Brownfields

A COMPREHENSIVE GUIDE TO REDEVELOPING CONTAMINATED PROPERTY

THIRD EDITION

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CHAPTER 10

Valuing Brownfields

BILL MUNDY
JOHN A. KILPATRICK

Introduction

After the passage of CERCLA, the appraisal community began paying closer attention to the valuation of environmentally impaired or impacted property, such as brownfields. Many of the earliest writers approached contamination as analogous to a "takings" and, as a result, much of the underlying valuation theory, nomenclature, and methodology has origins in the eminent domain literature.

To illustrate, if an eminent domain authority lays claim to a portion of a property, such as for a highway expansion or other purposes, the obvious loss to the property owner is the pro-rata value of that portion of the property taken. However, appraisers recognize that there may also be a value loss to the remainder of the property. A vacant single-family lot may have an appraised value of $100,000. Say, then, that the highway department takes half of the lot for a road widening. To the layperson, the remaining half should be worth $50,000, but local zoning, construction, or comprehensive planning ordinances may prohibit construction of a dwelling on the reduced-sized lot. The remainder may only be suitable for some less valuable purpose and its value might only be $10,000. Thus, the total valuation impact of eminent domain action would be $90,000, equal to the physical take ($50,000) plus the damage to the remainder ($40,000).

The authors are indebted to our colleagues on the staff of Greenfield Advisors LLC for their valuable assistance in developing this chapter. Portions of the chapter have appeared in the following publications: John A. Kilpatrick & Bill Mundy, *Appraisal of Contaminated Real Estate in the United States*, Real Estate Research (Japan Real Estate Institute, Tokyo), October 2003, 25–31; John A. Kilpatrick, *Construction Defects and Stigma*, Mealey's Litigation Reports: Construction Defects, July 2003; and John A. Kilpatrick, *Real Estate Issues in Class Certification*, Class Action Litigation Report, October 8, 2004.

In the brownfield valuation methodology, the physical "take" is the analog to the actual cost to remediate the contamination. The "damage to the remainder" is referred to as "stigma," which is the additional valuation diminution suffered by the brownfield property over and above the cost to remediate. Stigma may result from reduction in the highest and best use (as was the case in the eminent domain example), a reduction in marketability, a negative impact to feasibility, increased costs to develop or own, increased financing costs, increased required rate-of-return by investors, or any combination of these or other negative impacts to value.

In 2002, the Appraisal Standards Board issued a major revision to its Advisory Opinion No. 9 to its Uniform Standards of Professional Appraisal Practice (USPAP), which provides guidance to appraisers faced with brownfield or other contaminated property valuation challenges. Appraisers are advised to use methodologies consistent with this model.[1] In general, the analytical paradigm begins with a valuation "as if unimpaired" and, using that as a starting point, compares it to the value *as-is* impaired or *as-will-be* remediated. Each of these scenarios requires its own set of assumptions, limiting conditions, unique data, and differing analytical tools.

In short, the valuation of a brownfield can be one of the most challenging appraisal problems. Data is often difficult to acquire, particularly comparable case studies or analyses of impaired or remediated brownfields. Portions of the appraisal assignment, such as feasibility analyses or highest-and-best-use studies, require significantly more effort and complexity than normally faced in an appraisal. Due to lack of knowledge or prudent decision-making by market participants, brownfield markets are often not at equilibrium, and as such comparable transaction data may be misleading. Operating cost data for income projections may be problematic, and at best may be an educated guess.

Nonetheless, the appraisal exercise adds significantly to the overall brownfield evaluation and potential adaptive reuse in numerous important ways. The appraisal can—and should—be viewed as a decision-making tool, allowing investors and others to evaluate a variety of acquisition, remediation, and adaptive reuse scenarios to optimize financial decisions. The appraisal serves as a "check" on other disciplines, such as engineering and land planning, to aid in determining the overall feasibility of the brownfield plan of operation. The appraisal can also serve to gauge market receptivity to remediation or adaptive reuse plans at an early stage in the brownfield project.

A thorough examination of the brownfield appraisal process would be well beyond the scope of this single chapter. However, key elements of the appraisal analysis can be illustrated, thus highlighting important impacts on brownfield redevelopment decision-making. Note also that this chapter approaches brownfield valuation primarily from an appraisal perspective for several important reasons. Appraisal methodology is well understood and accepted by the courts, appraisal standards are common in all U.S. jurisdictions, and the appraisal process is generally accepted and valued by the investment community. However, a variety of other disciplines, such as economic geography, urban planning, or land planning, bring important skill-sets to the analytical process. A well-developed brownfield valuation will incorporate important aspects of all of these disciplines.

Physical Status of the Brownfield

In any appraisal project, after determining the preliminary scope of work,[2] the appraiser sets about determining the salient physical characteristics of the property.

In a simple appraisal of an industrial property, these characteristics might include such factors as the size of the site, the size of and nature of the improvements, the physical age of the facility, functional components, external impacts on value, and any other physical characteristic that has an impact on the valuation process.

Valuation of a brownfield, however, adds a significant layer of complexity. With respect to the environmental issues, a brownfield may be

1. wholly uncharacterized;
2. characterized, but unremediated;
3. in the process of being remediated; or
4. fully remediated.

This list is often referred to as the *contamination lifecycle*. Note that the term "fully remediated" may be a moving target. For example, a typical measure of "full remediation" is the issuance of a no-further-action letter by the governing environmental agency. However, in many cases, no-further-action letters have been rescinded, leaving the responsible party—or even non-responsible subsequent owners—in the position of spending additional resources on a remediation that was thought to have been finalized.[3] The 2002 Brownfield Amendments added clarity and safe-harbor provisions for purchasers who meet certain criteria. However, as of this writing, not all state-level agencies have adopted rules and regulations consistent with these provisions. As a result, valuation of a fully remediated property may need to take into account the possibility of revisiting the remediation process.

More interestingly, appraisers are often called in to value a currently contaminated brownfield in the *as-if remediated* state. USPAP requires appraisers to establish a hypothetical condition of remediation, not unlike a prospective appraisal of a non-brownfield project proposed for development. In the simplest case, a residential construction loan is made using an appraisal generated under such a hypothetical condition.

