you wish to be entered in a drawing for a round of golf for 4 at Englewood Golf Course. If you were to win the drawing, please note that the winner's name is potentially public information. However, your survey responses will obviously remain confidential.

- ☐ ***YES, I would like to receive a summary of the results of this survey,***
- ☐ ***YES, I am willing to participate in a brief, confidential follow-up personal interview.***
- ☐ ***YES, I am willing to be entered in a drawing for a round of golf for 4 at Englewood Golf Course.***

Name: _____

Company: _____

Address: _____

_____

Phone: _____

e-mail: _____

Appendix B2

Summary Sample Statistics

Includes:

(1) Sample breakdown by respondent type according to:

- **Development role**
- **Typical transaction size**
- **Typical property type**

(2) Sample breakdown according to experience with and attitude toward contaminated properties

(3) Summary statistics for investment criteria under uncontaminated and contaminated scenarios

Self-identification according to role	*Count*
Broker (only)	45
Broker + Developer + Investor	26
Broker + Investor	25
Broker + Developer	17
Developer (only)	14
Broker + Developer + Financier + Investor	7
Investor (only)	6
Developer + Investor	4
Broker + Financier + Investor	2
Broker + Financier	1
Developer + Financier + Investor	1
Blank	1
TOTAL	*149*

Typical transaction size	*Count*
$250,000-$1mil and $1mil-$5mil	20
$1mil-$5mil and >$5mil	13
<$250,000 and $250,000-$1mil and $1mil-$5mil	12
$250,000-$1mil and $1mil-$5mil and >$5mil	8
<$250,000 and $250,000-$1mil and $1mil-$5mil and >$5mil	7
<$250,000/ $250,000-$1mil	7
<$250,000 and $1mil-$5mil	3
$250,000-$1mil and >$5mil	1
$250,000-$1mil	36
$1mil-$5mil	27
<$250,000	7
>$5mil	8
TOTAL	*149*

Type of property or properties dealt with			
Single-fam/ Multi-fam/ Retail/ Office/ Industrial	9	Multi-fam/ Retail/ Office/ Industrial	10
Single-fam/ Multi-fam/ Retail/ Office	3	Multi-fam/ Retail/ Office	3
Single-fam/ Multi-fam/ Retail/ Industrial	2	Multi-fam/ Retail/ Industrial	1
Single-fam/ Multi-fam/ Retail	1	Multi-fam/ Office/ Industrial	4
Single-fam/ Multi-fam/ Office/ Industrial	1	Multi-fam/ Office/ Other	1
Single-fam/ Multi-fam/ Office	4	Multi-fam/ Office	4
Single-fam/ Multi-fam/ Industrial	3	Multi-fam/ Industrial	3
Single-fam/ Multi-fam	12	Multi-family	8
Single-fam/ Retail/ Office/ Industrial	3	Retail/ Office/ Industrial	17
Single-fam/ Retail/ Office	3	Retail/ Office	7
Single-fam/ Retail/ Industrial	1	Retail/ Industrial	7
Single-fam/ Retail	1	Retail	4
Single-fam/ Office/ Industrial	4	Office/ Industrial	5
Single-fam/ Office	2	Office	3
Single-fam/ Industrial	3	Industrial	14
Single-family	6	*TOTAL*	*149*

Responses to attitude and experience questions; some respondents selected multiple responses to some questions, so totals sometimes exceed 149	*Count*	*Totals*
4. Have you ever purchased a property with environmental contamination issues (excluding asbestos & lead based paint)		
No	95	
Yes, I bought it unknowingly	12	
Yes, I bought it intentionally	41	
No response	1	149
5. Which best describes you ? (answer one)		
Will not ever buy contaminated property.	22	
Try to avoid contamination, but will invest if the economics makes sense.	103	
Invest in contaminated ("brownfields") properties as well as "clean properties.	24	
Only invest in contaminated ("brownfields") properties.	1	150
6. Do you intentionally seek contaminated property as an investment?		
Yes	7	
No	142	149
7. Have you ever walked away from a potential deal solely because environmental contamination was present?		
Not always; I will gladly evaluate the potential cost of remediation.	51	
No, but I have a limited tolerence for such issues.	46	
Yes, immediately upon the appearance or disclosure of environmental issues.	5	
Yes, after further investigating the extent of environmental problems.	33	
Yes, but only after I determined that remediation cost made the deal infeasible.	17	152
8. Have you ever dealt with a property that had a "No Further Action" letter from a state Voluntary Cleanup program?		
I don't know what a "Voluntary Cleanup program" is.	21	
No, have never been in that situation .	63	
No, I don't deal with contaminated properties.	1	
Yes, it lowered my risk and my required rate of return.	42	
Yes, but it did not lower my risk or my required rate of return.	25	
no response	1	153

9. Have you ever used Environmental Insurance for a property transaction?		
No, I don't deal with contaminated properties.	13	
No, have never been in that situation that warranted it.	91	
No, it's not worth the cost.	5	
Yes, but at someone else's request, i.e.-a lender.	19	
Yes, it lowered my risk and my required rate of return.	6	
Yes, but it did not lower my risk or my required rate of return.	5	
Yes, but it increased my required rate of return.	1	
I don't know what a "Environmental insurance" covers, never dealt with it.	20	
no response	1	161
10. When initially evaluating an investment, do you screen for on-site environmental issues		
As part of initial property inspection.	75	
A phase I environmental investigation is always done prior to seeking funding.	80	
Only if requested by lender or other financial partner.	8	
Only invest in contaminated property.	0	163
11. If a Phase I environmental investigation shows potential problems on-site, do you further investigate and continue to pursue the investment?		
Yes	126	
No	21	
blank	8	149
12. If a Phase I environmental investigation shows potential off-site contamination originating property, do you continue to pursue the investment?		
Yes	78	
No	66	
blank	5	149
13. If a Phase II environmental investigation shows potential on-site contamination, do you typically continue to pursue the investment?		
Yes	64	
No	73	
Blank	12	149

Investment Criteria for Clean and Contaminated Scenarios, ***Primary Property Type***	*Count Or Yes*	*No*	*Mean*	*Median*	*Mode*	*Max*	*Min*	*Blank*	*Totals*
14. Considering again your answer or answers to Question 2, please mark the <u>one</u> type of investment that you most often deal in:									
Multi-family residential	50								
Retail	29								
Office	31								
Industrial	43								
Land	1								
no response	4								158
14. If the property is CLEAN									136
Your overall cap rate ___%			10.23	10	10	25	8	45	
Your reversion/terminal cap rate ___%			10.95	10	10	23	6	91	
The discount rate you would apply ___%			10.28	10	8	30	1	105	
Investment holding period? ___years			9.11	10	10	30	0.5	43	
14. If there is a GASOLINE contamination problem									
Would you still consider investing? Yes/No	98	37						14	149
Your overall cap rate ___%			12.51	12	12	35	2	74	
Your reversion/terminal cap rate ___%			12.97	12	10	30	6	99	
The discount rate you would apply ___%			15.74	14	12	50	2	96	
Investment holding period? ___years			7.42	5	5	30	1	71	
Would you also deduct the cleanup costs directly from the resulting purchase price?	96	5						48	149
14. If there is a DRY CLEANING contamination problem									
Would you still consider investing? Yes/No	66	64						19	149
Your overall cap rate ___%			12.83	12	12	35	2	97	
Your reversion/terminal cap rate ___%			12.84	12	10	25	6	114	
The discount rate you would apply ___%			17.41	14	12	50	2	111	
Investment holding period? ___years			8.07	7	5	30	1	94	
Would you also deduct the cleanup costs directly from the resulting purchase price? Yes/No	76	5						68	149
14. If there is a DEGREASING/ SOLVENT contamination problem									
Would you still consider investing? Yes/No	70	58						21	149
Your overall cap rate ___%			13.19	12	10	35	2	93	
Your reversion/terminal cap rate ___%			13.49	12	10	30	6	113	
The discount rate you would apply ___%			16.78	15	20	35	2	109	
Investment holding period? ___years			8.03	7	10	30	1	88	
Would you also deduct the cleanup costs directly from the resulting purchase price? Yes/No	79	5						65	149

