

A Review of Sanitary **LANDFILL** Impacts on Property Values

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Sources and Research Methodologies

Study #1

Federal, state, and local governments are becoming more demanding and specific in the requirements for siting, approving, and operating sanitary landfills. State designated regulatory agencies vested with permitting authority, acting as fiduciaries of a public trust, are careful not only in the review of the technical merits of an application but other potential impacts to an area as well. While the scope of these issues is broad, one of the questions most frequently raised is that of possible impacts on residential property values at or near the site. This question is a most legitimate one and falls within the scope of the appraiser's expertise. Moreover, it is not uncommon for appraisers to be called upon to serve as expert witnesses in such matters when the issuance of a permit is at issue. Both sides, i.e., usually residents opposing the siting in their area and a waste disposal contractor seeking a permit for the site, may employ an appraiser as an expert witness. Assuming you are considering the possibility of being such a witness, where do you go from here? The following analysis is directed to a discussion of some of the research that has been done in this area that may be of benefit in addressing the question. Specifically, what research is available, what research methodologies were employed, and what were the research results?

Documentation of residential value impacts must be based on sound methodology. Fortunately, there have been some comprehensive studies conducted over the past few years which may serve as guides in conducting this type of research. The following discussion will review a few of these along with their findings. It should be noted that in each study the research was usually conducted a few years after the development and operation of the landfills.

Results of a Pennsylvania State University study, "Effects of Solid Waste Disposal Sites On Community Development and Residential Property Values," was published in November 1982. The purpose of this study was to consider whether sanitary landfills had any adverse effects on community development and residential property values, and if so, measure their magnitudes in selected areas of Pennsylvania. Ten sanitary landfills operating under permits from the Department of Environmental Resources in Pennsylvania were selected for study. While it is beyond the scope of this review to treat the methodology and research procedures in detail, a summary of the report's research procedures and findings is reviewed in the following analysis.

Ten sanitary landfills in Pennsylvania were selected for study based on the presence of residential development in the surrounding communities. The objective was to measure the effects of the landfills on community development and residential property values. Data availability problems for all sites did not allow for all to be included in each analysis, however.

"Study areas" were defined and delineated as those within one mile of the landfills. Four randomly selected areas, each one-half mile in diameter, located three miles from each landfill site constituted the "control areas." Several types of data were collected for the landfill and control areas. These data included the number of properties by size class, dates of new residential building, and proximity of properties to the landfill with respect to three distance zones. For properties purchased from 1977 to 1981, several other house, lot, and locational characteristics were also studied. Property tax record cards served as the source of most of this information.¹

1. J. Epp, *Effects of Solid Waste Disposal Sites On Community Development and Residential Property Values* (University Park, Pennsylvania: Institute for Research on Land and Water Resources, The Pennsylvania State University, 1982), p. 51.

The first part of the study reviewed the effects of the landfills on property development in the surrounding communities. A new residential construction rate, expressed as a percent of total residential parcels by year from 1971 to 1981, served as a proxy for community development. Residential construction rates for two distance zones around the landfill (0—1/2 mile and 0—1 mile) were compared to the rates in their respective control areas. The study found that there was no evidence to indicate that the nine landfills had any adverse effects on growth or development of their surrounding communities. For years 1976 and 1981 the data showed that rates of new residential development within one-half mile of the landfills were higher than the rates within either the one mile zones or the control areas. The data analysis further showed that landfills did not appear to have influenced the nature of developments near them. There was almost the same distribution of parcels by size categories near the landfills as in the control areas three miles away.²

The study did show differences in impacts within one-half mile of landfills based on the volume of waste handled, however. For landfills handling large volumes of waste, (i.e., over 500 tons daily) the rate of new residential construction and sales of residences and lots was much less than those landfills receiving 300 tons or less per day.³

The second part of the study dealt with the use of a multiple regression technique to measure the effect of landfills on residential property values. Due to a dearth of sales around the sites, only one site was utilized under this technique. It is beyond the scope of the analysis to review the nuances of multiple regression analysis. The objective of this statistical technique, however, was to measure the importance of independent variables on a dependent variable such as age of residence, square feet of living space, garage spaces and, in this case, distance of residence from the landfill, in explaining residential value. Per the report the following was found:

The regression results showed that in 1977 and 1979 the landfill had no discernible effects on residential property values. In 1978 the "distance to the landfill" variable was significant (at the 5-10 percent level), but the equation for this year explained only about 54 percent of the variation in housing prices (R^2), whereas in the 1977 and 1979 equations the distance variables were not significant at all but about 74 percent of the variations were being explained each year. This suggests that in 1978 the distance variable was strongly intercorrelated with some other variable, but we do not know which one, indicating that we should place less confidence on the results for this year.⁴

In short, this research showed that different sets of property characteristics and different functional forms led to the general conclusion that things other than proximity to the sanitary landfill were more relevant in explaining property values. Obviously, real estate markets are dynamic and local in many respects. Also, landfills are rather heterogeneous varying in size, visibility, accessibility, appearance, etc. While no study can control for all variables and all are subject to limitations, the findings of this research are interesting.

Study #2

Another major study, "Effects of Sanitary Landfills On The Value of Residential Property," was published in December 1983. It was carried out by Research and Planning Consultants, Inc. of Austin, Texas. This study employed four case

2. *Ibid.*, p. 51.