However, in the case of a brownfield, the hypothetical condition is much more complicated. Say, for example, a public utility was discontinuing the use of a transformer substation and planned to remediate the site. When the facility was built, it was in a transitional neighborhood and the site was zoned industrial. Today, the surrounding land uses are all residential, and any adaptive reuse of the site would be required by authorities to conform to the new zoning. The insurance company that indemnified the public utility against the remediation did so under the assumption that the remediation would be to lower "industrial" standards, not to higher "residential" standards. The problem was solved, though, when it was shown that the appraised value of the site for residential purposes was much higher than for industrial purposes, and that the difference in value offset the increased remediation costs. The utility, its insurance carrier, and the local regulators struck a three-sided deal that satisfied all parties, but which would not have been possible without the input of the appraiser.

As will be shown in a subsequent section, the physical characteristics of the brownfield drive the highest-and-best-use determination, which in turn determines the data to be used in the appraisal process.

Market Analysis and Feasibility

Recently, the term "second generation industrial site" has come into vogue for describing brownfields that are ripe for adaptive reuse. Brownfield valuation problems frequently arise in support of an adaptive reuse scenario, and many cities and counties are now encouraging brownfield reuse. Whether the plan is for continued use as an

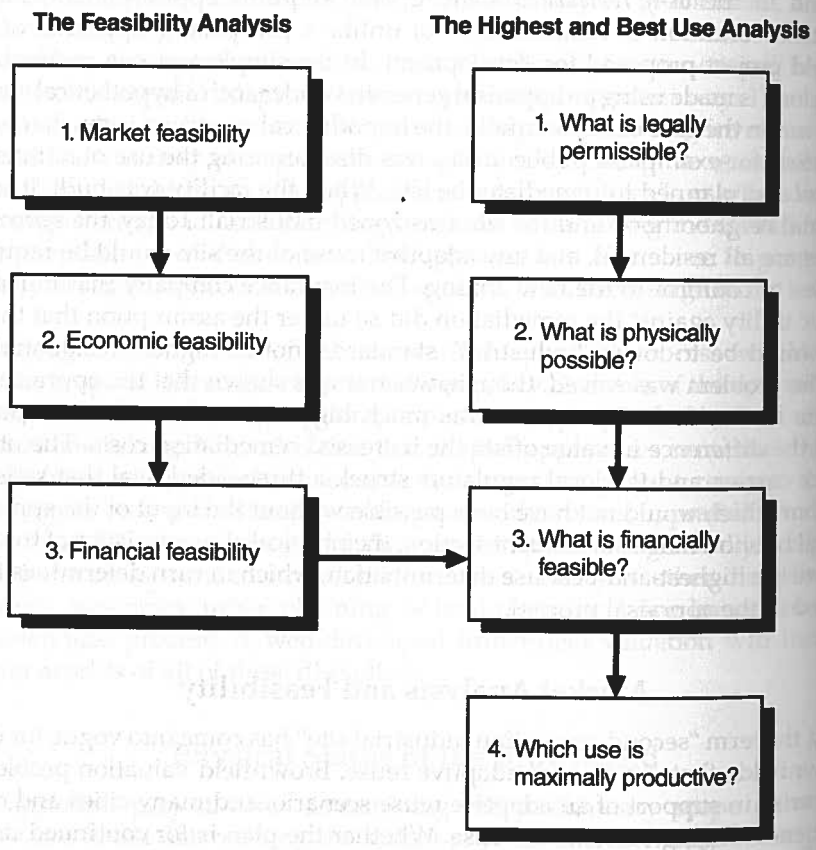
industrial site or a change in use to something else, the market analysis and feasibility study drives the subsequent highest-and-best-use analysis. Failure to take care in these often-overlooked portions of the valuation analysis can and probably will lead to disingenuous findings at the tail end.

A well-constructed feasibility study can be thought of as a three-step process:

1. Market feasibility
2. Economic feasibility
3. Financial feasibility

Each step entails its own analysis of market data, and the outcome of each step drives the need for the next step. That is, each step must have a positive outcome to go forward to the next step, and a particular use or set of uses must be found to be financially feasible for the valuation process itself to go forward. The absence of a set of financially feasible uses means that the project has a zero or even less-than-zero market value. While this conclusion may seem to be an incongruous finding, it is evidenced by the numerous untouched brownfields littering the landscape with no financially feasible solutions *even at zero acquisition costs.* In the end, the set of financially feasible uses drives the highest-and-best-use analysis (see Figure 10.1).

FIGURE 10.1. Feasibility Analysis and Highest and Best Use



Market Feasibility

With apologies to *Field of Dreams*, "If you build it, will they come?"[4] This stage in the process simply asks if the intended use of the property has positive utility. All too often, public policy agents who drive municipally influenced brownfield redevelopment reach a positive conclusion regarding market feasibility and mistakenly confuse this conclusion for economic or even financial feasibility. Even the courts add to this confusion, as demonstrated in Justice Blackmun's dissent in the *Lucas* decision, in which he states that Lucas was not deprived of all economic value of his property, since he "... can picnic, swim, camp in a tent, or live on the property in a moveable trailer."[5] Notwithstanding that at least one of these uses (living on the property in a trailer) was actually prohibited by covenants, none of these *market feasible* uses have any actual economic or financial value to a prospective purchaser of the property.

Market feasible uses include anything of positive utility. A park or playground may provide positive utility, but unless they contribute to the viability of surrounding properties, they contribute little economic value.

Economic Feasibility

Continuing with the *Field of Dreams* theme, "If you build it, and they come, will they be willing to pay economic rents?" An economic rent may include any actual payment, and in fact may include use of the site as a park or playground if doing so enables or increases the value of adjacent non-brownfield properties under development. For example, a town recently proposed redevelopment of an abandoned garbage dump. Amazingly, the dump had been situated back in the 1940s on the banks of a major river, in a beautiful spot that eventually became highly desirable for a residential subdivision *if not for the underlying garbage dump.* The town proposed the redevelopment as a stand-alone project, but only after meeting with appraisers and real estate consultants did they come to understand that the project lacked any economic feasibility. However, a developer could acquire adjacent non-brownfield properties and use the remediation of the garbage dump to meet open-space mitigation and wetlands set-back requirements. In addition, the presence of the open space would increase allowable densities, enhancing the desirability and ultimate financial feasibility of the residential development. Once the town came to understand the feasibility issues, they were able to recast the redevelopment plans into a win-win situation.