Investment Criteria for Clean and Contaminated Scenarios, ***Secondary Property Type***	*Count* *Or* *Yes*	*No*	*Mean*	*Median*	*Mode*	*Max*	*Min*	*Blank*	*Totals*
15. If you marked more than one investing type in Question 2, now please indicate the second most common type that you deal in:									
Multi-family residential	17								
Retail	18								
Office	33								
Industrial	22								90
15. If the property is CLEAN									149
Your overall cap rate ___%			10.69	10	10	22	8	86	
Your reversion/terminal cap rate ___%			11.28	10	10	20	6	109	
The discount rate you would apply ___%			10.73	10.5	12	25	1	118	
Investment holding period? ___years			9.24	10	10	30	1	87	
Would you also deduct the cleanup costs directly from the resulting purchase price? Yes/No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
15. If there is a GASOLINE contamination problem									
Would you still consider investing? Yes/No	59	21						69	149
Your overall cap rate ___%			12.63	12	12	20	6	103	
Your reversion/terminal cap rate ___%			13.70	12	10	30	6	117	
The discount rate you would apply ___%			15.56	15	20	30	2	115	
Investment holding period? ___years			7.93	6	5	30	1	105	
Would you also deduct the cleanup costs directly from the resulting purchase price? Yes/No	58	1				`		90	149
15. If there is a DRY CLEANING contamination problem									
Would you still consider investing? Yes/No	43	35						71	149
Your overall cap rate ___%			12.78	12	12	20	6	113	
Your reversion/terminal cap rate ___%			14.06	12	15	30	6	124	
The discount rate you would apply ___%			17.02	12	12	50	2	122	
Investment holding period? ___years			7.59	5	5	30	1	115	
Would you also deduct the cleanup costs directly from the resulting purchase price? Yes/No	48	1						100	149
15. If there is a DEGREASING/ SOLVENT contamination problem									
Would you still consider investing? Yes/No	43	32						74	149
Your overall cap rate ___%			13.13	12	12	20	6	112	
Your reversion/terminal cap rate ___%			14.13	12	15	30	6	123	
The discount rate you would apply ___%			16.67	15	25	35	2	120	
Investment holding period? ___years			8.00	6	5	30	1	113	
Would you also deduct the cleanup costs directly from the resulting purchase price? Yes/No	48	2						99	149

Appendix B3

Statistical Analysis Output

Includes:

- **Contaminated / Clean differential rate statistics**
- **Correlation analysis**
- **Tests of difference in means between subsamples**

Note: Variables in output tables are coded according the question number and part to which the variable is a response.

Statistics on Criteria Differentials between Contaminated and Clean Scenarios

Differentials for Primary Property Type (question 14)

	Differentials between GASOLINE and CLEAN				Differentials between DRY CLEANING and CLEA				Differentials between SOLVENT and CLEAN			
	Overall Cap Rate	Reversion cap rate	Discount Rate	Holding Period	Overall Cap Rate	Reversion cap rate	Discount Rate	Holding Period	Overall Cap Rate	Reversion cap rate	Discount Rate	Holding Period
Mean	2.2	2.1	2.1	(0.7)	2.4	2.0	3.2	(1.1)	2.8	2.3	3.7	(0.8)
Median	2.0	1.0	1.5	0.0	2.0	0.8	2.0	0.0	2.0	0.9	2.0	0.0
Min	(4.0)	0.0	0.0	(15.0)	(9.5)	0.0	0.0	(15.0)	(4.0)	0.0	0.0	(15.0)
Max	15.0	10.0	13.0	10.0	15.0	10.0	13.0	2.0	15.0	20.0	15.0	5.0

Differentials for Secondary Property Type (question 15)

	Differentials between GASOLINE and CLEAN				Differentials between DRY CLEANING and CLEA				Differentials between SOLVENT and CLEAN			
	Overall Cap Rate	Reversion cap rate	Discount Rate	Holding Period	Overall Cap Rate	Reversion cap rate	Discount Rate	Holding Period	Overall Cap Rate	Reversion cap rate	Discount Rate	Holding Period
Mean	2.0	2.3	2.4	(1.0)	2.2	2.5	3.2	(1.3)	2.4	2.6	3.6	(0.9)
Median	1.8	1.0	1.0	0.0	2.0	0.8	1.5	0.0	2.0	1.0	1.5	0.0
Min	(4.0)	0.0	0.0	(10.0)	(4.0)	(2.0)	0.0	(10.0)	(4.0)	0.0	0.0	(10.0)
Max	11.5	10.0	13.0	5.0	11.5	10.0	13.0	2.0	11.5	10.0	15.0	8.0

Correlation among capitalization and discount rates

Among all “clean” rates, for primary and secondary property types

The CORR Procedure -- **Clean Rates**

6 Variables: C14_2 *Overall cap rate* C14_3 *Reversion cap rate* C14_4 *Discount rate* C15_2 *Overall cap rate* C15_3 *Reversion cap rate* C15_4 *Discount rate*

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum	Label
C14_2	104	10.22596	2.25001	1064	8.00000	25.00000	C14#2
C14_3	58	10.94828	3.07607	635.00000	6.00000	22.50000	C14#3
C14_4	44	10.28409	4.98532	452.50000	1.00000	30.00000	C14#4
C15_2	63	10.69048	2.76561	673.50000	8.00000	22.00000	C15#2
C15_3	40	11.27500	2.95685	451.00000	6.00000	20.00000	C15#3
C15_4	31	10.72581	5.09221	332.50000	1.00000	25.00000	C15#4

Pearson Correlation Coefficients
Prob > |r| under H0: Rho=0
Number of Observations

	C14_2	C14_3	C14_4	C15_2	C15_3	C15_4
C14_2	1.00000	0.21443	-0.16472	0.69596	-0.04681	-0.20918
C14#2		0.1092	0.2912	<.0001	0.7772	0.2761
	104	57	43	62	39	29
C14_3	0.21443	1.00000	0.38763	-0.00186	0.92838	0.34626
C14#3	0.1092		0.0162	0.9909	<.0001	0.0768
	57	58	38	40	40	27
C14_4	-0.16472	0.38763	1.00000	-0.21898	0.39018	0.98673
C14#4	0.2912	0.0162		0.2629	0.0538	<.0001
	43	38	44	28	25	29
C15_2	0.69596	-0.00186	-0.21898	1.00000	0.09775	-0.06011
C15#2	<.0001	0.9909	0.2629		0.5538	0.7568
	62	40	28	63	39	29
C15_3	-0.04681	0.92838	0.39018	0.09775	1.00000	0.44238
C15#3	0.7772	<.0001	0.0538	0.5538		0.0236
	39	40	25	39	40	26
C15_4	-0.20918	0.34626	0.98673	-0.06011	0.44238	1.00000
C15#4	0.2761	0.0768	<.0001	0.7568	0.0236	
	29	27	29	29	26	31

Correlation among all “solvent” rates, for primary and secondary property types

The CORR Procedure -- **Solvent Rates**

6 Variables: S14_2 *Overall cap rate* S14_3 *Reversion cap rate* S14_4 *Discount rate* S15_2 *Overall cap rate* S15_3 *Reversion cap rate* S15_4 *Discount rate*

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum	Label
S14_2	54	2.75463	3.35568	148.75000	-4.00000	15.00000	S14#2
S14_3	36	2.34028	3.76504	84.25000	0	20.00000	S14#3
S14_4	22	3.68182	4.99892	81.00000	0	15.00000	S14#4
S15_2	37	2.41216	3.16240	89.25000	-4.00000	11.50000	S15#2
S15_3	25	2.58000	3.20052	64.50000	0	10.00000	S15#3
S15_4	16	3.56250	4.93921	57.00000	0	15.00000	S15#4

Pearson Correlation Coefficients
Prob > |r| under H0: Rho=0
Number of Observations

	S14_2	S14_3	S14_4	S15_2	S15_3	S15_4
S14_2	1.00000	0.80038	0.58834	0.93755	0.49819	0.42139
S14#2		<.0001	0.0040	<.0001	0.0155	0.1335
	54	33	22	34	23	14
S14_3	0.80038	1.00000	0.20580	0.74867	0.42570	0.09610
S14#3	<.0001		0.3708	<.0001	0.0339	0.7438
	33	36	21	24	25	14
S14_4	0.58834	0.20580	1.00000	0.54204	0.09471	0.72559
S14#4	0.0040	0.3708		0.0453	0.7583	0.0033
	22	21	22	14	13	14
S15_2	0.93755	0.74867	0.54204	1.00000	0.62344	0.58520
S15#2	<.0001	<.0001	0.0453		0.0015	0.0219
	34	24	14	37	23	15
S15_3	0.49819	0.42570	0.09471	0.62344	1.00000	0.36216
S15#3	0.0155	0.0339	0.7583	0.0015		0.2240
	23	25	13	23	25	13
S15_4	0.42139	0.09610	0.72559	0.58520	0.36216	1.00000
S15#4	0.1335	0.7438	0.0033	0.0219	0.2240	
	14	14	14	15	13	16

Tests for Differences in Means among Capitalization and Discount Rate Differentials

Summary statistics

OVERALL CAP RATE: GASOLINE, DRY CLEANING, SOLVENT (both Q14 & Q15)

The MEANS Procedure

Variable	N	Mean	Std Dev	Minimum	Maximum
G14_2	71	2.1760563	2.8583819	-4.0000000	15.0000000
D14_2	51	2.3578431	3.7783114	-9.5000000	15.0000000
S14_2	54	2.7546296	3.3556805	-4.0000000	15.0000000
G15_2	45	1.9500000	2.5797507	-4.0000000	11.5000000
D15_2	36	2.2291667	3.0772059	-4.0000000	11.5000000
S15_2	37	2.4121622	3.1623964	-4.0000000	11.5000000

