

**REDEVELOPING GREYFIELDS:
DEFINITIONS, OPPORTUNITIES AND BARRIERS**

by

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Submitted to the Department of Urban Studies and Planning in Partial Fulfillment of the
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ABSTRACT

The study of greyfields for this thesis was motivated by the increasing problems of traffic and air pollution associated with sprawling development patterns. Typically located in inner ring suburban areas, greyfields, or failed retail malls, represent sites that can be redeveloped profitably into mixed-use, walkable neighborhoods. Yet, few successful examples of greyfield redevelopment exist, especially when compared to the relative proliferation of brownfield redevelopment.

Brownfields, or contaminated urban sites, are very costly to remediate and it is surprising that this type of redevelopment outpaces greyfield redevelopment on such a significant scale. This thesis addresses the disparity between the two redevelopment types and describes differences between brownfields and greyfields through application of an economic model for redevelopment. The variables of the model are then applied to each redevelopment type and considered in the context of several greyfield case studies located on the east coast.

Where the economic model is incomplete in fully explaining the disparity between the redevelopment types, factors outside of the model have been considered, including the existence of externalities and public subsidies at federal, state and local levels. Lastly, suggestions of how to foster increased implementation of greyfield redevelopment and create an industry around the reuse of greyfield sites are discussed.

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TABLE OF CONTENTS

ACKNOWLEDGEMENTS.....	4
CHAPTER I. INTRODUCTION	5
CHAPTER II. GREYFIELDS REDEFINED.....	13
CHAPTER III. ECONOMIC MODEL FOR REDEVELOPMENT.....	18
CHAPTER IV. REDEVELOPMENT MODEL APPLIED	24
CHAPTER V. GREYFIELD CASE STUDIES.....	33
CHAPTER VI. BROWNFIELD AND GREYFIELD EXTERNALITIES.....	43
CHAPTER VII. OPPORTUNITIES IN GREYFIELD REDEVELOPMENT.....	50
CHAPTER VIII. CONCLUSIONS.....	57
BIBLIOGRAPHY	61

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CHAPTER I. INTRODUCTION

The study of greyfields for this thesis was initially motivated by the problems of traffic and air pollution associated with sprawling development patterns. The consequences of sprawl are not a new topic. Six years ago, a 2000 Pew Center survey found that of all domestic concerns, Americans were most troubled about sprawl and traffic – more than crime, jobs, or education.¹ Sprawl has been defined as an area where residential homes are more than 3 miles from daily destinations such as jobs, recreation, and shopping.² Another way of defining sprawl is an area in which land consumption is occurring at a rate faster than population growth.³ Yet, a common misconception of sprawl is that population growth is the primary driver of congestion and traffic. As shown in the following table, however, land consumption has far outpaced population growth, even in areas that declined in population.

Region	Time Frame (Years)	Increase in Population (%)	Increase in Land Consumption (%)
United States	1974-1984	38%	80%
Puget Sound	1970-1990	38%	87%
Los Angeles	1970-1990	45%	300%
New York City	1970-1994	5%	61%
Cleveland	1970-1990	(decline)	33%
Chicago	1970-1990	4%	35%
Kansas City	1970-1990	29%	110%

Source: Nozzi, Dom. *Road to Ruin: An Introduction to Sprawl and How to Cure It*, p. 10.

This table shows that population growth cannot be the sole driver behind the challenges of sprawl, but rather, the primary cause is the disproportionate increase of driving distances required to get to the same destinations for work, shopping and recreation. It is the car-based transportation system on which we rely that is creating the drastic increase in land consumption, per capita oil consumption, and resulting air pollution, traffic and congestion.⁴

Despite these facts, some defend sprawl because of its association with economic prosperity, privacy, mobility and choice. According to Robert Bruegmann, a defender of sprawl, “the reason these problems occur is that these [places] are so attractive... because they offer what people really want more than anything else.”⁵ Bruegmann goes on to describe privacy as the ability to control one’s environment through home and land ownership. A counter-argument exists, however, that providing suburbia for everyone means that its benefits ultimately go to no one.⁶ By everyone seeking to have a home surrounded by open space away from the city center means that no one gains these things. Instead, seekers of this lifestyle become surrounded by congested collector roads with hastily constructed residential subdivisions, suburban business parks and retail strip centers. “As soon as the suburban pattern became universal, the virtues it first boasted began to disappear.”⁷

The car-dependent nature of sprawl impacts the lives of many different population groups. For example, those too young, too old, or too poor to drive are isolated by car-dependent sprawl.⁸ Other affected population groups include weary commuters and stay-at-home parents who spend much of their time chauffeuring children from one place to another. In fact, the American stay-at-home parent averages 14 car trips per day.⁹

Households and municipalities also incur financial costs of car-based sprawl. For example, transportation, including gas, car purchases and maintenance, is one of the highest expense categories for American households, comprising 18% of a household’s budget, second only to housing at 19%.¹⁰ In cities such as Houston, TX, that are even more dependent on the car, transportation consumes 22% of an average household’s budget.¹¹ Local municipalities and the federal government also bear the financial burden of America’s auto-dependency. These municipalities struggle to keep pace with costly infrastructure requirements, such as road

improvements and construction of new schools. At the federal level, the government spent \$117 billion on roads and \$29 billion on public transportation in 1999.¹² It is interesting to note that it is often said that the government *invests* in highways and roads, but *subsidizes* transit, when the financial transaction is essentially the same – local, state and federal governments are spending money to improve transportation. When taking into account all true costs of driving, including environmental externalities such as air pollution, costs of defending oil supplies, and other direct subsidies, U.S. motorists receive an estimated \$700 billion per year in hidden subsidies for driving.¹³ If these subsidies were passed through directly to gas prices, one gallon of gasoline would cost between \$6 and \$15.¹⁴ Thus, it is clear that car-based, sprawling development patterns have adversely impacted the environment, the financial health of municipalities, and the overall quality of life for many Americans.

Given the existing challenges and financial costs associated with car-dependent sprawl, it is sobering to consider the projected increase in the built environment over the next few decades. The United States is in the midst of a building boom and projections anticipate further development and construction, with one source predicting a 50% aggregate increase in the built environment by 2030.¹⁵ Furthermore, this growth is anticipated to occur primarily in the suburban, lower density, autodependent areas of the southern and western United States.¹⁶ While some U.S. urban centers are witnessing a resurgence in population growth, it is quite small in comparison to suburban growth.¹⁷

Combining the consequences of sprawl with Americans' continued desire to live in the suburbs presents a unique opportunity for underutilized greyfields. Greyfields have been traditionally defined as failed retail malls and are often located in older, inner ring suburban areas.¹⁸ These failed malls were given the name "greyfield" due to the grey color of the single-

story buildings and the sea of parking lots that surround them. This term parallels “brownfields,” the development industry term for contaminated urban sites, and “greenfields,” defined as previously undeveloped rural land or open space on the suburban fringe.

As more people feel the strain of energy costs and traffic, the importance of walkability and alternative transportation choices start to appeal more broadly in the market. Redeveloping failed greyfields sites in suburban areas into higher-density, walkable, mixed-use neighborhoods can improve quality of life by decreasing the length and number of required vehicle trips, consequently also reducing air pollution and traffic. The idea is not to eliminate the car, but rather reduce our dependency on it by creating communities that can support transportation *options* such as walking, biking or public transit. In addition, mixed-use greyfield redevelopment can create substantial value for the property owner and local municipality through better financial performance of the property, increased tax base, greater feasibility of public transit, creation of new jobs, and establishing a sense of identity for the community. Rather than start over building new suburbs on greenfield sites, it preferable to reuse underutilized, previously developed greyfield sites and transform them into something better. The idea is not to stop suburban growth, but at least direct some of the growth into redeveloping greyfield sites.

Reusing greyfield sites has other advantages as well. First, at one point in time, people were accustomed to shopping at that location, in contrast to a greenfield site where a developer may be creating a new market from scratch. Additionally, while there has been some gravitation towards living in urban centers again, one of the main reasons this trend has yet to capture the suburban family is due to stereotypically poor public schools located in urban areas. Suburban locations often have much better performing public school systems and thus, while a walkable lifestyle may have general appeal, many families cannot afford private education and must

choose the strongest public schools for their children. Greyfields have a unique opportunity in this case to attract the young family demographic due to their location in the suburbs and potential proximity to strong school systems. Greyfield redevelopment could meet a need for an underserved population demographic while simultaneously reclaiming underutilized land, redeveloping existing structures into more sustainable, mixed-use places, and ultimately transforming suburban land use patterns.

Given the benefits of reusing greyfield sites, examples of greyfield redevelopments were studied as part of this thesis. All greyfields studied are located in U.S. states along the east coast with each site being either in the planning stage, under construction or substantially complete. What first became apparent about this topic was how few examples of this implementation actually existed. Merely identifying greyfield redevelopments was a challenge. A search for real estate development firms that specialized in greyfield redevelopment revealed that none existed. Two of the top urban planning firms espousing greyfield redevelopment were interviewed as well. Duany Plater-Zyberk (“DPZ”) and Dover Kohl Partners (“Dover Kohl”) are New Urbanist planners that have redesigned suburban greyfields into mixed-use walkable neighborhoods or town centers.¹⁹ Neither of these firms knew of any real estate developers specializing in greyfields nor were they aware of any new greyfield projects.²⁰

Greyfield specialist, Lee Sobel, with the U.S. Environmental Protection Agency (“EPA”), was also questioned about the location of new greyfield sites or greyfield-focused developers. Mr. Sobel indicated that it was quite difficult to identify new greyfield redevelopments and knew of less than a handful of new sites, interestingly all “one-off” transactions. This “one-off” nature was one of the characteristics that emerged during this study that nearly all greyfield sites shared. Whether the developer was a large-scale REIT or a small family-owned firm, no greyfield

redevelopments identified involved a “repeat” developer. Lastly, no federal or state databases or public resources existed to assist in identifying these redevelopments of greyfield sites.