Financial Feasibility

"If you build it, and they come, and they're willing to pay rent, will you make a profit?" At the end of the day, does the present value of the revenue outweigh the costs? This is a non-trivial question in brownfield redevelopment—many brownfields are abandoned sites, and were abandoned in the first place because the remediation and/or adaptive reuse costs outweighed the economic benefits to be obtained. Appraisers use a land-residual technique to get at the heart of the land value in cases where the eventual value and development costs are known.[6] If the end-use can be valued (accounting, of course, for any post-remediation stigma), and the costs of remediation and redevelopment can be projected, then the difference provides a measure of the acquisition price of the brownfield. Note, however, that appraisers must take care to account for the longer and sometimes-unpredictable time element associated with brownfield remediation and redevelopment.

Impacts of Feasibility Problems

The impact of contamination on development feasibility is summarized by Boyd, Harrington, and Macauley,[7] who analyzed both uncertain liability costs as well as inefficient land use. They argued that these problems may be due to differences in the information shared, known, and understood between buyers and sellers of impaired properties, which can lead to adverse selection. While there are laws and legal recourse to address these circumstances, taking such actions can be of limited value, has the potential to create moral hazard, and may lay the groundwork for future litigation, all of which can have the net effect of discouraging demand. Lastly, the authors note that the government has an imperfect ability to detect pollution, which can also contribute to a distortion of market values.

Highest and Best Use

As already noted, the feasibility study drives the third component of the highest-and-best-use (HBU) analysis. Generally, the first two steps in the HBU determination need to be carried out in parallel with the feasibility analysis in order to determine the financially feasible set of possible uses.

Legally Permissible

In evaluating the adaptive reuse of a brownfield, this may be the most interesting and challenging part of the assignment. Successful adaptive reuse more often than not requires some change in use to a higher and better use than the previous use. It is usually financially very difficult to take an industrial site, remediate it, and then turn it back into an industrial site. Also, many brownfields that are ripe for redevelopment are within a municipal boundary or comprehensive plan area. Often, there is a governmental bias toward some "problem solving" end use, such as affordable housing, job creation, or anchoring an inner-city redevelopment. Mixed-use projects are not uncommon in this setting. These higher and better uses often have different remediation requirements, and thus the potential adaptive reuse cost can be a moving target. Coupled with this goal, different end uses have different end values and costs. Iterative analyses under varying assumptions of legal constraints may be required in order to determine the value-optimizing solution to the problem.

Physically Possible

Of those uses that are legally permissible, which ones are physically possible? In a non-brownfield appraisal project, the appraiser typically relies on past experience to determine if the site is physically suitable for certain uses. At the absurd extreme, a one-acre, more-or-less square site would probably not be suitable for building an airport. On the other hand, consider a site that is legally permissible for either a shopping center or an apartment complex. The site has sufficient size and suitable topography for either. However, the ingress and egress are somewhat limited—sufficient for the low expected traffic at an apartment complex but wholly unsuitable for a shopping center. Thus, the physical constraints on the site point to one option over the other.

A brownfield site is evaluated by the same calculus, but, in addition, the existence of post-remediation contamination (albeit at levels lower than actionable) may physically constrain the adaptability of the site. Say, for example, a former industrial site was partially contaminated with an underground plume of hydrocarbons. Issuance

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of a building permit required larger setbacks and open space to allow authorities to conduct occasional testing. The solution to the problem was to use the contaminated space as landscaped buffer between the developed area of the site and the roadway. The final land plan also required relocating the entrance to the site from the main arterial (from which the plume emanated) toward a secondary access road.

In another example of a brownfield case, a plume of underground contamination was directly under the only ingress/egress access to an otherwise highly desirable site. Even though over 90 percent of the site was uncontaminated, permits to pave over the only access route could not be obtained during the remediation. The site remained vacant for over a decade while other surrounding sites were developed with highly valuable changes in use (from industrial to high-density suburban office and supportive businesses). Eventually, the adaptive reuse of the site went forward, but only after a costly solution to the physical access problem was found.

Financially Feasible

As noted, this step in the process requires an intense investigation of market forces—supply versus demand. However, in the case of a brownfield, market equilibrium may be nonexistent or difficult to measure. How will stigma impact the marketability and hence ultimate price of various end uses? Some uses with nominally lower values (e.g., retail) may suffer from less market resistance than uses with nominally higher values (e.g., high-density housing). As such, a solution that might have been feasible in the *unimpaired* state may not be feasible in the *impaired* state.

Maximally Productive (or Maximally Profitable)

The end result of the process is to find the one use that predominates over all others from a net-present-value maximization perspective. In brownfield analysis, the end result may be significantly different from what would be found for the very same site in a non-brownfield situation. Additionally, Kilpatrick shows that there may be different HBUs for the same site, depending on the nature and extent of remediation, the remediation cycle, or other factors.[8]

The Valuation Process

Once the HBU for the site has been determined, the next step is applying the actual valuation analytics. In the case of a brownfield, this may be a one-step process or may require multiple iterations to determine the value under varying scenarios of remediation. Under different circumstances, different data will be used and even different methodologies may be appropriate. For example, a comparative analysis of a brownfield acquisition versus the opportunity to acquire a more expensive albeit unimpaired alternative site may require the valuation of the brownfield site in the *as-if unimpaired* state as a baseline for further decision-making.

At the other end of the spectrum, the appraiser may be asked to value the contaminated brownfield only in the *as-is contaminated* state, which requires accounting for both the anticipated cost of remediation and the stigma resulting from risks and other unknowns. The appraisal may also have to tackle multiple remediation or adaptive reuse scenarios to aid in optimizing decision-making. Each of these post-remediation scenarios will take into account varying impacts of stigma resulting from market resistance, higher post-remediation operating or holding costs, and other risks and unknowns.

The appraisal toolbox is replete with various methodologies, and USPAP grants appraisers broad latitude to use the methods that are best in a given circumstance. The one broadly worded constraint, contained in the USPAP Scope of Work Rule, obligates the appraiser to use those methods that would be consistent with the expectations of his or her peers who are experienced with similar types of assignments. This rule is a bit of a two-edged sword with respect to brownfields. On one hand, appraisers who are familiar with and experienced in brownfield valuation recognize that the valuation methods useful in this situation are often different from the methods used in non-brownfield situations. Such specialized methods include survey research, case studies, national comparable transaction databases, regression analysis, time-series (longitudinal) studies, and other statistically based analytical tools. On the other hand, appraisers who are inexperienced with brownfield analysis will probably not be conversant with these tools. This difference can be a bit of a challenge in situations such as bank lending, where the appraisal will be reviewed by bank staff appraisers who have little or no experience in brownfield situations. Thus, the appraisal report itself will usually need to provide tutorial-type detail on the methodological underpinnings.