REVERSION/TERMINAL CAP RATE: GASOLINE, DRY CLEANING, SOLVENT (both Q14 & Q15)

The MEANS Procedure

Variable	N	Mean	Std Dev	Minimum	Maximum
G14_3	45	2.0500000	2.5347584	0	10.0000000
D14_3	33	2.0227273	2.6695356	0	10.0000000
S14_3	36	2.3402778	3.7650426	0	20.0000000
G15_3	30	2.3083333	2.9882553	0	10.0000000
D15_3	24	2.4791667	3.3862868	-2.0000000	10.0000000
S15_3	25	2.5800000	3.2005208	0	10.0000000

DISOUNT RATE: GASOLINE, DRY CLEANING, SOLVENT (both Q14 & Q15)

The MEANS Procedure

Variable	N	Mean	Std Dev	Minimum	Maximum
G14_4	28	2.1250000	3.0960698	0	13.0000000
D14_4	20	3.2000000	4.1498256	0	13.0000000
S14_4	22	3.6818182	4.9989176	0	15.0000000
G15_4	19	2.3947368	3.5923489	0	13.0000000
D15_4	14	3.2142857	4.4579846	0	13.0000000
S15_4	16	3.5625000	4.9392138	0	15.0000000

INVESTMENT HOLDING PERIOD: GASOLINE, DRY CLEANING, SOLVENT (both Q14 & Q15)

The MEANS Procedure

Variable	N	Mean	Std Dev	Minimum	Maximum
G14_5	75	-0.7266667	3.2790215	-15.0000000	10.0000000
D14_5	54	-1.0648148	3.1593621	-15.0000000	2.0000000
S14_5	59	-0.8389831	3.0078069	-15.0000000	5.0000000
G15_5	44	-0.9545455	2.9488235	-10.0000000	5.0000000
D15_5	34	-1.2941176	3.1094130	-10.0000000	2.0000000
S15_5	36	-0.9444444	3.3290449	-10.0000000	8.0000000

Tests for the Equality of Two Means: "OVERALL CAP RATE" among the Contamination Scenarios

Two Sample t-test for the Means of G14_2 and D14_2

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
G14_2	71	2.176056	2.8584	0.3392
D14_2	51	2.357843	3.7783	0.5291

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	-0.303	120	0.7627
Not Equal	-0.289	88.84	0.7731

Two Sample t-test for the Means of D14_2 and S14_2

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
D14_2	51	2.357843	3.7783	0.5291
S14_2	54	2.75463	3.3557	0.4567

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	-0.570	103	0.5701
Not Equal	-0.568	99.93	0.5715

Two Sample t-test for the Means of S14_2 and G15_2

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
S14_2	54	2.75463	3.3557	0.4567
G15_2	45	1.95	2.5798	0.3846

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	1.316	97	0.1912
Not Equal	1.348	96.42	0.1809

Two Sample t-test for the Means of G15_2 and D15_2

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
G15_2	45	1.95	2.5798	0.3846
D15_2	36	2.229167	3.0772	0.5129

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	-0.444	79	0.6582
Not Equal	-0.435	68.26	0.6646

Two Sample t-test for the Means of D15_2 and S15_2

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
D15_2	36	2.229167	3.0772	0.5129
S15_2	37	2.412162	3.1624	0.5199

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	-0.250	71	0.8029
Not Equal	-0.251	71.00	0.8029

Tests for the Equality of Two Means: "REVERSION / TERMINAL CAP RATE" among the Contamination Scenarios

Two Sample t-test for the Means of G14_3 and D14_3

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
G14_3	45	2.05	2.5348	0.3779
D14_3	33	2.022727	2.6695	0.4647

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	0.046	76	0.9635
Not Equal	0.046	67.00	0.9638

Two Sample t-test for the Means of D14_3 and S14_3

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
D14_3	33	2.022727	2.6695	0.4647
S14_3	36	2.340278	3.765	0.6275

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	-0.401	67	0.6899
Not Equal	-0.407	63.14	0.6856

Two Sample t-test for the Means of S14_3 and G15_3

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
S14_3	36	2.340278	3.765	0.6275
G15_3	30	2.308333	2.9883	0.5456

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	0.038	64	0.9701
Not Equal	0.038	63.87	0.9695

Two Sample t-test for the Means of G15_3 and D15_3

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
G15_3	30	2.308333	2.9883	0.5456
D15_3	24	2.479167	3.3863	0.6912

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	-0.197	52	0.8448
Not Equal	-0.194	46.32	0.8470

Two Sample t-test for the Means of D15_3 and S15_3

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
D15_3	24	2.479167	3.3863	0.6912
S15_3	25	2.58	3.2005	0.6401

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	-0.107	47	0.9151
Not Equal	-0.107	46.55	0.9152

Tests for the Equality of Two Means: "DISCOUNT RATE" among the Contamination Scenarios

Two Sample t-test for the Means of G14_4 and D14_4

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
G14_4	28	2.125	3.0961	0.5851
D14_4	20	3.2	4.1498	0.9279

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	-1.029	46	0.3090
Not Equal	-0.980	33.40	0.3342

Two Sample t-test for the Means of D14_4 and S14_4

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
D14_4	20	3.2	4.1498	0.9279
S14_4	22	3.681818	4.9989	1.0658

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	-0.338	40	0.7372
Not Equal	-0.341	39.69	0.7349

Two Sample t-test for the Means of S14_4 and G15_4

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
S14_4	22	3.681818	4.9989	1.0658
G15_4	19	2.394737	3.5923	0.8241

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	0.933	39	0.3567
Not Equal	0.955	37.84	0.3455

Two Sample t-test for the Means of G15_4 and D15_4

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
G15_4	19	2.394737	3.5923	0.8241
D15_4	14	3.214286	4.458	1.1914

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	-0.585	31	0.5629
Not Equal	-0.566	24.38	0.5768

Two Sample t-test for the Means of D15_4 and S15_4

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
D15_4	14	3.214286	4.458	1.1914
S15_4	16	3.5625	4.9392	1.2348

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	-0.202	28	0.8418
Not Equal	-0.203	27.96	0.8407

Tests for the Equality of Two Means: "INVESTMENT HOLDING PERIOD" among the Contamination Scenarios

Two Sample t-test for the Means of G14_5 and D14_5

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
G14_5	75	-0.72667	3.279	0.3786
D14_5	54	-1.06481	3.1594	0.4299

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	0.587	127	0.5585
Not Equal	0.590	116.78	0.5562

Two Sample t-test for the Means of D14_5 and S14_5

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
D14_5	54	-1.06481	3.1594	0.4299
S14_5	59	-0.83898	3.0078	0.3916

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	-0.389	111	0.6979
Not Equal	-0.388	108.92	0.6985

Two Sample t-test for the Means of S14_5 and G15_5

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
S14_5	59	-0.83898	3.0078	0.3916
G15_5	44	-0.95455	2.9488	0.4446

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	0.195	101	0.8462
Not Equal	0.195	93.76	0.8458

Two Sample t-test for the Means of G15_5 and D15_5

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
G15_5	44	-0.95455	2.9488	0.4446
D15_5	34	-1.29412	3.1094	0.5333

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	0.492	76	0.6238
Not Equal	0.489	69.17	0.6263

Two Sample t-test for the Means of D15_5 and S15_5

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
D15_5	34	-1.29412	3.1094	0.5333
S15_5	36	-0.94444	3.329	0.5548

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	-0.453	68	0.6516
Not Equal	-0.454	67.99	0.6510

Tests of Differences in Means among Respondent Groups by Development Role

Difference in Means of Clean Overall Cap Rate: Broker vs. Non-Broker

Two Sample t-test for the Means of C14_2B and C14_2NB

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
C14_2B	86	10.25581	2.4384	0.2629
C14_2NB	18	10.08333	0.9587	0.226

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	0.294	102	0.7690
Not Equal	0.498	68.93	0.6204

Difference in Means of Clean Overall Cap Rate: Developer vs. Non-Developer

Two Sample t-test for the Means of C14_2D and C14_2ND

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
C14_2D	45	10.45556	2.1369	0.3185
C14_2ND	59	10.05085	2.3354	0.304

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	0.908	102	0.3660
Not Equal	0.919	98.61	0.3603

Difference in Means of Clean Overall Cap Rate: Financier vs. Non-Financier

Two Sample t-test for the Means of C14_2F and C14_2NF

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
C14_2F	7	10.14286	1.7728	0.6701
C14_2NF	97	10.23196	2.2879	0.2323

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	-0.101	102	0.9200
Not Equal	-0.126	7.52	0.9033

Difference in Means of Clean Overall Cap Rate: Investor vs. Non-Investor

Two Sample t-test for the Means of C14_2I and C14_2NI

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
C14_2I	50	10.28	2.0055	0.2836
C14_2NI	60	10.61127	3.5136	0.4536

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	-0.591	108	0.5558
Not Equal	-0.619	96.41	0.5372