What is interesting about the relative low frequency of both the redevelopments and the resources with which to find them is that a significant number of greyfield sites may very well exist. A report completed in 2000 by Price Waterhouse Coopers indicated that 7% of all existing retail malls were in greyfield status, and an additional 12% of malls would reach greyfield status within the next 5 years.²¹ This translates into somewhere between 50 and 200 greyfield malls in the U.S., averaging 45 acres each in size.²² Given this significant number of sites, why have so few greyfield sites been redeveloped?

The lack of greyfield redevelopment is particularly puzzling when compared to the relative proliferation of brownfield redevelopment. A mature industry has emerged around brownfield redevelopment, including specialists, consultants and technological advances that ease the implementation of these redevelopments. Additionally, substantial resources exist at federal and state levels in identifying, understanding and assisting in the remediation and redevelopment of contaminated brownfields. With the significant costs, risk and liability of brownfield site remediation, why has it occurred so much more often than greyfield redevelopment? One answer may be purely based on scale, in that the universe of brownfield sites is simply much larger than greyfield sites. The U.S. HUD estimated in 1999 that approximately 5 million acres of brownfield sites existed.²³ This compares with Price Waterhouse Coopers’ estimate of 2,200 to 9,000 acres of retail greyfield sites.²⁴ Furthermore, the EPA estimates that there may be 450,000 to over 1 million brownfield sites in the U.S., which is significantly more than the 50 to 200 estimated greyfield mall sites.²⁵

Rather than draw the conclusion of why brownfield redevelopment has outpaced greyfield redevelopment based solely on scale, it is helpful to consider greyfields in further detail. First, this thesis will define a broader concept of greyfields, which will provide a larger universe of sites to study than those contained in the traditional concept of greyfields as failed retail malls. Then, using an economic model for redevelopment, each of the decision-making factors that comprise a redevelopment will be analyzed with respect to both brownfield and greyfield sites. The redevelopment model and its factors will then be applied to the greyfield case studies visited. Wherever the economic model does not fully explain the disparity between brownfield and greyfield redevelopment, other factors such as externalities and public subsidies will be considered in relationship to implementation. Lastly, this thesis will evaluate steps that can be taken to foster increased greyfield redevelopment.

CHAPTER I ENDNOTES

¹ Nozzi, Dom. *Road to Ruin*, p. 8.

² Ibid., p. 14.

³ Ibid., p. 8.

⁴ Ibid., p. xx.

⁵ Bruegmann, Robert. The Atlanta Journal-Constitution, Nov 27, 2005.

⁶ Marshall, Alex. *How Cities Work*, p. 105.

⁷ Mumford, Lewis. *The City in History*, 1961.

⁸ Duany, Plater-Zyberk, Speck, *Suburban Nation*, p. 115.

⁹ Nozzi, Dom. *Road to Ruin*, p. 37.

¹⁰ Ibid., p. 5.

¹¹ Ibid., p. 5.

¹² Ibid., p. 6.

¹³ Ibid., p. 6.

¹⁴ Ibid., p. 6.

¹⁵ Kotkin, Joel. “The New Suburbanism: A Realist’s Guide to the American Future”, p. 1

¹⁶ Ibid., p. 1

¹⁷ Ibid., p. 9

¹⁸ Sobel, Lee. *Greyfields into Goldfields*, p. 7, 22.

¹⁹ Duany Plater-Zyberk website: www.dpz.com, and Dover Kohl Partners website: www.doverkohl.com.

²⁰ Conversations with Dean Plater-Zyberk at the University of Miami and principals of Dover Kohl Partners in Miami, 3/5/06.

²¹ Sobel, Lee. *Greyfields into Goldfields*, p. 17.

²² Ibid., p. 8, 19.

²³ Brooks, Cynthia. Greenfield Environmental Trust Group Inc. Brownfields Redevelopment Presentation 6/26/06.

²⁴ Sobel, Lee. *Greyfields into Goldfields*, p. 8, 19.

²⁵ Brooks, Cynthia. Greenfield Environmental Trust Group Inc. Brownfields Redevelopment Presentation 6/26/06.

CHAPTER II. GREYFIELDS REDEFINED

As previously mentioned, greyfields have been traditionally defined as failed retail malls, typically ranging in size from 10 acres to more than 100 acres.¹ For a retail mall to reach “failed” or greyfield status, the mall will likely have at least 15% vacancy with sales per square foot averaging less than 50% of what a successful mall would earn on a per square foot basis.² Many greyfield malls earn less than \$120 per square foot, whereas a successful mall can earn upwards of \$300 per square foot.³ Additionally, most malls in greyfield status were originally constructed in the 1960s and have not been renovated for at least 7-8 years.⁴



Failed Regency Mall in Augusta, GA
Source: www.deadmalls.com

The time period in which greyfield malls were originally constructed is related to the pattern of suburban growth. Most greyfield malls are located in older, inner ring suburban areas, which declined as newer and nicer suburbs were built on the outskirts.⁵ These older malls were unable to compete with the new and expanded malls and subsequently lost market share, key tenants and ultimately declined with a lack of owner investment in the property.⁶

In addition to this definition of greyfields, a group of New Urbanist planners has recently coined the term “suburban retrofitting.” The idea behind this concept is to retrofit any failed, outdated or substantially underperforming single-use suburban parcel, including business parks or garden apartment complexes.⁷ Similar to failed greyfield malls, these sites are often located in

older, inner ring suburban areas that have lost their competitive edge to new suburbs and are subsequently falling into decay. Retrofitting, meaning literally to “to substitute new or modernized parts or systems for older equipment,” is appropriate because most of these redevelopment proposals include creating mixed-use buildings and intermodal transportation options, such as walking, biking and transit.⁸



Proposed suburban retrofit in Tysons Corner, VA. Includes a declining apartment complex and failed retail mall.
Source: Amy Merritt

It is logical to include the concept of suburban retrofitting within the greyfield terminology because many of these sites share similar characteristics. First, the scale of the parcels can be comparable, as apartment complexes, business parks and retail malls typically occupy at least 10 acres of land. Second, in accordance with Euclidean zoning, each of these places is primarily single-use, comprised of only office, retail or residential uses. Third, these sites were constructed in the post-World War II era, coinciding with the rapid rise in car use. Thus, the sites are often located near major thoroughfares or at key intersections and include substantial amounts of parking, often far more acres of parking than acreage actually occupied by buildings. Fourth, these sites are all typically occupied by many tenants under various lease structures, with apartment complexes often having highest number of tenants with the shortest-term leases. Lastly, while these parcels may be leased to many tenants, they are almost always

owned by a single entity. Thus, the term greyfield and its associated color can apply to all three land uses, including residential, office and retail.

Considering suburban retrofitting within a broader definition of greyfields is also appropriate in the context of the redevelopment scheme. In both greyfield redevelopment and suburban retrofitting, redevelopment is most often described and implemented in the form of mixed-use, walkable neighborhoods. The idea behind each concept is the same – to transform a substantially single-use land parcel with many acres of parking into a non-autodependent, mixed-use place. Broadening the concept of greyfields further still, the most defining characteristics of greyfields are the large seas of parking lots surrounding existing buildings and the fact that the property is underperforming the market. Given these two key criteria, there is no reason that greyfields cannot also include multi-use sites (uses mixed horizontally) or even mixed-use sites where uses are mixed vertically. The latter integration of uses is less likely to be found in greyfield sites, however, due to the fact that mixed-use places tend to be more compact and walkable and thus, would lack the prototypical large swaths of parking lots.

In terms of location and size, greyfields can be urban or suburban and range in size from very small sites (1 acre or less) to parcels of 300 acres or more. A greyfield site may have been constructed in the 1960s and declined as newer suburbs were built, but a greyfield site may also have been constructed more recently and declined for a variety of other factors – changing demographics, poor design, or shifting consumer preferences. This broad definition of greyfields could even include decommissioned airports or underutilized military bases in addition to the sites previously described.⁹

An example of a typology that would be excluded from this definition is a suburban single family home. While the home may be outdated or even vacant, a home would not have a

parking area that exceeded the building footprint. A new definition of greyfields, therefore, would be any previously developed property that is not contaminated (i.e. not a brownfield), contains more square feet of parking than building area, and is performing poorly. A greyfield is a place in which people were accustomed to working, shopping or living at one point in relatively recent history (within the last 40 years), yet has ceased to perform successfully as its originally intended use. Many of the same characteristics of suburban retrofits and traditional greyfields would likely be found in this new broader definition, including occupancy by one or more tenants, single entity ownership, and location near key intersections or major thoroughfares due to car dependency. The following table summarizes the characteristics of the more broadly defined greyfields:

Greyfields Redefined	
Key Characteristics	1) More land area occupied by parking lots than by building footprints 2) Property is underperforming the market
Location	Suburban or urban
Size	Any size
Land usage	Single use, multi-use or mixed-use
Existing structures	Single or multi-story buildings
Transportation Access	Located at key intersections or along major thoroughfares
Tenancy	Encumbered by one or more leases with various term lengths and structures
Occupancy	Typically at least 10-15% vacant
Ownership	Often owned by single entity

CHAPTER II ENDNOTES

¹ Sobel, Lee. *Greyfields into Goldfields*, p. 22.

² Ibid., p. 22.

³ Ibid., p. 18.

⁴ Ibid., p. 18.

⁵ Ibid., p. 7.

⁶ Ibid., p. 7, 18.

⁷ Duany Plater-Zyberk website: www.dpz.com, 2/6/06.

⁸ www.dictionaty.com, 2/6/06.

⁹ www.aa.uidaho.edu, 7/13/06.