In general, though, appraisal methods are traditionally grouped into three broad categories, commonly called the *three approaches to value*:

1. The cost approach
2. The sales comparison approach
3. The income approach

These approaches are described in the following sections.

Cost Approach

The underlying theme of the various cost approach methods is a "... comparison with the cost to build a new or substitute property. The cost estimate is adjusted for the depreciation evident in the existing property."[9] The starting point is usually an estimate of the land value under the condition that it is vacant and ready for development. Typically, the appraiser will then estimate the cost to construct the improvements, usually using the *comparative-unit* method, the *unit-in-place* method, or the *quantity survey* method.

If the appraisal is for an existing facility, the next step is to estimate the impact of two categories of depreciation: *physical*, which is the wear and tear to the structure itself or such factors as on-site contamination or construction defects, and *functional*, which is the lack of otherwise necessary amenities (e.g., lack of indoor plumbing, lack of an elevator in a tall commercial building, etc.). A third category, *economic* (or *external*), refers to the impact of external and uncontrollable forces, such as neighborhood decline or nearby (but not on-site) contamination. Economic depreciation will impact both new and existing properties, although not necessarily in the same way. Stigma is generally categorized under economic depreciation, since it is an external market force that impacts the value of the property.

For vacant brownfield sites with proposed development, the cost approach may actually be the most useful as long as stigma is properly estimated. For existing properties, particularly with complex or highly depreciated improvements, the cost approach is problematic and usually not very applicable.

Sales Comparison Approach

The sales adjustment grid, which is commonly used in both residential and commercial appraisals, is what most people consider when they think of an appraisal.[10] However,

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this approach is the most broadly defined of the three approaches, and includes all of those tools and techniques used for cross-sectional comparison of subject and comparable properties. For example, hedonic regression, at the heart of most automated valuation models, is simply a large-scale, statistically robust application of the sales adjustment grid.[11] Colwell et al. provides the most recent summary of hedonic modeling in the appraisal literature and shows its superiority over matched pairs and other non-parametric methods when sufficient data is available.[12] In the absence of a sufficient volume of transaction data, matched-pairs, survey research, repeat sales analysis,[13] and other longitudinal studies are all useful tools in the sales comparison approach.

Income Approach

The three most common income approach techniques are the *gross rent multiplier*, the *discounted cash flow technique*, and the *direct capitalization method*. The first approach is most commonly used when appraising simple residential rental units (small apartment buildings or houses) since, for a given neighborhood, rental units tend to sell for a multiple of the gross rent. However, variants of this method are also useful when comparing agricultural or grazing land, particularly in cases where land is leased on a grazing-unit basis.

Existing income-producing property is usually appraised using either direct capitalization or discounted cash flows (DCF) methodology. The former assumes that net operating income is a perpetuity, and the formulation resembles a preferred stock or perpetuity bond valuation. The latter recognizes that cash flows are rarely perpetuities, and so the appraiser discounts foreseeable operating cash flows (usually for a period commensurate with current leases) and the estimate of future reversion cash flows (from sale, reconstruction, demolition, etc.).

The DCF technique has two important advantages over direct capitalization. First, the former allows the appraiser to use different discount rates for operating cash flows versus reversionary cash flows. This distinction is important, since there is significant evidence that the market values these two categories of cash flows differently. Second, direct capitalization requires that if the appraiser assumes growth in the income stream or value of the underlying asset, then that growth has to be at a constant rate. DCF allows for discontinuous changes in underlying values or cash flows.

Direct capitalization has the advantage of being simple to use, and is a holdover from the days before the existence of electronic spreadsheets and other desktop analytical tools. Additionally, the cap rate in direct capitalization is implicitly equivalent to the unlevered internal rate of return (IRR), while the DCF model allows the analyst to endogenously solve for both the levered and unlevered IRR.

In the unimpaired state, discount or cap rates can be determined with simple market surveys or *band of investments* analyses (in some textbooks called *mortgage-equity analysis*). In the more complex brownfield problem, there are two other techniques that are commonly used. The first is a survey that either directly elicits discount rates from market participants for environmentally affected properties or indirectly surveys market premiums. The latter is preferred, since it allows for determination of a risk premium regardless of the underlying nominal rate of return for unimpaired properties (which can change over time). The second technique is a variant on the band of investments, and estimates the premium over nominal rates using the spread between other risky and less-risky investments. One common technique for estimating this spread is to use "junk" bond yields versus AA-rated corporate yields. While this technique owes its lineage to the early works of Mundy, it was most recently reviewed in Titman et al.[14] Figure 10.2 shows an example of this technique.[15]

FIGURE 10.2. Estimation of Impaired Property Discount Rates

"Junk" bond yields	15.5%
AA-rated yields	9.6%
Risk premium	5.9%

Unimpaired discount rate	10.0%
Risk premium	5.9%
Impaired discount rate	15.9%

This junk-bond spread technique is most appropriate when there is some extenuating circumstance, such as contamination, which adds a level of risk to the investment. The appraiser may estimate the appropriate cap rate by taking a base-line cap rate (an *unimpaired* rate) and adding to it a risk premium estimated from the risk premiums demanded by investors on other risky investments, such as junk bonds or high-leverage investments.

Note: If a contaminated income-producing property is being valued, then the appraiser may need to invoke the hypothetical condition of "no contamination" and value the income stream using the base-line cap rate to determine a base-line, unimpaired value.

Why Does the Market Devalue a Brownfield Site?