Difference in Means of Gasoline Differential for Overall Cap Rate: Broker vs. Non-Broker

Two Sample t-test for the Means of G14_2B and G14_2NB

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
G14_2B	57	2.298246	3.3775	0.4474
G14_2NB	14	1.107143	1.0774	0.2879

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	1.297	69	0.1989
Not Equal	2.239	64.40	0.0286

Diff in Means of Gasoline Differential for Overall Cap Rate: Developer vs. Non-Developer

Two Sample t-test for the Means of G14_2D and G14_2ND

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
G14_2D	36	2.659722	3.2641	0.544
G14_2ND	35	1.678571	2.3133	0.391

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	1.458	69	0.1495
Not Equal	1.464	63.15	0.1480

Diff in Means of Gasoline Differential for Overall Cap Rate: Financier vs. Non-Financier

Two Sample t-test for the Means of G14_2F and G14_2NF

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
G14_2F	7	3.785714	3.954	1.4945
G14_2NF	65	2.123077	2.8532	0.3539

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	1.410	70	0.1629
Not Equal	1.083	6.69	0.3165

Difference in Means of Gasoline Differential for Overall Cap Rate: Investor vs. Non-Investor

Two Sample t-test for the Means of G14_2I and G14_2NI

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
G14_2I	32	3.09375	3.394	0.6
G14_2NI	39	1.423077	2.0886	0.3344

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	2.544	69	0.0132
Not Equal	2.432	49.37	0.0187

Diff in Means of Dry Cleaning Differential for Overall Cap Rate: Broker vs. Non-Broker

Two Sample t-test for the Means of D14_2B and D14_2NB

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
D14_2B	42	2.470238	4.1298	0.6372
D14_2NB	10	1.6	1.6964	0.5364

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	0.649	50	0.5190
Not Equal	1.045	36.41	0.3030

Difference in Means of Dry Cleaning Differential for Overall Cap Rate: Developer vs. Non-Developer

Two Sample t-test for the Means of D14_2D and D14_2ND

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
D14_2D	28	3.276786	3.8702	0.7314
D14_2ND	22	1.727273	2.5482	0.5433

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	1.620	48	0.1117
Not Equal	1.701	46.73	0.0956

Difference in Means of Dry Cleaning Differential for Overall Cap Rate: Financier vs. Non-Financier

Two Sample t-test for the Means of D14_2F and D14_2NF

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
D14_2F	4	2.9375	3.6077	1.8039
D14_2NF	46	2.565217	3.4345	0.5064

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	0.207	48	0.8367
Not Equal	0.199	3.49	0.8535

Difference in Means of Dry Cleaning Differential for Overall Cap Rate: Investor vs. Non-Investor

Two Sample t-test for the Means of D14_2I and D14_2NI

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
D14_2I	21	3.797619	3.8775	0.8461
D14_2NI	29	1.724138	2.7858	0.5173

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	2.203	48	0.0324
Not Equal	2.091	34.32	0.0440

Difference in Means of Solvent Differential for Overall Cap Rate: Broker vs. Non-Broker

Two Sample t-test for the Means of S14_2B and S14_2NB

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
S14_2B	44	2.960227	3.6272	0.5468
S14_2NB	11	1.681818	1.5536	0.4684

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	1.137	53	0.2608
Not Equal	1.775	38.99	0.0836

Diff in Means of Solvent Differential for Overall Cap Rate: Developer vs. Non-Developer

Two Sample t-test for the Means of S14_2D and S14_2ND

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
S14_2D	30	3.475	3.7648	0.6874
S14_2ND	24	2.145833	3.0484	0.6223

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	1.400	52	0.1674
Not Equal	1.434	51.99	0.1577

Diff in Means of Solvent Differential for Overall Cap Rate: Financier vs. Non-Financier

Two Sample t-test for the Means of S14_2F and S14_2NF

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
S14_2F	5	4.45	4.4102	1.9723
S14_2NF	49	2.785714	3.3835	0.4834

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	1.021	52	0.3121
Not Equal	0.820	4.49	0.4537

Difference in Means of Solvent Differential for Overall Cap Rate: Investor vs. Non-Investor

Two Sample t-test for the Means of S14_2I and S14_2NI

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
S14_2I	24	3.802083	3.6882	0.7529
S14_2NI	30	1.916667	2.856	0.5214

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	2.118	52	0.0390
Not Equal	2.059	42.59	0.0457

Difference in Means of Clean Overall Cap Rate: Broker Only vs. All Others

Two Sample t-test for the Means of C14_2BO and C14_2AO

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
C14_2BO	29	10.22414	3.1864	0.5917
C14_2AO	75	10.22667	1.7902	0.2067

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	-0.005	102	0.9959
Not Equal	-0.004	35.05	0.9968

Diff in Means of Gasoline Differential for Overall Cap Rate: Broker Only vs. All Others

Two Sample t-test for the Means of G14_2BO and G14_2AO

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
G14_2BO	17	0.705882	1.9289	0.4678
G14_2AO	55	2.863636	3.3723	0.4547

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	-2.507	70	0.0145
Not Equal	-3.307	47.86	0.0018

Diff in Means of Dry Cleaning Differential for Overall Cap Rate: Broker Only vs. All Others

Two Sample t-test for the Means of D14_2BO and D14_2AO

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
D14_2BO	12	0.416667	2.0207	0.5833
D14_2AO	38	3.282895	3.4894	0.5661

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	-2.694	48	0.0097
Not Equal	-3.526	32.82	0.0013

Difference in Means of Solvent Differential for Overall Cap Rate: Broker Only vs. All Others

Two Sample t-test for the Means of S14_2BO and S14_2AO

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
S14_2BO	13	0.692308	2.0569	0.5705
S14_2AO	41	3.408537	3.4395	0.5372

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	-2.688	52	0.0096
Not Equal	-3.466	34.56	0.0014

Tests of Differences in Means among Respondent Types according to Main Primary Property Involvement

Difference in Means of Clean Overall Cap Rate: Residential vs. Non-Residential

Two Sample t-test for the Means of C14_2R and C14_2NR

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
C14_2R	60	10.15833	2.68	0.346
C14_2NR	44	10.31818	1.5023	0.2265

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	-0.356	102	0.7223
Not Equal	-0.387	96.17	0.6999

Diff in Means of Gasoline Differential for Overall Cap Rate: Residential vs. Non-Residential

Two Sample t-test for the Means of G14_2R and G14_2NR

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
G14_2R	39	2.24359	3.6303	0.5813
G14_2NR	33	1.787879	2.3016	0.4007

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	0.623	70	0.5356
Not Equal	0.645	65.20	0.5209

Difference in Means of Dry Cleaning Differential for Overall Cap Rate: Residential vs. Non-Residential

Two Sample t-test for the Means of D14_2R and D14_2NR

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
D14_2R	31	2.508065	4.2212	0.7582
D14_2NR	21	2.571429	3.1831	0.6946

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	-0.058	50	0.9537
Not Equal	-0.062	49.35	0.9511

Diff in Means of Solvent Differential for Overall Cap Rate: Residential vs. Non-Residential

Two Sample t-test for the Means of S14_2R and S14_2NR

Sample Statistics

Group	N	Mean	Std. Dev.	Std. Error
S14_2R	33	2.719697	4.0753	0.7094
S14_2NR	24	2.541667	3.23	0.6593

Hypothesis Test

Null hypothesis: Mean 1 - Mean 2 = 0
Alternative: Mean 1 - Mean 2 ^= 0

If Variances Are	t statistic	Df	Pr > t
Equal	0.177	55	0.8600
Not Equal	0.184	54.54	0.8548

Appendix B4

Focus Group Interviews And Analysis

This document summarizes the results of interviews with three different market players. One respondent seeks Brownfields investments (aggressive), one respondent avoids such investments (conservative), and the third neither seeks nor shies away (ambivalent). A common, but not unexpected, response amongst all three respondents is that any deal can work so long as the bottom line meets their investment criteria. With that said, each adjusts their investment criteria in response to environmental conditions at the site. It is this differential investment criterion between a "clean" site and a "dirty" site which we can use to quantify the increase in perceived risk, leading to higher required rates of return, and consequently leading to higher capital expenditures compared to the same end-use on a clean site.

The responses illustrate a fairly consistent approach to adjusting hurdle rates, whereby the costs of cleanup are explicitly accounted for in the pricing, either in evaluating feasibility or deducting from a resulting purchase price. After accounting for increased costs, hurdle rates are adjusted anywhere from zero to 75 basis points, depending on the particular transaction.[1] For ease of discussion, let's assume a "standardized" adjustment of 50 basis points.

For example, suppose a property generating $100,000 annually in investment income would typically transact at an overall capitalization rate of 9% if clean and 9.5% if contaminated. Further suppose that cleanup costs are $150,000. The resulting price a buyer is willing to pay to clear the required hurdle rate if clean is $1.1 million (100,000 ÷ .09) and if dirty $900,000 ([100,000 ÷ .095] – 150,000). The price differential, attributed to environmental conditions, totals $200,000.