CHAPTER III. ECONOMIC MODEL FOR REDEVELOPMENT

To understand the factors driving a greyfield or brownfield redevelopment, a simple economic model is helpful in establishing a framework from which to evaluate these factors. First, beginning with greenfield development, the decision to develop previously undeveloped land can be derived from a basic NPV analysis:

$NPV_0 - x \geq 0$ where NPV_0 represents the new land value if the proposed program is developed and x represents the current market value of the land.¹

The new land value if the proposed program is developed can be determined by measuring the difference between the value of the improvements less its costs:

$NPV_0 = V_0 - K_0$ where V_0 represents the expected value of the program improvements and K_0 represents construction costs.

Thus, to develop a greenfield site, the present value of the program's improvements, V_0 , less the program's construction costs, K_0 , and the current market value of the land, x , must be greater than or equal to zero to proceed with the proposed development. Shown in equation form:

$$V_0 - K_0 - x \geq 0.$$

Using this basic decision-making tool for greenfield development, brownfield and greyfield redevelopment can be analyzed in a similar way. However, two fundamental issues differentiate brownfield and greyfield redevelopment from previously undeveloped land:

- (1) Both greyfield and brownfield redevelopments incur extra development costs in the form of demolition expenses and/or site remediation costs.
- (2) A proposed redevelopment is competing directly with the current value of the existing structures on that parcel.²

These two factors present unique challenges to greyfield and brownfield redevelopment. A redevelopment equation incorporating these factors can be shown as follows:

$$\text{New land value} \geq \text{Old land value} + \text{value of existing buildings} + \text{demolition costs}^3$$

Rephrased another way:

$$L_{\text{new}} \geq L_{\text{old}} + V_{\text{old}} + D_0$$

where L_{new} represents the land value under the redevelopment proposal, L_{old} represents the old land value, V_{old} represents the value of the existing buildings, and D_0 represents demolition costs.

This equation can be further modified using the previous variables from the greenfield development NPV formula. Remembering that NPV_0 also represents the new land value under the proposed development scheme, the following substitution can be made:

$$L_{\text{new}} = NPV_0 = V_0 - K_0 - D_0 \geq L_{\text{old}} + V_{\text{old}}^4$$

For redevelopment to occur, the new land value, derived from the value of the improvements less construction and demolition costs, must exceed the combination of the previous land value and value of existing buildings. Phrased another way, the net present value of the new program, after paying for construction, demolition and site remediation costs, must be greater than or equal to the present value of the current income generated by the existing asset.

In addition to considering these redevelopment factors, the likelihood of the new proposal receiving necessary entitlements in the permitting process must also be taken into account. The use of this probability factor suggests two scenarios, each with its appropriately weighted likelihood of occurrence. The previous decision-making formula for redevelopment can thus be rewritten to incorporate entitlement risk as follows:

$\alpha (V_0 - K_0 - D_0) + (1-\alpha)(L_{old} + V_{old}) \geq L_{old} + V_{old}$ where α denotes a probability between 0 and 1 and represents the likelihood that a proposal will receive necessary entitlements.⁵

Simply rephrased, the above equation describes the following conditions which must be true in order to proceed with a redevelopment:

The weighted value of the redevelopment proposal if approved + the weighted value of the existing assets if redevelopment proposal is rejected \geq value of the existing asset (i.e. the developer does nothing).

The use of the probability of entitlements approval, α , is important in measuring which of several uses will have the easiest ability to obtain approvals. Any feasibility analysis for a redevelopment proposal must evaluate the likelihood of receiving necessary permits and approvals. When considering various options, some plans will naturally be more likely to obtain regulatory approval than others, and this can vary greatly by geographic area. For example, some cities and municipalities have recently taken initiative in rewriting zoning regulations or instituting form-based codes to foster mixed-use development and other smart growth patterns. In this type of municipality, a plan incorporating these characteristics would naturally have a higher probability of approval than a traditional suburban subdivision or standard commercial strip center. In other areas where this type of regulatory reform has not occurred, however, achieving approval on a mixed-use, New Urbanist redevelopment proposal of a failing retail site, for example, might be quite risky with a low probability of success— its α in the above equation may be closer to zero. Conversely, a developer in this same municipality who simply wants to re-skin the façades of the existing buildings and perhaps add a new retail pad in the parking lot may have a much greater probability of success and its α would be closer to 1. Alpha drives the

expected value of the left-hand side of the redevelopment equation and thus, understanding an area's regulatory climate and proposing plans that approximate existing guidelines become very important.

Alpha, α , also relates to highest and best use analysis as certain uses might outbid alternate uses for the land if the likelihood of entitlement creates a higher land residual. As part of determining a site's highest and best use in the context of entitlement risk, density becomes an influential development characteristic. Density, driven in part by market demand and construction feasibility, can significantly impact the probability of receiving permit approvals and the proposal's ultimate land residual. For example, while a 10-story residential condominium tower may be feasible in terms of market demand for housing, a low density neighborhood may be extremely adverse to this level of density. Consequently, the α for this proposal would be low and would reduce the value of the left-hand side of the equation. A proposal for a development of single family homes on this site, however, may have a high probability of approval and its α , being close to 1, would produce a greater value on the left-hand side of the equation, thereby outbidding the condominium use for the land. Thus, the relationship of density to entitlement risk becomes clear through highest and best use analyses using the redevelopment equation.

This complete redevelopment equation, incorporating various factors such as entitlement risk, construction costs, demolition and/or site remediation costs, value of existing structures and land residual, ultimately illustrates the concept of "land-use succession."⁶ In land use succession, land use changes due to a positive NPV opportunity to redevelop the existing program into another use. In studying greyfields and brownfields, land use succession and highest and best use analyses are interesting because these types of sites will likely undergo a change in use if

redeveloped. The following section addresses each of the factors of the redevelopment equation as they relate specifically to greyfields and brownfields.

CHAPTER III ENDNOTES

¹ All factors denoted with subscript 0 reflect Time 0, the time at which the irreversible decision to develop is made and the cost of the land is incurred. Thus, all values have been discounted at appropriate discount rates to reflect present value at Time 0. The NPV analysis is based on Dr. David Geltner's Canonical Model for evaluating development transactions.

² DiPasquale, Denise and Wheaton, William. *Urban Economics and Real Estate Markets*, p. 85.

³ Ibid.

⁴ D_0 has been moved to the left-hand side of the equation in this case because the demolition costs are not incurred *unless* the new redevelopment proposal is implemented. Otherwise, the developer is left with the original asset: $L_{old} + V_{old}$.

⁵ The use of α to denote the probability of receiving necessary entitlements is sourced from the economic model for redevelopment proposed by Professor Lynn Fisher.

⁶ DiPasquale, Denise and Wheaton, William. *Urban Economics and Real Estate Markets*, p. 87.

CHAPTER IV. REDEVELOPMENT MODEL APPLIED

The value of the redevelopment model is in understanding how each of the factors of the equation applies to greyfield and brownfield redevelopment and how these factors serve to differentiate the redevelopment typologies. As previously described, the model for redevelopment is as follows:

$$\alpha (V_0 - K_0 - D_0) + (1-\alpha)(L_{old} + V_{old}) \geq L_{old} + V_{old}$$

Each factor of this equation impacts both greyfield and brownfield redevelopment decisions. Since brownfield redevelopment has occurred on a much more frequent basis than greyfield redevelopment, it would seem logical that the factors of the redevelopment equation might explain why this is occurring. Should the equation's factors *not* present a clear rationale explaining the low frequency of greyfield redevelopment, then it is possible that there may be other factors outside of the equation that are contributing, at least in part, to the greater frequency of brownfield redevelopment over greyfield redevelopment.

Beginning with the redevelopment model, the left-hand side of the equation represents the value of the new program, weighted in accordance with its likelihood of receiving entitlements. The first parentheses on the left-hand side of the equation, $(V_0 - K_0 - D_0)$, include various components of the redevelopment decision-making process. For example, V_0 , representing the expected value of the completed improvements, takes into account market risk for each product type in projecting expected rents. Similarly, K_0 incorporates risks associated with construction costs, including materials shortages and labor risk, and may also reflect interest rate risk in financing costs. Since both greyfield and brownfield redevelopments are subject to market risk and construction risk, neither of these variables uniquely affects one redevelopment type more than the other.

However, in determining the expected value of the completed program, V_0 , the potential impact of historical stigma on expected rents must be taken into account. For example, brownfields typically have been sitting vacant, abandoned or underutilized for quite some time, even decades perhaps. Nearby residents are likely aware of the presence of physical contaminants and the brownfield has probably been an eyesore in the community. This stigma may very well affect a redevelopment proposal's achievable rents. Similarly, as a declining commercial center or residential complex, a greyfield may also be an eyesore in the community. While the site may not have physical contaminants, the demographic composition of the area may have changed during the site's economic decline and structural deterioration. Consequently, a greyfield site may have connotations of economic blight, low income demographic and even racial implications.¹ Both sites, therefore, have stigmas to overcome in attracting people to the redevelopment, which ultimately drives the program's expected value.

Between the two kinds of stigmas, however, brownfield stigmas may be easier to overcome than greyfield stigmas. For example, due to the proliferation of brownfield redevelopment, advanced science has developed new technologies to remediate, test and prove that soils are free from contamination. Thus, for potential new residents or commercial tenants, the perception of a brownfield site as contaminated or harmful can be reversed through provable, tangible and scientific means. Furthermore, in many cases, a brownfield site may have been contaminated several decades ago, with few people having any memory of what originally existed on the site. Greyfields, however, have likely declined within more recent history and surrounding neighborhoods may be very aware of the property's demise. Additionally, the stigmas that these sites must overcome are economic or social. These negative economic or social associations cannot be removed with a scientific technology or material method. Rather,

the transformation must be achieved through a shift in human perceptions, which can be quite difficult and slow. Thus, while stigmas and their effects will vary from one location to another, it is arguable that greyfields generally have more challenging, intangible stigmas to overcome.