After CERCLA and Three Mile Island, the appraisal profession in the United States began investigating the negative impact of environmental contamination on property values, and soon the literature was replete with guidance for appraisers tasked with quantifying these impacts.[16] As such, much of the seminal work in appraisal of contaminated properties dates from that time period. In 1988, the American Institute of Real Estate Appraisers[17] issued an official guidance piece, noting that "... leaking underground storage tanks (LUSTs) and spills and overfills from tank systems can cause severe contamination of subject properties and surrounding parcels and seriously affect the value of those properties."[18] Patchin observed that leaking underground storage tanks had a negative impact on real estate marketability and that even "... mildly contaminated [sites] can be expected to suffer reduced marketability."[19] Gamble and Downing found evidence that contamination also affected the values of nearby properties in a study of building lots near landfills and residential properties on the main access road serving such landfills.[20]

By the late 1980s, American appraisers generally recognized several factors in the valuation of brownfields or other contaminated property:

1. Values may be affected by either on-site or nearby contamination.
2. Brownfield projects methodologically resemble eminent domain projects, thus implying a "before-and-after" application of approaches.
3. The cost of remediation is not, by itself, a sufficient indicator of the diminution in market value,[21] since at market equilibrium, brownfields and other affected properties sell for less than the difference between unimpaired value and the cost of remediation. This difference is now generally referred to in the literature as "stigma."
4. The market—and appraisal methodology—recognizes that remediation is usually not a full cure or cleanup and that post-remediation properties continue to suffer stigma losses.

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paired discount rate	10.0%
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Subsequent advances in appraisal standards and methodology have helped give definition to these axioms, and in 2003 the Appraisal Standards Board (ASB) incorporated these axioms into a rewrite of its Advisory Opinion No. 9 to USPAP. In this Advisory Opinion, the ASB recommends that appraisers must take contamination into account.[22] USPAP's Ethics Rule prohibits appraisers from knowingly issuing opinions that mislead readers into believing that brownfields are not impacted by on-site or proximate contamination, and guidelines for federally regulated mortgages require appraisers to report any known contamination and include the impact of such in the value opinion.[23] Various states have mandatory disclosure laws pertaining to contamination and similar adverse conditions, and many state courts have ruled regarding these appraisal and reporting obligations.[24]

Theoretical Issues

Patchin developed a framework that includes remediation costs, the availability of indemnities, the premium demanded by investors on discount or cap rates, and the impact on the cost of financing. When using direct capitalization in the income approach, his methodology began with prevailing cap rates on unimpaired property, making adjustments for available mortgage terms and anticipated future improvements or declines in value.[25] He noted at the time that there was "... virtually no chance of obtaining mortgage financing for a seriously contaminated property."[26]

Patchin then became one of the first to observe that the decline in value is often greater than would be suggested by anticipated remediation costs.[27] Mundy first defined this phenomenon as "stigma," a term that has continued in the lexicon to this day.[28] In his definition, Mundy was also the first in the valuation literature to list necessary and specific conditions for stigma:[29]

1. Responsibility—is someone or some company specifically shouldering the blame?
2. Exposure—has there been a risk amplification, such as in the media?
3. Disruption—does the contamination impact daily lives?
4. Concealability—is the risk hidden?[30]
5. Aesthetic effect—can the contamination be seen, felt, or smelled?
6. Prognosis—will the contamination be cleaned up in the near future?
7. Peril—is there a health risk?
8. Fear—what is the general concern level associated with this contamination?
9. Involuntary—are the property owners themselves innocent in this contamination?

Mundy demonstrated that stigma can be attributed to a *marketability effect* and an *income effect*. In the first case, even if selling prices do not decrease, value is diminished due to the increased time necessary to realize liquidity. In the latter case, owners and buyers usually demand an increase in the discount rate to account for higher risks of holding such a relatively illiquid or risky asset.[31]

Mundy also attributed the income effect to decreases in rent or occupancy or increases in operating expenses. Since value can be defined as the fully discounted stream of anticipated benefits and costs, stigma factors in directly. This realization led him to focus on the determination of the appropriate risk-adjusted discount rate.[32] Here, he found that the appropriate measure of the increased risk associated with holding contaminated property is a potential increase in the cost of capital, both equity and debt. While Mundy and Patchin agree that impairment impacts the way

income is capitalized or discounted, Mundy prefers the use of varying discount rates to account for varying levels of risk in different time periods (a DCF model), while Patchin uses direct capitalization. Jackson builds on Mundy's work, showing that a mortgage-equity type model can be useful in quantifying the effects of stigma.[33] Kilpatrick, Brown, and Rogers extend Mundy by showing that the value impacts can be partitioned between a *risk impact* (the increase in the discount rate) and a *cash-flow impact* (the decrease in cash flows).[34]

Post-remediation stigma impact has been addressed by Patchin, Mundy, and Chalmers and Jackson.[35] Patchin suggested a theoretical model of stigma diminishing over time ". . . once a cure is in place." Mundy, on the other hand, argues that any stigma dissipation would be a function of ongoing market perceptions of risk. He developed a graphical representation of how such perceptions may change over time and the resultant theoretical impact on value. Bell adopted Mundy's graphical model and expanded it to theorize that property value changes over time may vary according to a variety of situation-specific circumstances.[36] Chalmers and Jackson call this the "contamination lifecycle," and theorize that the effects of contamination vary according to the status in time: before cleanup, during and after cleanup, and after remediation is completed.

Jackson summarizes this and other appraisal literature on contaminated property, and lists seven factors for appraisers to consider: the cost and timing of remediation, the existence and quality of any indemnification, the degree to which the problem has been characterized, the potential for business interruption, the approval of a remediation plan, the regulatory framework, and the likelihood of third-party lawsuits.[37]

Market Value

Real estate appraisals performed for financing by federally insured lenders—nearly all mortgage loans—require the analysis to adhere to the necessary and sufficient conditions contained in what has come to be known as the "Definition of Market Value":

> The most probable price which a property should bring in a competitive and open market under all conditions requisite to a fair sale, the buyer and seller each acting prudently and knowledgeably, and assuming the price is not affected by undue stimulus.[38]

Implicit in this definition is the consummation of a sale as of a specified date and the passing of title from seller to buyer under conditions whereby:

- buyer and seller are typically motivated;
- both parties are well informed or well advised, and acting in what they consider their own best interests;
- a reasonable time is allowed for exposure in the open market;
- payment is made in terms of cash in U.S. dollars or in terms of financial arrangements comparable thereto; and
- the price represents the normal consideration for the property sold unaffected by special or creative financing or sales concessions granted by anyone associated with the sale.

This discussion leads inexorably to the realization that more advanced valuation techniques are frequently needed in brownfield situations. Chalmers and Beatty[39] discuss the condition of "full information" implicit in the most commonly used definitions of market value. However, as Simons observes, contaminated property transactional data may not reflect actual market values at equilibrium under the assumptions inherent in these common definitions of value. Thus, as shown by Simons, Allen and Austin,[40] McLean and Mundy,[41] Simons, Bowen, and Sementelli,[42] Flynn et al.,[43] Simons and Saginor,[44] and others in the valuation literature, more advanced methods are appropriate and will result in more reliable and credible findings.