Remember, both prices reflect the price for clean property, one that was never contaminated and one that has been successfully cleaned.[2] The $200,000 differential attributable to environmental conditions can be further assigned. If $150,000 is the hard costs of cleanup, then the remaining $50,000 can be attributable to stigma—the value loss due to environmental risk over and above the cost of cleanup. And, although the property may be clean, there are future risks reflected in that stigma—risk from regulatory changes that require additional cleanup and risk that future sues of the property may be limited by the cleanup techniques.

Risk and perceived risks become the critical factors. The surveys and interviews cover three risk management tools- increased investment hurdle rates, environmental insurance and regulatory "no further action" letters. While adjusting hurdle rates is the easiest for an investor, it tends to significantly impact deal flow—transactions cease from happening in the market and move into the realm of a limited number of specialized entrepreneurial investors. No Further Action Letters help to reduce perceived risk, but do not eliminate potential future risks.[3] Environmental Insurance can quantify and address environmental risks, but based on our interviews, is little known.

The interviews also highlight several market failures. A somewhat obvious and pervasive problem in the market is that players are not knowledgeable in environmental risks; the Risk Averse Respondent actually stated that he has no problem with asbestos properties because it is common, the general public is familiar with the issue, and cleanup methods are widely known and accepted. However, the Risk Averse respondent didn't want to have anything to do with a dry cleaning site simply because it was an unknown. In some instances, sellers decide it is the buyer's onus to address environmental issues; however the field of buyers willing to take on that challenge is slim. Similarly, the seller of a contaminated property may not be willing to recognize the value impairment and not be willing to reduce his price accordingly; the property is virtually taken off the market. The Aggressive Respondent has a somewhat novel approach in that he

[1] One basis point is equal to 1/100 of 1% or .0001; 100 basis points equals 1%, 50 basis points equals 1/2 %.

[2] Closure is assumed to be through a cost effective risk-based closure technique that eliminates exposure risk for the intended site use, but may or may not completely remove the hazards from the site.

[3] No further action letters are intended to identify that a site is safe for its intended use, but may become invalid if site use changes or if regulations change that toughen cleanup standards.

recognizes he needs to offer a higher price to acquire the property, but then leverages public participation to enable economic viability.

Interviews with respondents are summarized as follows:

RESPONDENT NO. 1

Summary of survey question responses:

- Broker, Developer and Investor.
- Deals in retail, office and industrial properties.
- Typically looks for a transaction size ranging from less than $250,000 to more than $5 million in size.
- Invests in contaminated ("brownfields") properties as well as "clean" properties.
- Does not intentionally search for contaminated property as an investment but does not walk away from a potential deal solely because environmental contamination is present. If contamination is found, evaluates the potential cost of remediation and the impacts on deal economics. Will invest if the economics make sense after considering costs of addressing environmental issues.
- Has intentionally purchases property with environmental contamination issues after evaluating the bottom line deal economics.
- Considers a Voluntary Cleanup "No Further Action" letter to lower, but not completely eliminate, environmental risk and required rate of return.
- Has not previously had the opportunity to deal with "Environmental Insurance for a property transaction.
- Screens for on-site environmental issues as part of initial property inspection and continues to pursue environmental assessments as long as the deal continues to be financially viable.
- Will use the same investment criteria for clean versus Brownfields sites, after explicitly deducting all additional costs attributable to the environmental condition, i.e- cleanup, above-normal due diligence efforts.

Summary of interview comments:

- Doesn't intentionally seek contaminated properties, but doesn't flee either. Will continue to conduct due diligence as long as the deal is economically viable, considerate of environmental related costs.
- Feels that an environmental issue can always be solved (from an engineering perspective) with persistence, and of course if economically viable to do.
- In describing the real estate market, he splits the players between the marketing and development side. He thinks that most developers have faced the issue of dealing with contamination and are comfortable with many situations; the marketing side (salespersons) tends to shy away from marketing these properties because they don't understand the issues.
- Sees a No Further Action letter form the Voluntary Cleanup Program as a negotiation tool in a deal. For an unsophisticated seller, can use it to lower the price—use it as evidence of the environmental problem. For a more sophisticated seller and buyer, it will reduce the risk in the deal. A seller can use it to argue a higher price because environmental issues have been resolved.
- No Further Action letters do not completely eliminate deal impacts however. There will be higher due diligence costs associated with the transaction. The type or extent of contamination (particular with risk-based closure where there may be hazardous materials left in place) may impact utility of

the property; i.e- may impact how a site is subdivided/platted, or impact rezoning and allowable uses on the site.

- In many deals, it is "buyers beware," that means it is typically up to the buyer to investigate environmental conditions. However, this respondent feels that the seller "owns" the problem and should deal with it. It should be part of the seller's responsibility to at least conduct phase I investigations. If a contamination issue shows itself, the respondent feels that it is a continuing responsibility of the seller to find out the extent of the problem and how much it will cost to mitigate. This discussion relates to advice to the seller if they were my client, not necessarily what actually happens. The cost of cleanup should be reflected in the price, adjusted downward for remediation costs.
- Sales brokers should try to preserve value for the seller. In this instance it would be accomplished by the seller undertaking the cleanup, putting value back into the property, and selling for the highest price.
- Ultimately, long-term outcome expectations drive the deal. For example, if a risk based closure enables reuse of the site, but disallows future excavations below ground, it can impact the next use on the site thereby diminishing the value of the property at the time of conversion (cashing out of the investment) in the future. If the environmental closure affects future uses, it may affect current pricing.

RESPONDENT NO. 2

Summary of survey question responses:

- Broker, Financier and Investor.
- Deals in multi-family residential, office and industrial properties.
- Typically seeks a transaction size of at lest $1milion and more than $5 million in size.
- Does not intentionally seek contaminated property as an investment. Tries to avoid contamination and, although the respondent stated they would invest if the economics makes sense, they have a limited tolerance for environmental issues and has never purchased a property with environmental contamination issues.
- Has dealt on a property that had a "No Further Action" letter from the Colorado Voluntary Cleanup program and it did lower their perceived risk some, but not completely.
- Has been involved in a deal where Environmental Insurance was required to be in place by the lender. That policy did enable financing of the transaction.
- Screens for on-site environmental issues with a Phase I environmental investigation as part of initial due diligence. If the phase I shows possible on-site contamination, the respondent will continue to investigate the investment. Potential off-site contamination will kill the deal due to potential third party lawsuits.
- Continues to pursue the investment when a Phase I environmental investigation shows potential problems on-site.
- If a Phase II environmental investigation confirms on-site contamination the respondent may or may not proceed with the deal depending on the situation.
- The respondent would not invest in transactions involving Dry Cleaners or degreasing solvent—primarily because the respondent does not understand (or want to understand) the liability implications. The "unknown" is the deal killer.
- The respondent would invest in office properties that had gasoline contamination, but would require higher investment hurdle rates including a higher overall capitalization rate (by 75 basis points), a higher reversionary capitalization rate (by 50 basis points), a higher discount rate (by 50 basis

points), and would use a longer hold period (increased from 5 years to 10 years). These higher rates are in addition to deducting the costs of cleanup.

- The respondent would invest in multi-family residential properties that had gasoline contamination, but would require higher investment hurdle rates including a higher overall capitalization rate (by 75 basis points), a higher reversionary capitalization rate (by 75 basis points), a higher discount rate (by 50 basis points), and would use a longer hold period (increased from 5 years to 10 years). These higher rates are in addition to deducting the costs of cleanup.

Summary of interview comments:

- Does not intentionally seek out these investments and would try to avoid them.
- There have been deals that he has been involved with that that have presented environmental conditions during the course of due diligence. While pursuit of these deals cautiously proceed forward, they must make economic sense, and generally don't proceed to deal closure.
- With regard to No Further Action Letters, he said that yes, they do lower the investment for contaminated property, but also raises a red flag on the issue. The letter lowers overall risk, but does not remove it.
- He noted specifically that a deal he was working on had a No Further Action letter from the CO Dept. of Health & Environment. This letter was taken as a red flag that potentially detrimental environmental conditions were present.
- While he understood that the NFA letter indicated that the site was declared clean for its intended use, it raised concerns that regulators could change the rules on how clean is clean, and could potentially be liable for future environmental issues.
- Doesn't rust NFA letters, "what if the regulations change?"
- He has heard of environmental insurance, but doesn't really know anything about it. After I explained to him the typical uses and coverage, he agreed that it may relieve some of the investment risk, but said he would need to be comfortable with the deal to begin with. Environmental Insurance wouldn't make or break a deal on its own.
- He said he would definitely consider environmental insurance if a deal went past a Phase II environmental investigation and contamination was known. It would be something he would consider if he were to move ahead.
- He wasn't sure how to respond to the various contamination scenarios because he didn't know what environmental issues were implied by each scenario and how they differed. Instead, his answers reflect the general presence of environmental risk in a deal that he may be considering.
- He did add in a category himself, that of asbestos. He has, and would do, deals which involve asbestos contamination. It has been an issue ling enough that he understands how it is mitigated and is comfortable that removing the asbestos removes the liability and risk.
- He would model his investment with a longer hold time, not because his investment plan calls for a longer term hold, but to reflect the risk that it may take longer to market and sell a former brownfields site compared to a former greenfields site.