The value of the third variable in the parentheses on the left-hand side of the equation, D_0 , representing demolition costs, can vary greatly by site and project type. A typical greyfield, for example, may have several low-density buildings surrounded by asphalt parking areas that will require demolition prior to redevelopment. Brownfields, on the other hand, could have substantially different levels of demolition required. Some contaminated sites may no longer have any structures above ground and merely be a vacant parcel of land. Demolition costs in this case would be minimal. However, other brownfield locations may have multi-story factories or large manufacturing plants depending on their historical uses, and demolition costs in these cases could be substantial.

Other factors specific to greyfield redevelopment are imbedded in the D_0 variable, including costs associated with consolidating or buying out existing leases and re-tenanting leased space. The cost of breaking existing leases could be quite expensive depending on the type, size and use of the greyfield site. Furthermore, re-tenanting costs of the new program could also be considerable and would vary based on the new program's design. Additional brownfield redevelopment factors are included in the D_0 variable as well, such as site remediation costs. While some level of site remediation is required for all brownfield redevelopment, the amount of cleanup required can vary by the proposed uses of the new program.² Specifically, remediation required for a future industrial use may be less than the cleanup required for prospective residential uses. All levels of this site remediation, however, would be captured in the D_0 variable.

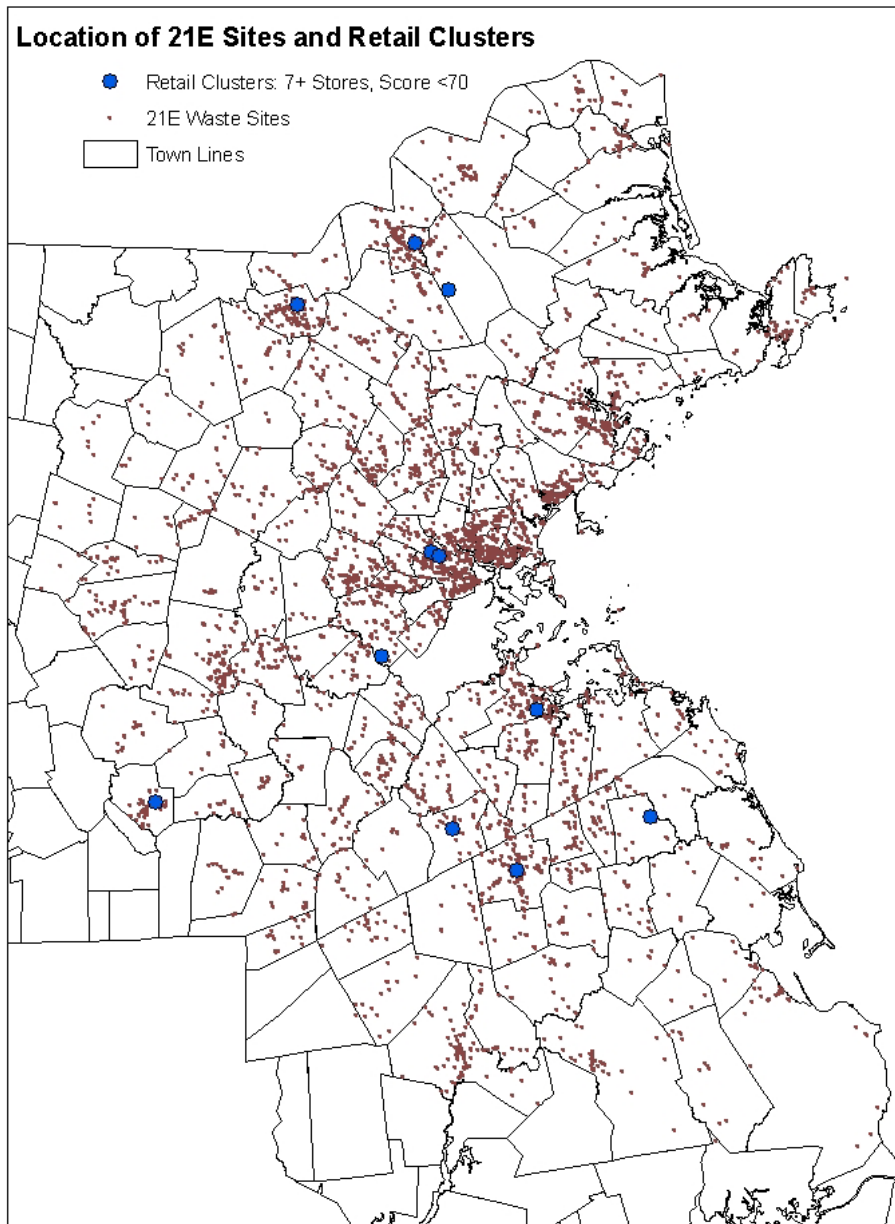
It is generally accepted that brownfields have substantial site remediation costs and, in fact, EPA-designated Superfund sites can cost \$35-50 million per site and take as long as 10 years to remediate.³ In spite of these costs, however, several means of reducing these costs and mitigating the risk of site remediation have emerged with the proliferation of brownfield redevelopment. Federal programs such as the EPA Brownfields Program, environmental insurance and brownfield specialists have all served to simplify the site remediation process and mitigate the risk of redeveloping contaminated sites. Thus, while remediation costs can be very expensive, the risks and costs of this remediation can be at least somewhat offset by industry specialists and other resources.

Continuing with analysis of the left-hand side of the redevelopment equation, the probability of a proposal receiving necessary entitlements, α , affects both greyfield and brownfield redevelopment feasibility. While both of these sites are likely eyesores in their local communities and it is likely that these communities would prefer to see redevelopment occur, zoning regulations and neighborhood concerns vary so much from one locale to another that it is difficult to make any broad generalizations about whether brownfields or greyfields are more impacted by entitlement risk. However, since density is one of the primary drivers of value in a redevelopment proposal, greyfield or brownfield sites that are located in municipalities likely to accept density may have higher alphas than proposals in lower density areas. This issue of density hints at the potential for the locational tendencies of greyfields versus brownfields to have some impact on overall redevelopment feasibility. Specifically, if greyfields are usually in urban fringe or suburban locations with brownfields typically located in urban areas, then the tendency of higher density development in urban areas could contribute to the probability of receiving entitlements and to overall redevelopment feasibility.

In addition to α and entitlements risk, the question of density and location also relates to the new land value, $(V_0 - K_0 - D_0)$, on the left-hand side of the redevelopment equation, which reflects the value of the new asset. If brownfield sites are located much closer to interior urban areas with greyfields located on the urban fringe or in other suburban areas, then the land value generated by a redeveloped, higher density asset may be greater as more density can be supported than the density that currently exists on the site. More specifically, as land becomes more valuable in the interior areas of a city, developers substitute away from land usage to structural capital.⁴ With land being more expensive, a developer chooses to use less land and more structural capital, and the more intensive use of the land further increases its value. Again, relating to the previous section, one hypothesis about the relatively low frequency of greyfield redevelopment is that the values of greyfield *locations* in suburban areas or on the urban fringe have not risen sufficiently to create market support for the kind of density needed to achieve a positive redevelopment value. Conversely, brownfields that are potentially located in urban centers would have substantial market value driven by high density surroundings.

To test the relative location of brownfields to greyfields within and around a city, a simple mapping exercise was completed for the greater Boston metro area.⁵ First, to determine where brownfields were located, a comprehensive list of 21E Waste Sites was obtained from the Massachusetts Department of Environmental Protection (“Mass DEP”). The database of 21E Waste Sites from Mass DEP includes any site that contains contaminants, such as oil or other toxins, which qualifies them as potential brownfields.⁶ Potential greyfield sites were identified by analyzing a dataset of all retailers in the Boston metro area and applying a credit score filter to highlight underperforming clusters of retail.⁷ Any clusters of at least seven (7) retailers with an

average credit score of less than seventy (70) were hypothesized to be potential greyfields.⁸ The following map shows the relationship of these retail clusters to the 21E Waste Sites:



This map shows that the location of potential brownfield sites is not so different from the location of potential greyfield sites and in fact, these sites seem to be in fairly similar concentrations around the city. Thus, if densification is a necessary characteristic for a redevelopment proposal to achieve a positive NPV result, location alone would not be the

primary reason that greyfield redevelopments lags brownfields because these two kinds of sites are located in very similar patterns around Boston.⁹

Shifting to the right-hand side of the equation, the value of existing structural capital, V_{old} , affects a redevelopment decision as rental income generated by the current asset is one of the key barriers to overcome in identifying positive NPV redevelopment opportunities. Creating a redevelopment proposal that is at least equal to or greater than these rents, taking into consideration the risk, timeline to completion and other factors of such redevelopment, is a significant challenge for developers. This is particularly challenging with greyfield sites as the current asset is likely producing some positive cashflow for the owner. With brownfields, however, it is unlikely that the original asset is producing income as the presence of contaminants may make the site unusable. Furthermore, many contaminated sites have simply been abandoned with any existing structures demolished. Thus, the value of existing structural capital, V_{old} , for brownfields may be close to zero, whereas reasonable income could still be generated by greyfield sites. This discrepancy may support the evidence of fewer greyfield redevelopments than brownfield redevelopments.