Appraisal Methodology

One important implication of all of this analysis is that appraisers must account for the quality and availability of data. For example:

1. If the contamination that impacts the brownfield property also affects other comparable properties in the area (as is common in some industrial neighborhoods), then attempting to use nearby sales data to determine *unimpaired* values may lead to a misleading result.
2. The most commonly used definition of *market value* in the United States creates a set of explicit assumptions about comparable data that may be questionable in brownfield transactions.
3. Comparable brownfield transactions often do not trade at equilibrium prices due to marketing and other difficulties. As a result, data that could normally be extracted from market comparable sales (e.g., market cap rates, sales adjustments, depreciation, land prices) is noisy at best or even unavailable.

For example, Chalmers and Jackson[45] observe, "[t]he use of the sales comparison approach requires extraordinary care if useful market evidence is to be extracted." Kinnard concluded that the sales comparison approach and the matched-pairs method are problematic in this context.[46] To quote, "[u]nfortunately, the market frequently does not cooperate. The net effect, therefore, is that these ideal measures tend to remain precisely that—ideal. The appraiser generally has to look elsewhere to identify the market effects of contamination on property values." Kinnard's observations on the shortcomings of the traditional methodologies when valuing brownfields and other contaminated property are supported by Patchin,[47] Wilson, Roddewig,[48] and Weber.[49]

In light of this discussion, when appraising a brownfield, appraisers must ask two important questions about the transactional market:

1. To what extent do market prices fully capture all available information?
2. Even if all information is "available," to what extent are buyers and sellers able to make market-equilibrium decisions?

Fundamental to the market decision-making process is the concept of rational expectations—that is, the concept that market participants fully discount whatever information they have in formulating prices. However, both theory and empirical appraisal evidence demonstrate that real estate markets are generally not at equilibrium, and that special situations, such as contamination, further disturb whatever equilibrium may exist.

This means that appraisers must resort to more advanced techniques to determine market value to a reasonable degree of appraisal certainty. Simons shows that such techniques may include survey research, case studies, regression analysis, and other well-tested and suitable techniques.[50] Winson-Geideman outlines the proper use of case studies,[51] and Boyle and Kiel focus on the use of hedonic regression models for valuing environmentally contaminated property.[52]

Such advanced methods may also include options pricing, as suggested by Lentz and Tse as an alternative to the discounted cash flow model.[53] Weber takes a stochastic approach, suggesting the use of a Monte Carlo simulation.[54] Mundy and McLean recommend the use of contingent valuation and conjoint measurement.[55] Kilpatrick recommended the application of secondary research, such as a literature review, and the use of national-scope transactional data to aid in measuring the degree of diminution attributable in a particular situation. Kilpatrick also uses depreciation analysis to value situations where an impairment results in a foreshortening of the economic life of improvements.[56] Kinnard and Worzola surveyed and summarized the key methodologies, and note that the methods used in practice often fell short of the more advanced techniques recommended in the academic and even the practitioner literature.[57]

Subsequent studies of real estate values have confirmed the usefulness of these methods. Boyle and Kiel[58] summarize empirical studies of the impact of contamination on residential values, while Jackson[59] summarizes impacts on nonresidential properties. Both of these studies confirm the usefulness of the methods that have evolved over the past 20 years.

Summary and Cautionary Notes

The appraisal of a brownfield can be a complex, time-consuming, and specialized undertaking. Attorneys, investors, and real estate advisors who have experience in non-brownfield valuation projects will often be surprised at the scope of work needed to undertake a thorough appraisal of a brownfield. Several key issues surrounding the valuation project, detailed in the following sections, should be thoroughly understood by the investors or sellers and their advisors as early in the process as possible.

Most appraisal firms will not be familiar with brownfields. Most successful brownfield appraisal projects in the United States are undertaken by a handful of specialized real estate appraisal or advisory firms. Local firms are extraordinarily useful in the process, particularly in gathering and analyzing local *unimpaired* market data. However, many local-market appraisers wisely refuse these projects and refer them to one of the national-scope brownfield specialists. This tends to be a win-win for the local-market firm, which will often end up partnering with the national firm on the projects.

Scope-of-work and costs are significantly greater for brownfields. The simple act of data gathering alone adds costs to the brownfield appraisal project, and will often entail travel and other costs not normally associated with an investment appraisal. As noted, the feasibility analysis and HBU determination entail greater levels of rigor. Finally, while appraising non-brownfield investment properties (e.g., apartments, shopping centers, office buildings) usually entails economies of scale resulting from repetition

in that type of appraisal, brownfields are almost always one-of-a-kind projects with little or no economies of scale.

Banks and other lenders may not be familiar with methods. Banks and other traditional lenders are increasingly finding "comfort zones" for brownfield lending, but bank review appraisers rarely have the training or skill set needed to evaluate a brownfield appraisal. Following the most recent lending crisis, the underwriting process is gaining renewed emphasis.[60] As a result, the appraisal report itself will need to be more thoroughly written (a *self-contained* appraisal report rather than the normal *summary* report submitted to lenders), and analytical techniques and findings will have to be thoroughly and rigorously supported.

In a global investment market, U.S. brownfield experiences may not translate. While normal real estate investment metrics may transcend global boundaries, brownfield facts (degree of diminution, stigma, etc.) may not. Various countries have differing experiences with brownfields. Many E.U. countries, for example, have different attitudes toward environmental risk along with greater institutional controls that change the calculus for stigma. Japan, on the other hand, is relatively new to the business of valuing brownfields, and China has yet to consider the issue. As a result, U.S. investors doing business abroad, as well as foreign investors doing business in the United States, will find steep learning curves when approaching non-domestic brownfield projects.

Get the appraiser involved early in the project. Many investors are used to getting an appraisal only at the bank lending phase of a project. Brownfield owners often do not hire an appraiser at all, leaving that part of the due diligence to the buyer. Both of those attitudes are probably costly in the brownfield situation. Investment analysis for a brownfield is an iterative process, requiring various *what-if* scenario analyses and sensitivity tests. Additionally, as the physical remediation process progresses, markets may change or discovery of previously unknown physical factors (e.g., more or less contamination than expected) may have valuation implications. In the property disposal process, the appraiser can help guide the market positioning of the property in order to optimize the return to the seller.