RESPONDENT NO. 3

Summary of survey question responses:

- Developer and Investor.
- Deals in multi-family residential and industrial.
- Typically deals in transactions ranging from $250,000 to $5 million in size.
- Purchases property with environmental contamination issues (Excluding asbestos & lead based paint.
- Intentionally seeks contaminated property as an investment, as well as “clean properties.
- Has walked away from a potential deal solely because environmental contamination was present, but only after it was determined that cleanup costs made the deal infeasible.
- A “No Further Action” letter from the state Voluntary Cleanup program will lower this respondent’s perception of risk and required rates of return.
- Has never been in a situation that warrants Environmental Insurance for a property transaction.
- Will continue to consider an investment with verified on-site or off-site contamination as long as the deal economics, considerate of environmental costs, make sense.
- The respondent would invest in multi-family residential properties that had gasoline, dry cleaning, and/or degreasing solvent contamination, but would require higher investment hurdle rates, i.e.- an overall capitalization rate higher by 200 basis points compared to a “clean” property. However, this rate would be applied after deducting cleanup costs.

Summary of interview comments:

- Brownfield sites are typically underutilized and value recovery can be achieved by bringing the site to a better use.
- Environmental issues are not usually the only problem with these sites. Often times the buildings are functionally obsolete. Environmental problems are one of a number of issues that affect older properties.
- The cost of cleaning should be viewed as another construction cost. Because many sellers won’t discount their sites for cleanup costs, the only way to get these properties into a new use is to pay full price, have reliable cost estimates, and calculate the feasibility.
- There is a public benefit involved in bringing underutilized sites into reuse. Public-private financial partnering can go a long way in making a Brownfields deal work financially. Particularly where the acquisition price does not reflect cleanup costs, but is a price that needs to be paid to get the property into redevelopment.

VIII. APPENDIX C: BACKGROUND MATERIALS

Summary of Retail Gap Analysis

highlighting 80219/Westwood retail opportunities

Identifying Retail Opportunities in Central Denver

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I. Background

- Inner cities seen as problems versus opportunities
  - "Inner city" now inner ring around downtown core
- Donut effect isolates inner ring residents
  - Downtown revivals (e.g. LoDo) during recent boom
  - Suburbs continue to thrive
- Yet costs + attention siphon profits in thriving areas
  - Thick markets don't need highlighting
- Lower costs alongside opportunity in inner-ring
  - Labor and land less expensive + Neglected niches
  - Thin markets bypassed: $20 on sidewalks?

II. Retail Gaps?

- Denver's inner ring: Semicircle from SW to NE
  - Pockets of unemployment, poverty, and board-ups
- Considerable unmet needs in retail
  - Low incomes, but much purchasing power
- Lower Costs + Unmet Demand = Profits
  - Reputation, thin markets obscure opportunities
- Highlighting *private* profit also helps *social* goals
  - Plug spending leakages and recycle local $
  - Reduce transport costs and sprawl
  - Available labor with jobs matching local (youth) needs
  - Reinforce community fabric

III. Informational Bridge: EDA/Denver/CSU Project

- Identify gaps in target neighborhoods for 1997
  - Rank census tracts and use broader zips
  - Focus on food, clothing, & home products
- Develop techniques for public data
  - Standardized approach
  - Publish methods in econ development journals
- Demand: Households, income, and CES
- Supply: Econometric estimation
  - Census + County/Zip Business Patterns
- Estimates within 1-2% of actual values

IV. Study Results

- Target areas indeed underserved
  - Food: Half of targets buy 20%+ outside area
  - Apparel and Home: 81% and 58% outside area
- Local Benchmark: Fill ½ of gaps
  - New square footage: 740,000+
    - 66,000+ in Food and 673,000+ in Apparel/Home
  - New Jobs: 1350+
    - 150+ in Food and 1200+ in Apparel/Home
- Maps

V. Implications

- Analysis suggests significant business opportunities
  - Clear demand in areas with low costs and plentiful labor
  - Recent Census figures emphasize local potential
- Poor information hurts prospects
  - Thin markets in inner city areas
- Supports general city goals
  - Private business development
  - Infill/brownfield development vs. sprawl
- Methodology can also help other areas
  - Thick markets rarely need highlighting
  - Thinner struggling markets can benefit

RETAIL POTENTIAL FOR DENVER'S INNER CITY AREAS

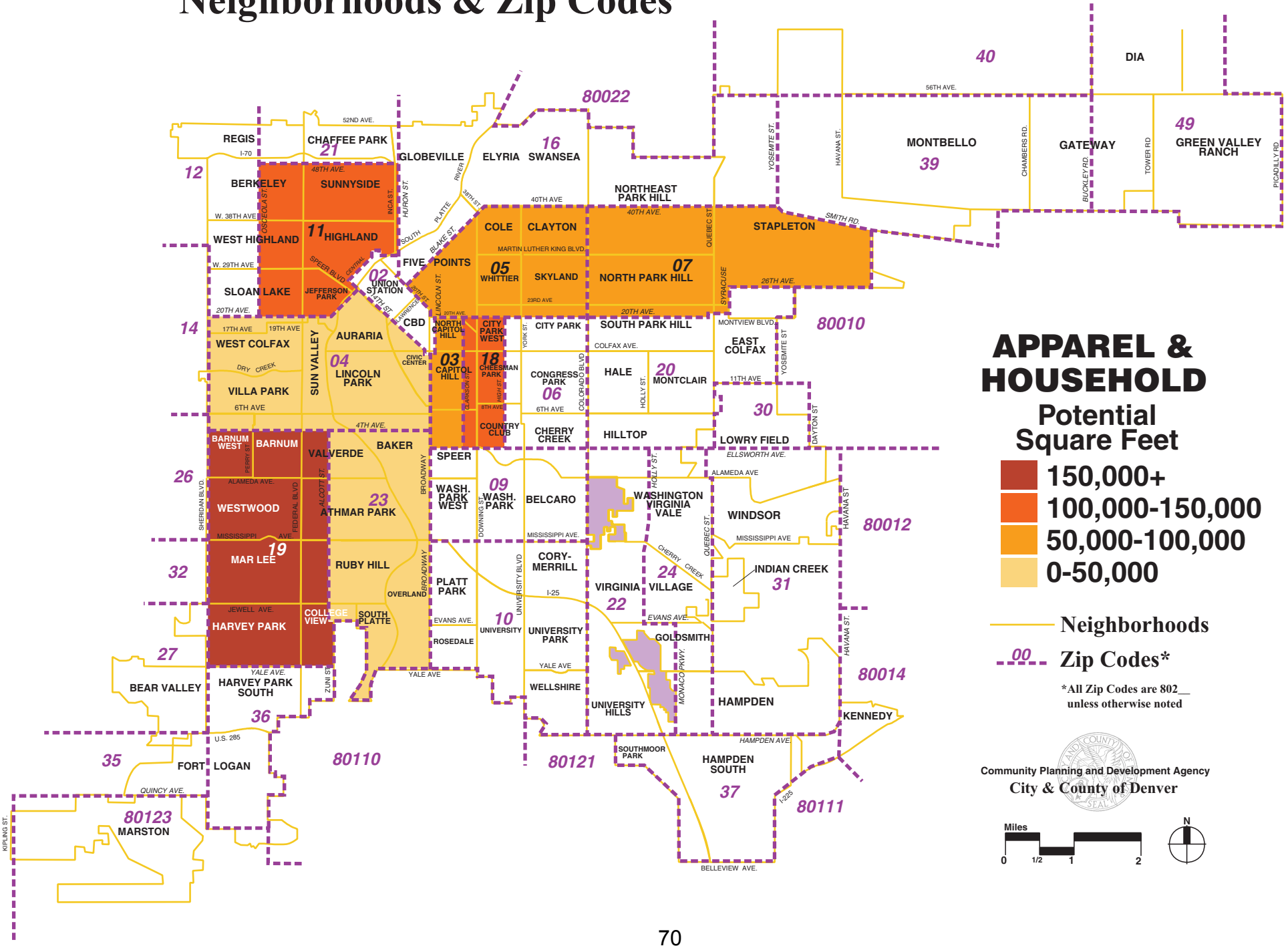
1997 Food at Home - Supermarket Potential