The following table summarizes the factors of the redevelopment equation and which redevelopment type is most affected by each factor:

Factors of Redevelopment Equation			
$\alpha (V_0 - K_0 - D_0) + (1-\alpha)(L_{old} + V_{old}) \geq L_{old} + V_{old}$			
Value of Proposed Program (Left-hand side)		Value of Existing Asset (Right-hand side)	
Factor	<u>Greyfield / Brownfield Affected</u>	Factor	<u>Greyfield / Brownfield Affected</u>
V_0	Both affected, but Greyfield stigma more difficult to overcome	L_{old}	Varies by individual location, Urban location may benefit brownfields with density
K_0	Both affected	V_{old}	Greyfields more affected by value of existing asset
D_0	Brownfields more affected by site remediation costs		
α	Both affected, but varies by individual location		

This table shows that while market stigma and the value of existing assets may adversely impact greyfield redevelopment feasibility, potential brownfield redevelopments are affected negatively by extensive site remediation costs. The remaining redevelopment factors either vary too much by individual location characteristics or affect both brownfield and greyfield redevelopments and thus, conclusions about which type is most affected by these remaining variables cannot be drawn. Thus, it becomes an empirical question as to which factor, market stigma (V_0), site remediation costs (D_0), or the value of the existing asset (V_{old}), most outweighs the other in affecting redevelopment efforts. While the model may be inconclusive in that it cannot explain *alone* which factor is ultimately most important, we can assume that the barriers of market stigma and value of existing assets must outweigh site remediation costs since brownfield redevelopments are so much more numerous than greyfield redevelopments. Yet, the model does not seem to fully explain the disparity between these two redevelopment types and thus, it is likely that there are other factors outside of the redevelopment model that contribute to this disparity.

CHAPTER IV ENDNOTES

¹ Conversation with anonymous greyfield developer, 7/11/06.

² Brooks, Cynthia. Greenfield Environmental Trust Group Inc. Brownfields Redevelopment Presentation 6/26/06.

³ Ibid.

⁴ DiPasquale, Denise and Wheaton, William. *Urban Economics and Real Estate Markets*, p. 61.

⁵ The Boston metro area used in this study includes towns that surround the city of Boston, but excludes Boston proper, and was defined by the MIT Center for Real Estate.

⁶ The list of 21E sites may overstate the actual number of brownfields as the list does not differentiate between a vacant brownfield site with redevelopment potential, versus other contaminated sites, such as a heating oil leak at a residential home or an oil tanker spill on a highway.

⁷ The original retail dataset was provided by Thacher Tiffany, who assisted in developing a way to identify clusters of retailers. Specifically, any retail stores located within one (1) foot of each other were considered to be in a cluster.

⁸ Clusters of retail that included at least 7 stores were then filtered by their aggregate average credit score, highlighting those with an average score of less than 70. Of the eleven (11) retail clusters identified from this data analysis, it is estimated that at least half of these would fit within the new definition of greyfields presented in this thesis, including being surrounded by broad swaths of parking lots.

⁹ It is acknowledged that Boston has developed historically in a unique way and this may limit the applicability of this analysis to other parts of the country. Specifically, Boston metro originally developed as a series of mill towns, each of which had an industrial presence. The location of brownfields in suburban areas could be partially due to this scattered pattern of town development, whereas areas of the country that developed with true residential suburbs around metropolitan centers may lack the industrial past that some of these Boston towns have had. Consequently, in these areas, the locations of brownfields and greyfields may not map as closely as they do in Boston and the ability to increase the density of a site would partly explain why brownfield redevelopment has outpaced greyfield redevelopment.

CHAPTER V. GREYFIELD CASE STUDIES

To gain a better understanding of what greyfield redevelopment looks like and the kinds of challenges it faces in various stages of the redevelopment process, I felt it would be helpful to visit several examples of redeveloped greyfield sites. Consistent with the conclusions of the redevelopment analysis above, these greyfield redevelopments exhibited some of the same characteristics or overcame similar challenges as those identified in the analysis. All greyfield redevelopments studied for this thesis were located in U.S. states along the east coast and exhibited land use succession. Specifically, rather than study a simple “mall-over”¹ whereby a retail mall’s façade is upgraded or other straightforward makeovers of commercial and residential structures, examples of greyfield redevelopment that involve substantial changes in land use are more likely to include the complexity of costs and benefits contained in the redevelopment model. These multifaceted redevelopments offer richer examples of the factors that go into the decision-making process and ultimately have the potential to truly transform a site and the surrounding area. The following table lists the greyfield sites visited and studied for the purpose of this thesis:

Greyfield Sites				
<u>Name</u>	<u>Location</u>	<u>Former Use</u>	<u>Current Stage</u>	<u>Proposed / Existing Uses</u>
Downtown Kendall	Kendall, FL	Retail mall	Under construction	Mixed-use mini-city
Mizner Park	Boca Raton, FL	Retail mall	Complete	Mixed-use arts & cultural center
Eastgate Town Center	Brainerd, TN	Retail mall	Partially complete	Mixed-use town center
Metropolitan Midtown	Charlotte, NC	Retail mall	Under construction	Mixed-use urban neighborhood
Project Name TBD	Tysons Corner, VA	Grocery-anchored retail, Garden apartments	Planning, Permitting	Mixed-use urban neighborhood
Market Commons	Arlington, VA	Warehouse, other commercial buildings	Complete	Mixed-use neighborhood
Project Name TBD	Richmond, VA	Retail mall	Planning, Permitting	Multi-use program
Mashpee Commons	Mashpee, MA	Retail strip center	Partially complete	Mixed-use village

Each of the greyfield redevelopments visited had particular difficulty with at least one of the redevelopment factors described previously, including cost overruns due to project

complexity (K_0), market challenges such as absorption and poor demographic conditions (V_0), or delayed regulatory approval (α). For example, in Kendall, FL, just south of Miami, a 350-acre transit-oriented redevelopment of an existing mall and adjacent parcels encountered resistance to densification from the nearby affluent Coral Gables neighborhood. As a result, the height limits of some of the buildings were restricted.² A reduction in density reduces the overall value of completed improvements, V_0 . The project also incurred significant cost overruns, K_0 , due to unexpectedly hitting water during construction of the 2-story underground parking decks.³ The 12-month delay caused by this construction challenge had a ripple effect through the timing of completion for the mixed-use town center buildings and remaining master plan implementation. Delays such as these can be difficult to quantify in terms of additional financing costs incurred or a strong residential condominium market that may be missed, but they are representative of general redevelopment challenges which greatly impact a project's ability to achieve a positive NPV in the redevelopment model.



The new Downtown Kendall under construction
Mixed-use buildings with underground parking shown
Source: Amy Merritt



Rendering of same street with completed improvements
Source: www.downtowndadeland.com

Similar to the Downtown Kendall project, the Eastgate Mall in Brainerd, TN, and Mashpee Commons in Mashpee, MA, are two more examples of greyfield sites that involve mixed-use redevelopment proposals replacing formerly single-use retail sites. The Eastgate Mall redevelopment project began in 1998 and Mashpee Commons began in 1986. Despite how many

years have since passed, neither redevelopment has begun constructing the residential portion of the program due to poor market conditions for housing in the immediate area. Both malls have been “turned inside out” to gain the aesthetic of true town centers, but neither has been able to implement its housing strategy due to the residential market simply not being there. Apparently, these sites have not overcome their perception as retail-only destinations to warrant construction of residential housing. The lack of demand for residential housing in both of these redevelopments may be partly due to the location of these sites. Whereas the downtown Kendall project is in close proximity to Miami, FL, Mashpee Commons is not located near any major metropolitan area, with Boston, MA, being more than 60 miles away. The Eastgate Mall project in Brainerd, TN, is, however, less than 10 miles from Chattanooga, TN, which is considered a metropolitan city. Yet, Chattanooga is just the 4th largest city in Tennessee with a population of only 155,000.⁴ This may suggest that proximity to a major metropolitan area is necessary to support a mixed-use concept with a significant residential housing component.



Eastgate Mall under construction, 1998

Source: Dover Kohl Partners



Mashpee Commons retail

Source: Amy Merritt

Both malls have the appearance of town centers as they have been “turned inside out,” but neither project has been able to move forward with its planned residential housing component.

Further complicating the housing strategy for Mashpee Commons, its redevelopment program includes an affordable housing component under Chapter 40B. This regulatory legislation has been ongoing for several years and is still pending approval. Eastgate Mall has

also suffered further housing complications as its new commercial tenants following initial redevelopment of the mall in 1998 demanded more parking than the original master plan had intended.⁵ Thus, much of the original surface parking lots that were intended to contain housing structures will not be able to be redeveloped as planned unless costly structured parking is built. All of these factors, combined with the lack of major metropolitan area located nearby, have likely contributed to the faltering implementation of the residential housing strategy.

Other greyfield redevelopments have struggled with market stigmas, affecting the V_0 variable in the redevelopment model in terms of rents that can be achieved in the market. For example, a regional mall located on the outskirts of Richmond, VA, has recently been purchased by a regional developer hoping to construct a multi-use project on the site.⁶ However, impacting the feasibility for various product types, including housing, is the area's stigma as being crime-ridden and surrounded by a low income demographic. Similarly, a greyfield redevelopment in Tysons Corner, VA, also has a challenging market stigma to overcome. Tysons Corner, located in Fairfax County, one of the most congested suburbs of Washington DC, is known for "its suburban sprawl, traffic and hodgepodge of development that grew out of poor planning 30 years ago."⁷ A 40-acre failed grocery-anchored retail center and underperforming garden apartment complex are in the planning and feasibility stages for redevelopment, with a mixed-use, higher density plan, including buildings of more than 10 stories, being contemplated. The developer has hired New Urbanist planning firm Duany Plater-Zyberk to focus on giving the program a sense of place and character which will hopefully overcome current perceptions of the Tysons Corner area. Additionally, the master plan has given special attention to making the development as auto-independent and walkable as possible to reverse the impression of Tysons Corner as an auto-centric, congested area.⁸



Current photograph of Tysons Corner greyfield project
Source: Amy Merritt

This photograph gives a sense of the current conditions that will need to be overcome to successfully market and develop the proposed improvements.