Approach the appraisal analysis as an à-la-carte menu. Many investors and attorneys think of the appraisal firm as a *prix-fixe* restaurant, with every engagement leading to a one-size-fits-all appraisal report. This is an overly expensive way of approaching the problem. Instead, use the appraiser's services to help fit pieces of the puzzle together—feasibility and highest and best use coming early in the process, with the likelihood of redoing those processes several times before actually completing an appraisal analysis. The final reconciliation of value, when and if actually needed, can be delivered orally—USPAP creates no obligation for a written report.

Get the appraiser, the engineer, the land planner, and the other team members in the same room at the same time. Siloing the project gains nothing, detracts from efficiency, and ultimately results in increasing costs. The various real estate specialists need to communicate with one another and work in tandem. The appraiser needs to understand

the implications of the other specialists' work, and they in turn need to understand the valuation implication of various recommendations.

Suggested Reading

One of the leading handbooks for appraisers in the United States is THE APPRAISAL OF REAL ESTATE, currently in its 13th edition. It is published by the Appraisal Institute (http://www.appraisalinstitute.org) in Chicago.

THE UNIFORM STANDARDS OF PROFESSIONAL APPRAISAL PRACTICE, new editions published semi-annually. Contact the Appraisal Foundation (http://www.appraisalfoundation.org), Washington, DC.

ESSAYS IN HONOR OF WILLIAM N. KINNARD, JR. (C.F. Sirmans & Elaine Worzala, eds., Kluwer Academic Publishers 2003). The late Dr. Kinnard was a former President of the American Real Estate and Urban Economic Association and one of the most highly regarded experts in the field of valuation of contaminated property. This monograph, co-sponsored by the Appraisal Institute, the Royal Institute of Chartered Surveyors Foundation, and the American Real Estate Society, is "must reading" for any appraiser or attorney in the field.

Notes

1. The appraisal literature frequently uses the terms "brownfields" and "contaminated property" interchangeably. Methodologically, it makes little difference, but the latter term refers to a broad array of contamination situations in addition to brownfields.

2. The 2006 edition of USPAP added a canonical methodology for determining the scope of work at the beginning of each appraisal project. This includes consideration of the client and intended users, the intended use of the appraisal report, the effective date of the appraisal, any special conditions or assumptions, the interests to be appraised, and the salient physical characteristics of the property.

3. *See, e.g.*, Mitchell H. Kizner & Donna T. Urban, *No Further Action Letter Could Be Unreliable*, NEW JERSEY L. J., March 27, 2006.

4. FIELD OF DREAMS (Universal Pictures 1989).

5. Lucas v. South Carolina Coastal Council, 505 U.S. 1003 (1992).

6. THE APPRAISAL OF REAL ESTATE 512 (13th ed., Appraisal Institute 2008).

7. James Boyd, Winston Harrington & Molly K. Macauley, *The Effects of Environmental Liability on Industrial Real Estate Development*, 12(1) J. REAL ESTATE FIN. & ECON. 37–58 (1996).

8. John A. Kilpatrick, *Valuation of Brownfields*, *in* BROWNFIELD LAW AND PRACTICE (LexisNexis Matthew Bender 2008).

9. THE APPRAISAL OF REAL ESTATE, *supra* note 6, at 77.

10. Ironically, the seminal text THE APPRAISAL OF REAL ESTATE (*supra* note 6) only spends three chapters on this approach, compared with four chapters on the cost approach and five on the income approach!

11. George Lentz & Ko Wang, *Residential Appraisal and the Lending Process: A Survey of Issues*, 15 J. OF REAL ESTATE RESEARCH 11–39 (1998).

12. Peter F. Colwell, John A. Heller & Joseph W. Trefzger, *Expert Testimony: Regression Analysis and Other Systematic Methodologies*, APPRAISAL J., Summer 2009, at 253–62.

13. John A. Kilpatrick, *Application of Repeat Sales Analysis to Determine the Impact of a Contamination Event*, J. OF HOUSING RESEARCH, Fall 2006.

14. Sheridan Titman, Stathis Tompaidis & Sergey Tsyplakov, *Determinants of Credit Spreads in Commercial Mortgages*, REAL ESTATE ECON., Winter 2005, at 711–38.

15. Jackson arrives at this same conclusion through a somewhat different analysis. *See* Thomas Jackson, *Mortgage Equity Analysis in Contaminated Property Valuation*, APPRAISAL J., January 1998, at 46–55.

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perty Valuation, APPRAISAL J.

16. William N. Kinnard & Elaine M. Worzala, *How North American Appraisers Value Contaminated Property and Associated Stigma*, APPRAISAL J., July 1999, at 269–79.

17. The American Institute was one of the two predecessor organizations to the present-day Appraisal Institute. The other predecessor organization was the Society of Real Estate Appraisers.

18. AMERICAN INSTITUTE OF REAL ESTATE APPRAISERS; RESEARCH DEPARTMENT, UNDERGROUND STORAGE TANKS: BASIC INFORMATION FOR APPRAISERS 3 (National Association of Realtors 1988).

19. Peter J. Patchin, *Valuation of Contaminated Properties*, APPRAISAL J., January 1988, at 10.

20. HAYS B. GAMBLE & ROGER H. DOWNING, EFFECTS OF SANITARY LANDFILLS ON PROPERTY VALUES AND RESIDENTIAL DEVELOPMENT 7 (Institute for Research on Land and Water Resources 1984).

21. Throughout this chapter, the term "market value" is used. This has a very stylized meaning in the appraisal context, and represents a set of necessary conditions that must be met for an observed transaction price to be representative of value. This definition was promulgated by the Office of Thrift Supervision, among other groups, and is required to be used in federally insured transactions. However, the authoritative text THE APPRAISAL OF REAL ESTATE (*supra* note 6) cites quite a few different definitions of value, and various courts and jurisdictions have alternative definitions of value either in their rules of evidence or in model jury instructions. The appraiser must take care to apply the appropriate definition of value in a contamination case, in accordance with USPAP and various USPAP advisory opinions.

22. In this context, AO-9 only really summarizes binding requirements under various USPAP Rules.

23. *See, e.g.*, FANNIE MAE SELLING GUIDE (2009), specifically at 546 and 1118–24.