								50% Capture of Local Gap			
Zip	**Households**	**Median Inc**	**Mean Inc**	**Expenditures**	**Sales**	**Gap**	**Gap/HH**	**New Est**	**New Emp**	**New Sales**	**SqFeet**
80207	7,652	$46,746	$58,441	$24,856,860	$4,270,776	($20,586,084)	($2,690)	3.0	63	$10,293,042	27,669
80203	11,099	28,212	39,750	31,991,946	17,721,368	(14,270,578)	(1,286)	2.1	44	7,135,289	19,181
80211	14,303	31,517	39,294	41,079,982	32,366,443	(8,713,539)	(609)	1.3	27	4,356,769	11,712
80223	7,456	33,172	40,806	21,666,893	15,804,124	(5,862,769)	(786)	0.9	18	2,931,385	7,880
80205	8,940	24,502	37,351	25,276,200	28,815,263	3,539,063	396				
80216	2,854	29,653	36,214	7,992,122	14,083,640	6,091,518	2,134				
80204	12,074	26,621	36,132	33,787,313	45,539,386	11,752,073	973				
80218	9,283	32,835	56,404	29,825,120	69,188,947	39,363,827	4,240				
80219	18,738	37,763	43,889	55,696,091	102,756,756	47,060,664	2,512				
Sum	92,399	$32,336	$43,142	$272,172,528	$330,546,704	$58,374,176	$632	7.2	152	$24,716,484	66,442

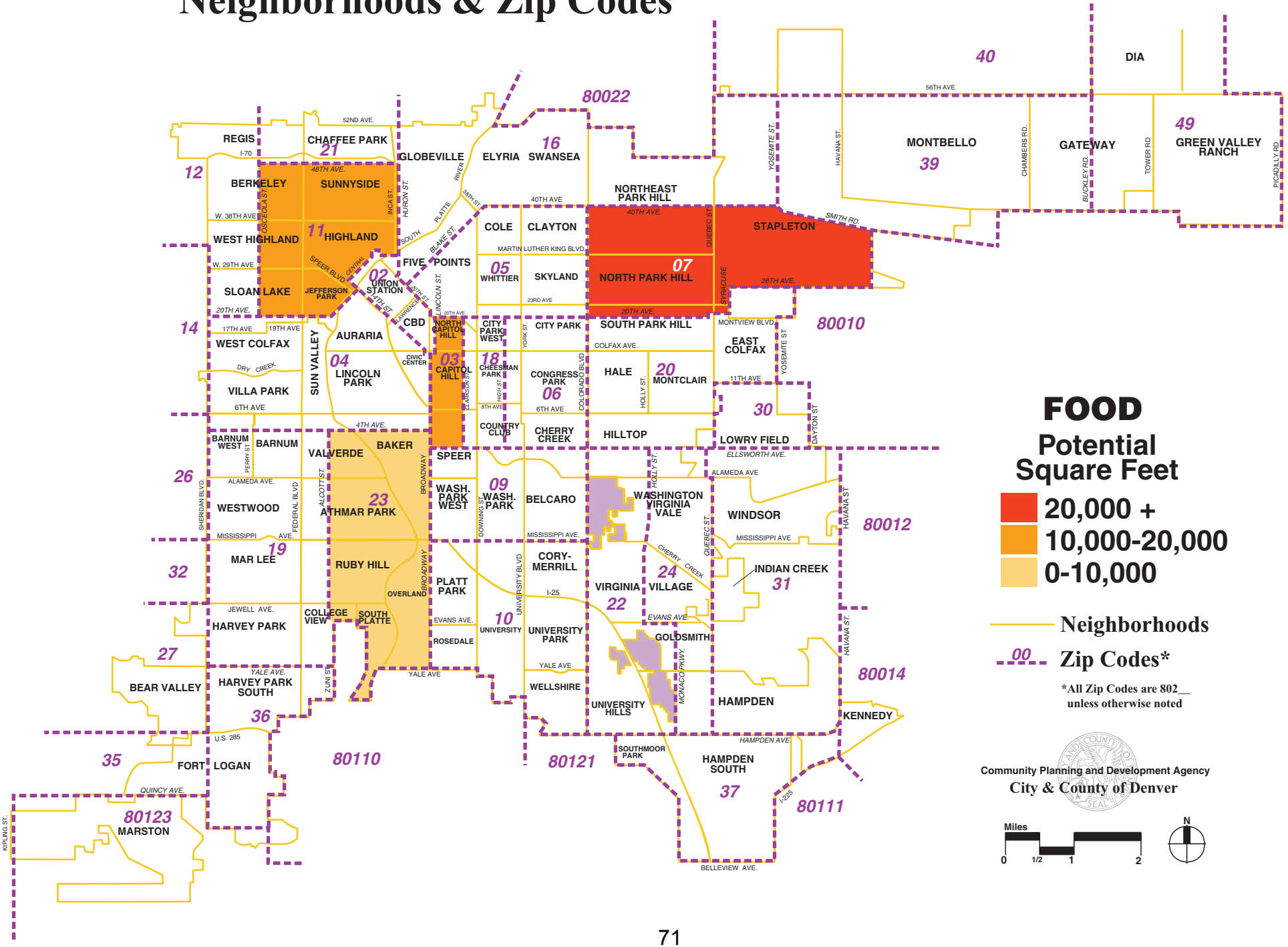
1997 Apparel and Household - Department and Specialty Store Potential

								50% Capture of Local Gap			
Zip	**Households**	**Median Inc**	**Mean Inc**	**Expenditures**	**Sales**	**Gap**	**Gap/HH**	**New Est**	**New Emp**	**New Sales**	**SqFeet**
80219	18,738	$37,763	$43,889	$82,411,820	$16,576,393	($65,835,427)	($3,513)	30.9	277	$32,917,714	155,272
80211	14,303	31,517	39,294	57,826,912	4,114,599	(53,712,313)	(3,755)	25.2	226	26,856,156	126,680
80218	9,283	32,835	56,404	49,166,170	6,298,714	(42,867,456)	(4,618)	20.1	181	21,433,728	101,102
80207	7,652	46,746	58,441	41,575,066	4,008,959	(37,566,107)	(4,909)	17.6	158	18,783,053	88,599
80203	11,099	28,212	39,750	45,271,076	14,045,375	(31,225,701)	(2,813)	14.7	131	15,612,851	73,646
80205	8,940	24,502	37,351	34,764,667	4,437,607	(30,327,061)	(3,392)	14.2	128	15,163,530	71,526
80204	12,074	26,621	36,132	45,765,944	27,279,312	(18,486,632)	(1,531)	8.7	78	9,243,316	43,601
80223	7,456	33,172	40,806	31,027,481	25,601,772	(5,425,709)	(728)	2.5	23	2,712,854	12,796
80216	2,854	29,653	36,214	10,836,913	28,225,162	17,388,250	6,093				
Sum	92,399	$32,336	$43,142	$398,646,049	$130,587,893	($268,058,156)	($2,901)	134.1	1202	$142,723,203	673,223

Neighborhoods & Zip Codes



Neighborhoods & Zip Codes



FOOD
Potential Square Feet

- 20,000 +
- 10,000-20,000
- 0-10,000

Colorado Brownfields Foundation conference presentation

highlighting Westwood socio-economic status
and initial results dissemination

Brownfield Redevelopment: Private and Social Returns

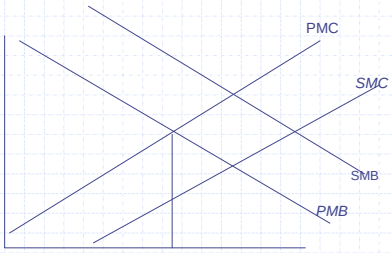
Stephan Weiler
Colorado State University

Colorado Brownfields Foundation Conference
Denver, CO
September 26, 2003

Outline of CSU/EDA/Denver Research Program

- Assess retail gap & private-vs-social incentives of filling the gap
- Further returns from underused sites
  - Spatial econometric assessment of the community's *social benefits* of site quality improvements
  - Risk premium associated with developing environmentally damaged property added to benefit-*cost* analysis

Costs Versus Benefits



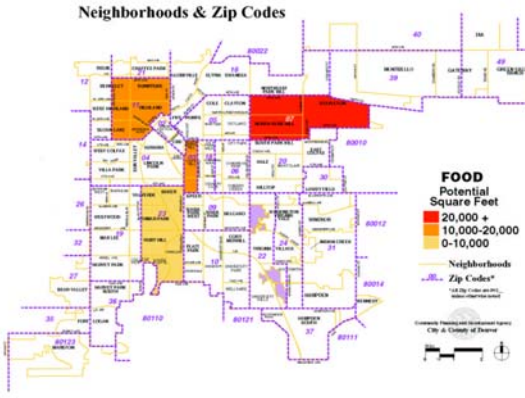
Brownfield Development

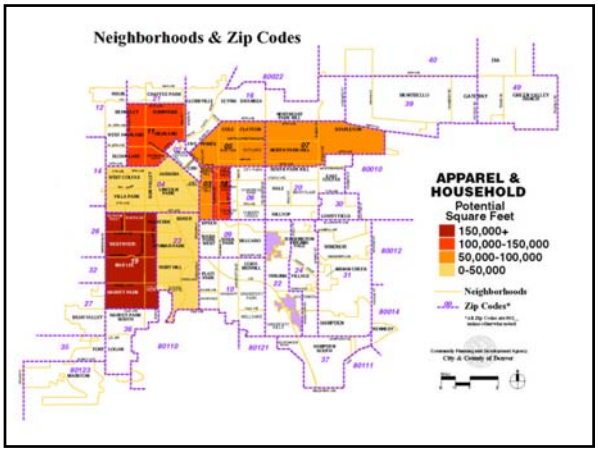
Inner-City Retail Gaps

- Inner cities opportunities
  - Net outflow of retail spending: "Retail Gaps"
  - Resources flowing out of struggling areas
- Denver's inner ring: SW/NE Semicircle
  - Pockets of unemployment, poverty, underused land
- Path Dependent Cycle
  - Thin Markets bypassed due to poor Information
    - Lang/Nakamura: Redlining actually Thin Market effect?
  - Neglected niches + Land/Labor less expensive
    - Possibly higher social returns given lower oppy costs
- Approach: Local Demand – Local Supply = Gap
  - Econometric estimates using public data
  - CES, Zip County Biz Patterns, Retail Census...