Rendering of proposed redevelopment at Tysons Corner
Source: www.dpz.com

There are a few greyfield redevelopment projects along the east coast that are substantially complete and perceived as very successful. Market Commons at Clarendon in Arlington, VA and Mizner Park in Boca Raton, FL fall into this category. Both of these redevelopments were filled with pedestrians when visited and were recommended as a place to visit either as a tourist or as a prospective resident moving to the area. It was difficult to find much information about any challenges that these redevelopments may have faced during their planning and implementation stages. Market Commons has apparently had problems with the user-friendliness of its structured parking and Mizner Park appeared to have over-built its parking decks, but otherwise, problems or shortcomings of these developments were difficult to uncover. Due to the complex nature of these projects, however, it is unlikely that they were developed without significant obstacles. Yet, each of these places has become very popular and has created a sense of identity for the city in which it is located.⁹

To illustrate the popularity of these developments, for example, the 300 or so residential apartments at Market Commons in Arlington rent for \$1,500 for a studio, \$2,000 for a one-bedroom, and \$2,500 to over \$3,000 for a two-bedroom apartment.¹⁰ The popularity of Market Commons as a place to live is due primarily to its substantial retail component on the first two

levels, including such retailers as Pottery Barn and Crate and Barrel, as well as its proximity to a Metro stop.¹¹ Mizner Park is popular for its Center for the Arts, which includes a 5,000 seat amphitheatre, 1,800 seat concert hall and 44,000 square foot Boca Raton Museum of Art.¹² This cultural center combined with high-end retailers and boutique restaurants make Mizner Park a successful entertainment and shopping destination, as well as a popular place to live.

One aspect that differentiates these projects from the previously discussed Mashpee Commons and Eastgate Mall projects is that both of these projects were fully implemented as planned, including all mixed-use components, whereas the latter developments remain incomplete. This suggests that the market demand for the housing component and other uses was sufficient to create a positive NPV opportunity for the successful redevelopments. The strong market demand could be due to the location of these sites, which are in proximity to successful metropolitan regions. First, Market Commons is located in Arlington, VA, which is a very popular suburb of the rapidly growing Washington DC area and has great public transit access via the Metro subway line. Mizner Park, while not located immediately adjacent to a major metropolis, is located within one of the six largest Metropolitan Statistical Areas (“MSA”) of Florida.¹³ Of the six MSAs in Florida, the Boca Raton–West Palm Beach MSA has experienced the second-highest population growth at 31% from 1990-2000.¹⁴ These successful redevelopment examples further support the idea that location, whether suburban or urban, may help create positive NPV opportunities when in proximity to a major city or metropolitan area that is experiencing rapid growth.



Market Commons at Clarendon in Arlington, VA
Source: Amy Merritt



Mizner Park in Boca Raton, FL
Source: Amy Merritt

Another project that has been received with great success thus far is the new Metropolitan Midtown redevelopment in Charlotte, NC. This greyfield site, less than 1 mile from downtown Charlotte, is the location of the former Midtown Mall, the first enclosed mall in Charlotte, and was built by The Rouse Company in the 1960s.¹⁵ The developer of the parcel, Pappas Properties, has initiated a lottery to pre-sell its residential condominiums due to high demand.¹⁶ The marketing tagline for the development is: “Life is what happens when you’re not in your car,” and is attempting to appeal to those weary from increasing traffic and congestion in the greater Charlotte area.¹⁷ Similar to the growth of the Washington DC area and Boca Raton-West Palm Beach MSA, the Charlotte MSA experienced a 30% increase in population growth from 1990-2000, with continued annual population growth expected at 3.6%.¹⁸ This population growth should help ensure strong market demand for the project, similar to Market Commons in Arlington and Mizner Park in Boca Raton.



Renderings of Metropolitan Midtown in Charlotte, NC. The redevelopment of the former enclosed retail mall is currently under construction.

Source: Metropolitan Midtown website: www.metmidtown.com

Another similarity between Mizner Park and the apparent popularity of Metropolitan Midtown thus far is that both projects received substantial investment from their local municipalities. For example, in 1980, the city government in Boca Raton, FL created a community redevelopment agency (“CRA”), which designated the failed mall as a blighted area and established a \$50 million program to upgrade the area’s infrastructure. Furthermore, once the plan for Mizner Park was in place, the CRA contributed an additional \$68 million to the transaction via tax-increment financing to ensure that the project would include a cultural arts center.¹⁹ Metropolitan Midtown has also received funding assistance from the city of Charlotte and Mecklenburg County. Together, Charlotte and Mecklenburg County are spending \$60 million on improvements to the adjacent roads and greenway, which is part of a large linear system of parks throughout Charlotte.²⁰ Additionally, the city and county approved \$17 million in tax-increment financing to ensure the construction of structured parking so that the development could maintain its proposed high density.²¹

By comparison, while the Eastgate Mall redevelopment did have public participation during the charrette process, the project received little support from public funding sources. Part of the reason this project failed to implement its housing strategy was due to insufficient parking areas to meet the demands of the new commercial tenants. Had the Eastgate Mall redevelopment

received public subsidies to assist in the construction of structured parking, it is possible that the master plan as originally conceived in the public charrette would have been feasible.

It is interesting to note that in addition to public subsidies received on some greyfield redevelopments, there are other greyfield redevelopment proposals that have actually been initiated by the local municipality itself, rather than a traditional developer or property owner. Both the downtown Kendall project in Florida and the greyfield mall in Richmond, VA fall into this category. In each case, the municipality recognized the need for redevelopment and took the initiative to either set up an RFP process to select a developer or, in the case of downtown Kendall, contract with New Urbanist planning firms to create a master plan and reform existing zoning regulations. This extensive public support, either through financial investment or in taking initiative to spur the redevelopment itself, highlights a redevelopment factor that was previously not considered in the basic economic model. Based on the public involvement, it is likely that there are externalities associated with this type of redevelopment that benefit local municipalities and surrounding communities. While these externalities may not be part of the original redevelopment equation, they are significant enough to draw public involvement and subsidies.

CHAPTER V ENDNOTES

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- ¹ Southworth, Michael. "Reinventing Main Street: From Mall to Townscape Mall," *Journal of Urban Design*, p. 151.
- ² Conversation with anonymous resident of Coral Gables, FL. 3/4/06. Actual number of stories reduced and specific buildings affected unknown.
- ³ Conversation with anonymous onsite construction manager in Kendall, FL. 3/3/06.
- ⁴ Sobel, Lee. *Greyfields into Goldfields*, p. 52.
- ⁵ Ibid.
- ⁶ The names of both the developer and the mall have been withheld since the transaction is still in feasibility and planning stages.
- ⁷ Lieberman, Bret. "Fairfax's answer to sprawl: taller, denser developments around Metro stations," *Virginia Business Magazine*, May 2005.
- ⁸ Duany Plater-Zyberk website: www.dpz.com, 7/15/06.
- ⁹ Sobel, Lee. *Greyfields into Goldfields*, p. 34
- ¹⁰ Conversation with anonymous leasing agent at Market Commons in Arlington, VA. 2/18/05.
- ¹¹ Ibid.
- ¹² Mizner Park website: www.miznerpark.org, 7/15/06.
- ¹³ The Center for Economic Development Research at the University of South Florida website: <http://cedr.coba.usf.edu/>.
- ¹⁴ Ibid.
- ¹⁵ Howard, J. Lee. "Home Depot buys midtown site, but plans unclear," *Charlotte Business Journal*, 5/17/02.
- ¹⁶ Anonymous conversation with Metropolitan Midtown sales agent, 6/28/06.
- ¹⁷ Metropolitan Midtown marketing materials.
- ¹⁸ Charlotte Chamber of Commerce website: www.charlottechamber.com.
- ¹⁹ Sobel, Lee. *Greyfields into Goldfields*, p. 34.
- ²⁰ Smith, Doug. "Midtown's future comes into focus: After years of planning, developers give details, set dates on \$200 million 'urban marketplace'," *The Charlotte Observer*, 5/3/06.
- ²¹ Ibid.

CHAPTER VI. BROWNFIELD AND GREYFIELD EXTERNALITIES

Identifying the externalities of brownfields and greyfields represents another way to illustrate the differences in these two kinds of redevelopment. An externality exists because of market failure, in that the specific cost or benefit is not priced by the market and is consequently over or under produced. Externalities are important because they capture these external costs and benefits of one individual's decision on another individual's property value or quality of life.¹ The example of densification on an existing residential parcel is one of the most common situations involving externalities. For example, if a developer chooses to subdivide a single family lot into multiple lots or construct a mid-rise tower in place of an existing low-rise structure, the new units will be priced according to the current residential market. However, the effects of this redevelopment on the surrounding neighbors may not be priced into the sale of the units. Neighbors may feel that they suffer a loss of open space or that their views are obstructed, which could subsequently reduce their property value. This quantifiable loss in value represents a negative effect that is a cost to the neighbors, but is not accounted for by the private market in the construction and sale of the new units. Externalities such as these make the case for public intervention through zoning laws, height restrictions and maximum levels of density.