24. *See, e.g.*, Fausett & Co v. Bullard, 229 S.W.2d 490 (Ark. 1950), Clark v. Olson, 726 S.W.2d 718 (Mo. 1987) (*en banc*), Lynn v. Taylor, 642 P.2d 131 (Kan. App. 1982), McRae v. Bolstad, 646 P.2d 771 (Wash. 1982); Fauerke v. Rozga, 332 N.W.2d 804 (Wis. 1983), Reed v. King, 145 Cal. App. 3d 261, 193 Cal. Rptr. 130 (1983).

25. In 1988, before the widespread popularization of the personal computer and various computer-based analytical tools, appraisers used what was known as the Ellwood Method to estimate cap rates in such a fashion. Today, simple computer spreadsheets or other widely-available proprietary programs allow the use of more complex direct capitalization models.

26. Patchin, *supra* note 19.

27. Peter J. Patchin, *Contaminated Properties—Stigma Revisited*, APPRAISAL J., April 1991, at 167–72.

28. Bill Mundy, *Stigma and Value*, APPRAISAL J., January 1992, at 7–13.

29. While Mundy (*supra* note 28) was the first in the valuation literature to present these, he correctly cites the authorship of this from the sociology literature: MICHAEL EDELSTEIN, CONTAMINATED COMMUNITIES: THE SOCIAL AND PSYCHOLOGICAL IMPACTS OF RESIDENTIAL TOXIC EXPOSURE 6 (Westview Press 1988).

30. Interestingly enough, the old bromide "out of sight, out of mind" does not apply here. The greater the degree of concealability, the greater the stigma.

31. Bill Mundy, *The Impact of Hazardous Materials on Property Value*, APPRAISAL J., April 1992, at 155–62. In 2007, the 75th anniversary issue of THE APPRAISAL JOURNAL listed this article as one of the nine most important articles ever published by the Appraisal Institute.

32. Bill Mundy, *The Impact of Hazardous Materials on Property Value: Revisited*, APPRAISAL J., October 1992, at 463–71.

33. Jackson, *supra* note 15, at 46–55.

34. John A. Kilpatrick, Doug Brown & Ronald C. Rogers, *Exterior Insulation Finish Systems and Property Values*, APPRAISAL J., January 1999, at 83–88.

35. James Chalmers & Thomas Jackson, *Risk Factors in the Appraisal of Contaminated Property*, APPRAISAL J., January 1996, at 44–58.

36. Randy Bell, *The Impact of Detrimental Conditions on Property Values*, APPRAISAL J., October 1998, at 380–91.

37. Thomas Jackson, *Investing in Contaminated Real Estate*, REAL ESTATE REV., January 1997, at 38–43.

38. Office of Thrift and Supervision, 12 C.F.R. § 564.2(f) (1989); Office of the Comptroller of the Currency, 12 C.F.R. § 34.42(f) (1989).

39. James A. Chalmers & Jeffrey Beatty, *Environmental Hazards Devastate Property Values*, Real Estate Valuation, Spring 1994, at 22–28.

40. Marcus Allen & Grant Austin, *The Role of Formal Survey Research Methods in the Appraisal Body of Knowledge*, Appraisal J., October 2001, at 394–99.

41. David McLean & Bill Mundy, *Addition of Contingent Valuation and Conjoint Analysis to the Required Body of Knowledge for the Estimation of Environmental Damages to Real Property*, J. Real Estate Prac. & Educ., 1999, at 1–19; Bill Mundy & David McLean, *Using the Contingent Valuation Approach for Natural Resource and Environmental Damage Applications*, Appraisal J., July 1998, at 290–97.

42. Robert Simons, William Bowen & Arthur Sementelli, *The Effects of Leaking Underground Storage Tanks on Residential Sales Price*, 14(1) J. Real Estate Research 29–42 (1997); Robert Simons William Bowen & Arthur Sementelli, *The Price and Liquidity Effects of UST Leaks from Gas Stations on Adjacent Contaminated Property*, Appraisal J., April 1999, at 186–94.

43. James Flynn, Donald MacGregor, Wayne Hunsperger, C.K. Mertz & Stephen Johnson, *A Survey Approach for Demonstrating Stigma Effects in Property Value Litigation*, Appraisal J., Winter 2004, at 35–44.

44. Robert Simons & Jesse Saginor, *A Meta-Analysis of the Effect of Environmental Contamination and Positive Amenities on Residential Real Estate*, 28(1) J. Real Estate Research 71–104 (2006).

45. Chalmers & Jackson, *supra* note 35.

46. William Kinnard, *Measuring the Effects of Contamination on Property Values*, Environmental Watch, Winter 1992, at 1–4. The Appraisal Institute's annual award for excellence in education is named the Kinnard Award in his memory.

47. Patchin, *supra* note 19, at 7–16.

48. Richard Roddewig, *Stigma, Environmental Risk, and Property Values: 10 Critical Inquiries*, Appraisal J., October 1996, at 375–87.

49. B.R. Weber, *The Valuation of Contaminated Land*, 14(3) J. Real Estate Research 379–98 (1997).

50. Robert A. Simons, *Estimating Proximate Property Damage from PCB Contamination in a Rural Market: A Multiple Technique Approach*, Appraisal J., October 2002, at 388–400. For his study, Dr. Simons used data gathered in the Anniston, Alabama PCB case.

51. Kimberly Winson-Geideman, *Environmental Case Studies: Ensuring Suitable Comparables*, Appraisal J., Summer 2005, at 288–95.

52. Melissa Boyle & Katherine Kiel, *A Survey of House Price Hedonic Studies of the Impact of Environmental Externalities*, 9(2) J. Real Estate Literature 117–44 (2001).

53. George Lentz & K.S.M. Tse, *An Options Pricing Approach to the Valuation of Real Estate Contaminated by Hazardous Materials*, 10(2) J. Real Estate Fin. & Econ. 121–44 (1995).

54. Weber, *supra* note 49.

55. *Supra* note 41.

56. John A. Kilpatrick, *Concentrated Animal Feeding Operations and Proximate Property Values*, Appraisal J., July 2001, at 301–06; John A. Kilpatrick, *Construction Defects and Stigma*, in Mealey's Litigation Reports: Construction Defects, July 2003.

57. Kinnard & Worzala, *supra* note 16, at 269–78.

58. Boyle & Kiel, *supra* note 52.

59. Thomas Jackson, *The Effects of Environmental Contamination on Real Estate: A Literature Review*, 9(2) J. Real Estate Literature 91–116 (2001).

60. Observations from the bank lending attitude changes that followed FIRREA can be illustrative of future expectations.