3. *Ibid.*, p. 53.

4. *Ibid.*, p. 52.

studies to assess the effects landfills had on property values of adjacent neighborhoods. The sites were in Houston, Texas; Baltimore, Maryland; Minneapolis, Minnesota; and Atlanta, Georgia.

Various types of statistical analyses were used to produce the study findings. One of the techniques was time-series analysis. In this case residential real estate sales prices for the delineated area next to the landfill were gathered for eleven years, five years preceding the landfill and thereafter. The two time periods were then compared to a control area's performance. Because the control area was selected based on its similarity to the landfill area, the control area basically should be representative of what the landfill area's performance would have been in the absence of the landfill. Significant variations between the two areas, of course, would suggest the impact of the landfill.⁵

A second technique employed analyzed the annual mean residential sales price for the facility area for a five-year period prior to the landfill opening. This trend was then extrapolated for the next five years suggesting what the resulting values would represent in the absence of the landfill. These values were then compared to the actual annual mean residential sales prices that occurred in the facility area. Employment of a statistical test, the t-test, indicated if the differences between the two sets of data, projected versus actual data on mean annual sales prices, were statistically significant.⁶

An overview of the findings from this study, summarized below, indicated the following:

1. Based on the time-series analysis and t-test performed, the nominal value of residential property in three of the four case study neighborhoods had not declined since landfill development.
2. In the case of the fourth site, which relied on census data versus primary data for the other three facilities, the median value of the single-family, owner occupied housing units increased substantially.
3. Neither the direction or rate of change in residential property values in the landfill neighborhoods was changed in two of the three areas included in #1 while property values increased in the other.
4. For those properties included in #1 trends in residential values in the landfill neighborhoods did not change after landfill development compared to overall trends in property values in the control area.
5. For the landfill facility in #2, trends in its residential property values increased substantially compared to its control area.
6. The pattern of development in two of the landfill neighborhoods had not changed since development of their landfills.
7. In two of the cases the pattern of development became more residential since development of their landfills.⁷

It should be noted that this study was performed for Browning-Ferris Industries, Inc., (BFI), a major waste disposal contractor. Part of the criteria used in selecting the four sites was that the site be in a state or region where BFI anticipated developing landfills.

5. Research Planning Consultants, Inc., *Effects of Sanitary Landfills On the Value of Residential Property* (Austin, Texas: Research Planning Consultants, Inc., December, 1983), p. ii.

6. *Ibid.*, p. ii.

7. *Ibid.*, p. v-vi.

Study #3

Other research has shown that the development of a sanitary landfill may actually enhance property values, especially where the location is relatively remote. The introduction of infrastructure such as new or improved access roads, utilities, drainage, etc., has actually stimulated additional development in certain cases. Increases in land values and new construction have resulted in specific cases.⁶

Study #4

The studies cited are interesting from the standpoint that they represent before and after analyses on property value impacts for sanitary landfill locations. Thus, they are relevant in suggesting possible outcomes for other proposed locations. In fact, I relied on these research efforts in this capacity in a recent hearing. What technique(s) can be used, however, for measuring impacts for a proposed sanitary landfill when de facto data are not available? One possibility is to gauge indirectly local residential perceptions.

In a recent case I opted to measure community attitudes and perceptions by gathering building permit historical data for a time frame before the permit application was announced versus a specified time frame afterwards when it carried a high profile. Since there is typically a several month delay between permit application and the final decision, sufficient time elapses to do this. The logic, of course, was to see if there was a marked drop in construction permitted after the sanitary landfill announcement compared to the prior period. Based on the research conducted in this case, which included a three-mile radius around the site, the data showed no marked variance in permits issued after the announcement versus the pre-announcement period. It was my conclusion that community perceptions were still positive, based on the willingness to continue to build in the immediate landfill area. Attempts to use before and after sales data proved unproductive due to the dearth of sales of the same properties. The use of before and after sales volume comparisons proved unproductive as well due to an inactive market. The lack of data, of course, is not uncommon since most landfills are in relatively remote locations with thin or inactive real estate markets.

Summary

Many older landfills which were not authorized under today's stricter permitting standards are reaching their physical limits. An acceleration in the search for new sites and permit applications is inevitable. In many cases, community concern and organized opposition can also be expected, some of which will take the position of possible negative impact on property values. No one can conclusively state that such developments have no negative impact on property values. Since it is typically the layman's first reaction that landfills do negatively impact on property value, the results of the studies noted are of particular interest. It would seem logical to conclude that property value impacts will depend on several variables such as general community perceptions of environmental risks; density of the local population; proximity to population centers; and design features of the landfill, including its physical profile, volume and nature of waste handled, and other site characteristics. In my opinion, the appraisal community will be called upon with increasing frequency in the future to testify in cases involving the siting of sanitary landfills. Hopefully, this cursory look at the literature will be of assistance in such assignments.

6. C.L. Pettit and Charles Johnson, "The Impact On Property Values of Solid Waste Facilities," *Waste Age*, April 1987, p. 104.

References

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Pettit, C.L., and Johnson, Charles. "The Impact On Property Values of Solid Waste Facilities," *Waste Age*, April, 1987, pp. 97-102.



*"Appraising is an inexact science,
but that's what makes it so much fun."*