Externalities can also be in the form of public goods or amenities that increase the value of properties located in proximity to these benefits. For example, values of identical housing stock or land should be priced higher for locations that offer more amenities and lower in locations with poor amenities.² Examples of public amenities could be access to a local park, proximity to mass transit or good schools located nearby. Realizing the potential effects of externalities on community and property values, combined with the fact that unregulated private

markets tend to inadequately account for public good, creates a situation where intervention or involvement in redevelopment efforts at the public level makes sense.³

Externalities of brownfields are often very clear and quantifiable, which justifies public intervention at federal, state and local levels when the private market does not remediate the problem. The potential for contamination or pollution to adversely impact the health of residents in an area, or perhaps spread even further to other adjacent properties is clearly a negative externality. Furthermore, an abandoned or underutilized brownfield site is often an eyesore in a community and, once redeveloped, the site can have a positive impact on the community and nearby property values. Without public subsidies and other forms of government assistance, however, the value created by the new redevelopment, V_0 , would be insufficient to create a positive NPV opportunity. Public subsidies can offset construction costs, K_0 , and site remediation costs, D_0 , which can enable the redevelopment project's feasibility. The existence of these regulatory agencies is not a political statement, rather it shows that because the externalities of brownfields have been scientifically tested, quantified and proven, the existence of these agencies and the services they provide are warranted. If greyfield externalities were tested in the same way and proven to need assistance, greyfield agencies would be created as well.

To address and remediate brownfield sites, federal agencies and programs have been established such as the Environmental Protection Agency (EPA) and the Superfund program of 1980, which is the federal government's program to clean up uncontrolled hazardous waste sites.⁴ The federal EPA provides various types of funding assistance, including cleanup grants, subsidized loans, and assessment grants, which are given to property owners or purchasers attempting to learn the extent of a site's contamination.⁵ The EPA also supplies technical

resources, databases of brownfields projects nationwide, and legal counsel on understanding liability and other components of brownfields legislation.⁶

In addition to federal brownfields programs, involvement at the state level is common as well. For example, some states have established Voluntary Cleanup Programs (VCPs) that provide the state with authority over brownfield sites and set up systems to protect private parties who voluntarily agree to clean up contaminated sites.⁷ VCPs often work in conjunction with the EPA to coordinate remediation compliance and financial assistance.⁸ In Massachusetts, the Department of Environmental Protection (DEP) maintains a database of affected sites and licensed professionals who can assist with remediation.⁹ The DEP also provides financial assistance for cleanup efforts and ensures compliance with remediation requirements. These federal and state agencies promote and assist brownfield remediation and provide a structure that can enforce cleanup. Lastly, in addition to federal and state resources, nonprofit agencies such as the National Brownfield Association provide information resources, brownfields databases, and education and training for brownfield redevelopers.¹⁰ The proliferation of public and nonprofit agencies for brownfield redevelopment is largely due to the direct externalities produced by the contaminated sites on local communities. The negative externalities warrant the involvement of these agencies to ensure the sites are cleaned up for the health and betterment of the community.

While public aid for greyfield redevelopment has been given at the local level, greyfield sites do not receive federal and state support in the same way that brownfield sites do. The lack of federal and state aid for greyfield redevelopment is due in large part to the difference in externalities associated with these two kinds of sites. While the contamination of brownfield sites produces very clear and tangible externalities in terms of health and environmental

consequences, the externalities of greyfield sites are more indirect and less quantifiable. Without any clear reason for federal or state intervention, these agencies will simply not exist.

The most concrete negative consequence of a greyfield site is the measurable decline in property values of homes in close proximity to the community eyesore and the subsequent erosion of the municipal tax base, which is a pecuniary externality. Indirect examples of greyfield externalities may include increased traffic congestion and loss of rural land that occurs as the desire for newer, nicer suburbs are built on the suburban fringe. These effects may seem to be fairly unrelated, but if a greyfield site is redeveloped for a better and more intensive mix of uses, this may result in fewer greenfield sites being developed and produce a higher concentration of places to live, shop and work at interior locations. For example, a one-acre brownfield reclamation project saves an estimated 4.5 acres of green space.¹¹ If this substitution in land consumption is true for brownfields, then some level of similar substitution would likely occur for greyfields as well. The higher utilization of infill locations can also reduce per capita gasoline consumption and related air pollution as people drive less. Governments may spend less due to reduced road infrastructure needs.¹² Lastly, a mixed-use walkable greyfield redevelopment that is not dependent on the car can reduce the acreage of parking lots required, make public transit more efficient, and enable residents without a car to feel more independent.¹³ These effects would suggest the existence of positive externalities of greyfield redevelopment that are not priced into the new asset itself. If these benefits could be quantifiably measured and proven, similar to brownfield externalities, then a certain level of public subsidies and other involvement at the federal and state levels could be warranted.

The involvement of local governments in greyfield redevelopment proves, at least in part, the existence of greyfield externalities. For example, as mentioned previously, the Boca Raton

CRA contributed \$118 million towards the redevelopment of the failed Boca Raton Mall into Mizner Park.¹⁴ After its completion in 1996, Mizner Park quickly became a major shopping, arts and entertainment destination for residents and tourists alike, and is now referred to as “the downtown” of Boca Raton.¹⁵ These benefits of increased identity and sense of place, while somewhat intangible, are representative of positive externalities that can be created for a community through redevelopment. Additionally, by 2001, single family homes in the adjacent area, which had sold below the county average in the early 1990s, were selling for 10% above the county average.¹⁶ Furthermore, in the same year, approximately 1.7 million square feet of new real estate was under construction within the Boca Raton CRA district surrounding Mizner Park.¹⁷ The price appreciation of surrounding homes and increased jobs and municipal tax base created by the new development are significant and quantifiable externalities of the redevelopment.

In spite of these benefits of greyfield redevelopment, however, it is the difference between greyfield and brownfield externalities that partially explains why brownfield redevelopment is occurring so much more frequently than greyfield redevelopment. Public assistance and subsidized funding help make these redevelopment projects more feasible and successful. However, because the externalities of greyfield redevelopment have perhaps not been measured and are less tangible than those of brownfields, federal and state support is not warranted in greyfield redevelopment. Brownfield contamination is scientifically provable, whereas the effects of a greyfield site are more subjective. Without a clear measurement of the direct externalities of a greyfield site and a way to concretely designate a site as a greyfield, it is difficult to justify a need for public support at federal and state levels.

Without public support at federal and state levels, greyfield redevelopment will vary greatly from one locale to another, depending on the cooperation and assistance provided at the local level. The direct and clear externalities of brownfields have enabled the creation of public agencies that offer significant support through funding and other resources. This availability of public support has in turn fostered the growth of an industry around brownfields and development of various brownfield specialists. Greyfields are still largely one-off deals and must obtain public support on a local and individual basis. For greyfield redevelopment to really gain traction, it may need support at federal and state levels to subsequently create the need and opportunity for a specialized industry around greyfields. Gaining support at the local level, while helpful for individual transactions, is too fragmented to create a comprehensive industry of scale that would be able to provide specialization, support and ultimately create a greyfield industry.

CHAPTER VI ENDNOTES

¹ DiPasquale, Denise and Wheaton, William. *Urban Economics and Real Estate Markets*, p. 348, 354.

² Ibid., p. 349.

³ Ibid., p. 369.

⁴ The act passed by Congress in 1980 was the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), although it is more commonly known as “Superfund.” Environmental Protection Agency website, www.epa.gov.

⁵ Ibid.

⁶ Ibid.

⁷ Brooks, Cynthia. Greenfield Environmental Trust Group Inc. Brownfields Redevelopment Presentation 6/26/06.

⁸ Environmental Protection Agency website, www.epa.gov.

⁹ Massachusetts Department of Environmental Protection website: www.mass.gov/dep

¹⁰ National Brownfield Association website: www.brownfieldassociation.org.

¹¹ Cherokee Investment Partners website: www.cherokeefund.com.

¹² Nozzi, Dom. *Road to Ruin*, p. 113, 133.

¹³ Ibid.

¹⁴ Sobel, Lee. *Greyfields into Goldfields*, p. 33-34.

¹⁵ Ibid., p. 34.

¹⁶ Ibid., p. 35.

¹⁷ Ibid., p. 35.

CHAPTER VII. OPPORTUNITIES IN GREYFIELD REDEVELOPMENT

Based on the redevelopment model analyzed and greyfield redevelopments visited, there would seem to be investment opportunity to identify and redevelop appropriate greyfield sites. However, as indicated in the previous section, without public support, these greyfield transactions are unlikely to be positive NPV opportunities. While subsidies and support at the local level may be sufficient to create individual redevelopment opportunities, the fragmented and unique nature of each transaction would not encourage repeat development nor foster the creation of broader industry specialists. Similar to the increasingly successful brownfield industry of the last few decades, greyfields may need support at the federal and state levels to achieve similar levels of frequency and industry specialization.

At the moment, there is no likely federal agency to sponsor greyfield redevelopment, due in part to the somewhat unclear and indirect nature of the sites' externalities. In lieu of establishing greyfield-specific federal and state agencies, however, perhaps some of the existing agencies that support brownfield remediation could begin to include greyfield sites as well. While the EPA's definition of brownfields very specifically requires the presence of pollution or contamination to receive brownfield status, some states' definitions are more general.¹ Specifically, some states define brownfields as "abandoned, idled and/or underused real property – typically industrial or commercial."² This definition would certainly include many greyfield sites. By availing greyfield sites of the assistance for which brownfields are currently eligible and thereby possibly reducing K_0 or D_0 , the number of positive NPV redevelopment opportunities for greyfields would increase. Additionally, having a consistent support structure at the state level would enable developers to create a replicable redevelopment model in that state,

rather than having to tailor each project to the preferences and systems of the local government within the state.

In general, justifying the need for public intervention in greyfield redevelopment would not seem to be the most difficult challenge as several successful greyfield examples have already secured local assistance and the positive effects of these redevelopments can be measured by the municipality and proven to other cities. The more difficult aspect of trying to make public assistance available to greyfield sites, particularly at the state or federal level, would seem to be articulating an objective definition that would clearly capture the universe of greyfields. The designation of brownfields according to the EPA's definition is largely indisputable in that contamination is either present or not. Greyfields, however, are not so scientifically measured and defined. Physical characteristics of a greyfield, such as a range of parcel sizes and ratio of building footprints to acres of parking lots, could be specified, but determining what constitutes an "underperforming" or "underutilized" site is less precise. Measures such as vacancy, sales per square foot, and average credit rating of tenant composition may be used, but devising a concrete set of criteria with these metrics that would capture most greyfield sites could be difficult. Also, it is possible that owners of failing commercial parcels may be resistant to this type of designation if they are not convinced of the declining status of the site. One solution may be that if greyfield funding sources were established at state or federal levels, the administering of these funds could simply be reviewed on a case by case basis, by which a developer or property owner would apply to the appropriate public agency to receive greyfield status. This subjectively-given status would then make the site eligible for the various resources and financial assistance of the agency. Of course, a major drawback to this type of process is that the administration could be quite burdensome for the agency.