Neighborhood Statistics

Neighborhood	% Persons in Poverty	% age 25 w/ <12th grade Ed	Average HH Income	% Change in Total Population 1990-2000
Westwood	24.1	55.9	37,961	35
Sun Valley	71.5	56.6	12,434	2.6
Highland	24.2	44	39,568	16.8
Five Points	31.5	39.5	35,518	8.8
Northeast Park Hill	23.8	33.5	37,468	26.5
Denver	14.3	21.1	55,129	18.6



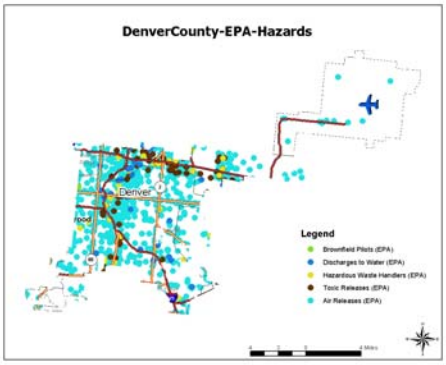


Private vs Social Incentives I

- Returns of 10,000 sqft grocery?
  - Example of retail re/development
  - Private = 7.15% vs Social = 33.4%
  - Social include factor oppy cost and spillovers
  - Suburban location Social = 16.3%
  - Ranking for entrepreneurs & public officials

Brownfield Redevelopment

- Underused central sites
  - Stigma to focal site and neighborhood
- Brownfield Investment Incentives
  - Private/Entrepreneur versus Public/Social
    - Spillovers to neighboring property values
    - Private versus Public Hurdle Rates?
- Statistical analysis estimates value impacts
- Survey evaluates hurdle rates



Previous Work

- Kohlhase, Janet (1991) "The impact of toxic waste sites on housing values" Journal of Urban Economics, 30, p1-26
  - Hedonic model of NPL listing impact on housing values
  - Houston housing market 1976-1985
  - Cleanup removes value stigma to surrounding properties
- Jackson, Thomas. (2002.) "Environmental contamination and industrial real estate prices." Journal of Real Estate Research, 23, 179-199.
  - Focused on price impact of contamination on industrial properties
  - Significant impact on prices 30%, but dissipates after cleanup
- Ihlanfeldt, Keith R. and Laura O. Taylor (working paper) "Externality effects of small-scale hazardous waste sites: Evidence from urban commercial property markets"
  - Apartment, retail, offices, industrial, and vacant
  - Found significant decrease in property value with proximity to waste sites
  - Policy suggestion for clean-up: Cost-sharing

Hedonic Model of Housing Value

$$y = \beta X + \varepsilon$$

$$\varepsilon \sim N\left(0, \sigma^2 I_n\right)$$

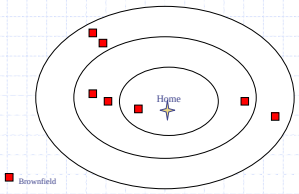
Y = Denver home prices

X = Matrix of House & Nbhd Characteristics

- Incorporate brownfield effects

Spatial Econometric Contribution

- Saturation indices (>1 site)
  - Measurements of dis/amenities
- Spatial Econometrics
  - Incorporate potential spatial spillovers



Initial Property Value Analysis

- Focal Equation
  - Median Home Value in 2000 = F [# Brownfields, Median # of Rooms]
- Data/Approach
  - 133 Census Tract observations for Denver
  - # Brownfields
    - Any EPA hazardous release site
    - Located in the census tract or on the border
    - Brownfield may be counted in more than one census tract
  - # of Bedrooms as control for house size

Initial Property Value Results

- Econometric results

	Coefficients	
Intercept	*$178,367*	*F-test:*
# Brownfields	*$-1,718*	*Eqn significant at*
Median Rooms	*$6,320*	*>99% confidence*

- Implications
  - Brownfield saturation: Significant negative effect
    - Implies one additional brownfield will decrease median home value by almost $2,000

Private vs Social Risk Wedge

- Objective: Assess brownfield "premium"
  - *H_o: Higher hurdle rates for brownfields*
- Approach: Developer/investor survey
  - *Sent to investors/developers/brokers/financiers*
    - Elicited hurdle rates for clean vs contaminated sites
    - Respondents given a scenario with known clean-up costs
      - Therefore, premium represents ROR wedge
      - Uncertainty regarding extra cleanup, stigma, viability…
  - *900 surveys mailed; near 20% return*
- Brownfield risk (real/perceived) borne by developer
  - Creates wedge b/w private vs social incentives
  - Private pioneering problem with social spillovers

Key Survey Results

- Even when clean-up costs are netted out, a ROR "premium" **is still** required for contaminated properties
- Respondents are more willing to consider a gasoline problem than a dry-cleaning or solvent problem, require a lower return differential, and expect a shorter holding period
- Cap rate differential is 2% to 2.5% for dry-cleaning and gasoline contamination, 3% for a solvent problem (Means table follows)
- Sub-sample analysis:
  - No measurable difference b/w residential and non-residential
  - For gasoline and solvent contamination, those with an "investor" role require higher overall cap rate than non-investors; other divisions inconclusive
  - For dry-cleaning contamination, "developers" and "investors" require higher cap rate than "brokers" and "financiers"; others inconclusive
  - Those who play only a broker role express cap rate differentials measurably lower than those with participation roles: 2% lower for gasoline, 3% lower for dry-cleaning and solvent contaminated properties

Developer Survey: Summary of Mean Return Requirements

	If the property is CLEAN	If there is a GASOLINE contamination problem	If there is a DRY CLEANING contamination problem	If there is a DEGREASING /SOLVENT contamination problem
Would you still consider investing?	N/A	98 - Yes 37 - No	66 - Yes 64 - No	70 - Yes 64 - No
Your overall cap rate	10.23%	12.51%	12.83%	13.19%
Your reversion/terminal cap rate	10.95%	12.97%	12.84%	13.49%
The discount rate you would apply	10.28%	15.74%	17.41%	16.78%
Investment holding period?	9.11 years	7.42 years	8.07 years	8.03 years
In addition to the above, would you also deduct the cleanup costs directly from the resulting purchase price?	N/A	98 - Yes 5 - No	76 - Yes 5 - No	79 - Yes 5 - No

Private versus Social Incentives II

Denver's Westwood Neighborhood

- Three underutilized sites totals about one acre.
- Current site activities include yard storage, automotive repair services and used parts sales
- Residents benefit from neighborhood serving retailers and personal service providers, in addition to the environmental benefits

Redevelopment		Results in Change
Property Value	$390,600	51%
Business Fixtures & Equipment	$96,000	99%
Employment	15	88%
Total Earnings	$269,300	46%
General Fund	$1,300	59%
Sales Tax	$27,300	45%
School Revenue	$4,400	57%
New Investment		
Construction	$1,048,000	
Business Equipment	$192,000	
Environmental Services	$770,000	

Source: Development Research Partners

Estimated Impact of Stigma

	Clean	Dirty
Net rent	$6.00 PSF	$6.00 PSF
Cap Rate	10.25%	12.5%
Value	$59 PSF	$48 PSF

- Over 27% of the market drops out of bidding (Survey)
- A required annual rate of return 225 basis points higher
- An internal rate of return 550 basis points higher
- 19% market value loss of $11 PSF
- Value loss likely to be borne by the seller
  - Effect of brownfields' private risk versus broader social returns
- Opportunity cost of $330,000/yr based on impacts evaluated

Conclusions

- Redeveloping brownfields?
  - Obstacles and Opportunities
  - Obstacles largely borne by developers
    - Survey assesses ROR wedge
  - Opportunities for communities
    - Remove stigmatized sites, increase propy value
    - Low oppy cost further raises social returns
- Use Benefit/Cost to prioritize sites and $