Shifting from public level assistance, there may be opportunity to foster increased redevelopment of greyfield sites through private efforts. One such means is the creation of a greyfield investment fund, similar in structure to the brownfield remediation fund, Cherokee Investment Partners. Cherokee Investment Partners (“Cherokee”), founded in 1993, purchases brownfield sites, performs the cleanup and remediation and then repositions the property for reuse.³ Cherokee has raised three institutional funds, with Fund III raising \$620 million in private equity capital.⁴ While Cherokee has an explicit sustainability focus and environmental mission, the investors in Fund III are the same endowments, pension funds and institutions that invest in traditional venture capital and private equity funds.⁵ Furthermore, contrary to the previous section whereby public support and subsidies were described as helpful, if not essential, in achieving positive NPV status, Cherokee’s brownfield remediation projects have used little public financing because the public grants available are so small in comparison to the total cost of the cleanup.⁶ Cherokee’s private equity fund model suggests that if brownfield remediation can be achieved profitably at the private level on an international scale with little public financing, the opportunity may exist for a greyfield fund to do the same thing.

Considering Cherokee as a model for a greyfield fund, the lack of public funding used and the appeal to a traditional investor base is promising, in that there is not anything particularly unique about Cherokee’s investors or financing strategy that would not then translate to a greyfield fund. Perhaps the least clear area in which a greyfield fund would be able to replicate the Cherokee model is in value creation. In Cherokee’s case, previously unusable land has been cleaned up by the company with a successful track record, creating tangible value with which to justify an increase in price from its original basis. Similarly, a greyfield fund would need to articulate its value creation strategy. This strategy would need to be focused enough that many of

the same processes could be repeated for each property in the fund. For example, while every property is unique, almost all greyfield sites have a variety of complicated lease structures that would need to be bought out or terminated somehow. Additionally, existing structures on the parcel may be outdated but reusable, so having a team able to identify structures suitable for reuse versus structures needing to be demolished would be helpful. Other similarities would likely occur across greyfield sites, but unlike brownfields, preparing a greyfield site for reuse is less scientific. Thus, to really replicate Cherokee's model, the question of articulating how a greyfield fund really adds value to each parcel that, in turn, justifies an increase in land price to a potential purchaser would need to be answered. Articulating value creation is essential for two reasons: (1) creating a repeatable process for the fund that can be applied across all investment properties, and (2) helping investors understand the fund's strategy. Investors will need to make investment decisions based on the quantifiable process whereby the fund adds value to a greyfield site.

In addition to defining value creation, the greyfield fund may have difficulty in sourcing deals. While there are federal, state and local databases of brownfield sites, greyfield sites are not catalogued in any central database. These locations are identifiable primarily at the local level only, which could be quite time-consuming for a fund and make the efficient deployment of investment capital difficult. Additionally, creating a portfolio with enough properties to achieve an appropriate level of diversification will require a fairly substantial amount of capital. To deploy this substantial amount of capital, the fund's focus will likely need to be regional or even national in focus to have enough greyfield sites from which to choose and invest. Identifying greyfield sites on this broad geographic scope would be complicated given the lack of information and resources at state or federal levels. One factor that may somewhat offset this

difficulty, however, could be that simply creating a greyfield fund establishes a brand that will attract greyfield deal flow. The initial start up period may be challenging though as many institutional investors like to have a sense of the future properties of a portfolio before investing. Generating enough greyfield deal flow while simultaneously trying to raise capital and create a greyfield brand would be a complicated endeavor.

If these challenges of deal flow and value creation could be solved, there are several reasons why a greyfield-focused private equity fund could be helpful in increasing the frequency of greyfield redevelopments. First, the well-capitalized fund could partner with local developers and provide much-needed access to capital for these typically large and complicated mixed-use redevelopments. Second, over time, the fund would develop expertise in specific greyfield redevelopment aspects, such as securing local public financing to subsidize parking infrastructure or working with communities to approve high density redevelopment proposals. Third, the timeline of a private equity fund of this nature would likely be 10 years or more, especially if the fund were to be directly involved in the redevelopment. Having a fund's whose interests are aligned with long-term objectives is ideal for a site needing redevelopment and transformation. Since many greyfield sites have had a relatively short shelf-life of a few decades from when they were first constructed, having a fund whose goal is not the "build and flip" model could be preferable for ensuring long-term success.⁷ Furthermore, mixed-use developments tend to weather individual real estate product market cycles better than a single use development as they are not totally dependent on the performance of one product type for profitability. Thus, an investor whose interests are aligned with the project's long-term success is preferable to a traditional developer whose goal is to construct the product type as quickly as possible and resell to the highest bidder. A long-term fund structure may abate this misalignment

of interests and ensure that places are built with a greater likelihood of long-term success and less chance of becoming a greyfield in a few decades.

Based on the relatively young age of the greyfield redevelopment field, it would not seem that the timing is ideal to start a greyfield fund now. Yet, as awareness and education about greyfield sites and the benefits of redevelopment increase in both public and private institutions, the possibility of a successful fund implementation may become more likely. Due to the long timeline of development projects, however, it may take several years, even decades, for this level of awareness to reach a broad enough scope of people and institutions to create a true greyfield industry in which a greyfield fund could succeed.

CHAPTER VII ENDNOTES

¹ Environmental Protection Agency website: www.epa.gov.

² Brooks, Cynthia. Greenfield Environmental Trust Group Inc. Brownfields Redevelopment Presentation 6/26/06.

³ Cherokee Investment Partners website: www.cherokeefund.com.

⁴ Ibid.

⁵ Loftus, Peter. "Why would anyone want to invest in the town dump?" *Dow Jones Newswires*

⁶ Cherokee Investment Partners website: www.cherokeefund.com.

⁷ Hall, Kenneth B. and Porterfield, Gerald A. *Community by Design: New Urbanism for Suburbs and Small Communities*, p. 58.

CHAPTER VIII. CONCLUSIONS

While the greyfield industry is relatively small in comparison to brownfields, it does seem to be growing in interest and popularity. As the industry grows and matures, it will become evident when the creation of public agencies at federal and state levels is warranted or when the timing is right for implementation of a greyfield fund. In the meantime, however, there are several steps that could be taken that will foster growth and understanding of the field.

First, one of the most helpful aspects to encourage greyfield redevelopment will be to quantify empirically the potential benefits and externalities of this redevelopment. Using examples of successful implementation such as Mizner Park and Market Commons at Clarendon, the benefits of saved open space, reduced car usage, gas consumption, air pollution and congestion should be studied. Additionally, positive effects on the surrounding community including increased property values and municipal tax base should be quantified as well.

Fully understanding the benefits created by greyfield redevelopments can serve several purposes. First, it will warrant the increased involvement of federal and state governments, in the form of resources and financial subsidies. Second, on a more intangible basis, just as brownfield remediation is appreciated by socially and environmentally conscious people for its health benefits, society will appreciate greyfields in the same way if the benefits of greyfield redevelopment in mitigating the effects of sprawl can be demonstrated. The idea behind this form of education and social awareness about the benefits of greyfield redevelopment is not the typical sprawl bashing that some “anti-growthers” espouse, but is rather about supporting the idea of creating *choice* for those who may prefer a different lifestyle, especially in suburban areas. While everyone may not want to live in high density urban centers, there may be many families who would prefer a small townhouse in a mixed-use greyfield redevelopment rather

than a typical detached single family suburban home, if the tradeoffs of a shorter commute and less time in the car, for example, were offered by this lifestyle.

As society begins to value benefits from mixed-use greyfield redevelopment such as walkability, decreased car-usage, reduced gas consumption and congestion, this shift in preferences will add value to redevelopment projects in a quantifiable way. People may even begin to place value on potential long-term health benefits of an active lifestyle fostered by walkability and access to other uses. There is some evidence that this is occurring, even in traditionally auto-centric parts of the southeast. For example, Post Apartments, a historically garden-style suburban apartment developer, has recently advertised ground-floor retail as one of the primary amenities in its new apartment building in Charlotte, NC.¹ This demonstrates that some suburban markets are responding to mixed-use development and capturing value from its benefits. The pricing of these benefits through increased rents and sales prices in newly redeveloped assets will potentially create more positive NPV redevelopment opportunities as V_0 increases.

The societal change in preferences and creating lifestyle choice in suburban areas relates to identifying positive NPV opportunities through greyfield site selection. Strong, growing metropolitan areas that are feeling the strains of traffic on quality of life and household and municipal transportation costs will be ideal areas in which to find greyfield sites for redevelopment. Both the local municipality and the market will likely be receptive to greyfield redevelopment if its benefits and externalities have been proven.

Increasing the frequency of greyfield redevelopment is not a linear process, and will require multiple steps and involve various parties including local residents, developers and government institutions. Social education and a shift in consumer preferences, combined with

quantified and scientifically proven benefits of greyfield redevelopment will be integral in creating a strong market for these projects. Even the recent increase in gasoline prices helps foster receptivity to these changes. Once the demand has increased in the market and appropriate levels of intervention from government agencies have been determined, the greyfield industry will gain a level of scale in which a private greyfield fund could be successful.

CHAPTER VIII ENDNOTES

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