THE COST OF CUTS:
The Impact of Reductions in Capital Investments to Public Housing Authorities

Final Report Submitted To:
Public and Affordable Housing Research Corporation
189 Commerce Court PO Box 189
Cheshire CT 06410-0189

Final Report Submitted By:
Econsult Corporation
1435 Walnut Street Suite 300
Philadelphia PA 19102

June 21, 2012

TABLE OF CONTENTS

EXECUTIVE SUMMARY

This study uses a cost benefit analysis to estimate the potential net impacts of proposed reductions by the US Department of Housing and Urban Development (HUD) in federal funding of capital investment in public housing authorities (PHAs).[1] It examines the extent to which reductions in capital investment in PHAs impose costs on governments at all levels, as well as local communities, businesses, PHA residents, and society as a whole. The report narrates and estimates the incidence, distribution, and scale of these impacts and compares them against the total amount cut from annual Capital Fund Program Grants, which fund maintenance and modernization of public housing properties. The Public and Affordable Housing Research Corporation (PAHRC) partnered with Econsult Corporation in this effort to inform current discussions regarding future funding cuts by HUD to PHAs for capital expenditures, by identifying potential negative impacts resulting from these cuts, and attempting to quantify those impacts and compare them against the cut amounts.

There are currently about 3,300 PHAs throughout the US, of which approximately 3,100 receive annual grants from HUD's Capital Fund Program for the maintenance and improvement of the public housing infrastructure. In 2010 (the year of reference for this study), PHAs operated 1.16 million housing units and received a combined $2.39 billion in capital funding from HUD. These numbers represent a steady decline in general capital funding over the last decade (down 17 percent from $2.89 billion in 2000), and subsequently a reduction in the number of units available for families (down 10 percent from 1.28 million units in 2000).

Multiple sources of data were used to arrive at an approximate net value of capital funding cuts. First, a survey of PHAs was used to assess the capital expenditure categories that would be cut, and by how much, if HUD were to cut federal funding for Capital Fund Program Grants. Second, existing literature and econometric analyses of extensive data assembled specifically for this project were used to calculate how these capital expenditure decreases would result in various negative impacts that offset the savings gained by the cuts.

Estimates were developed using a "conservative" baseline, which essentially represents the minimal reasonable estimate of impact. We also explore a "middle of the road" scenario that reflects likely impact outcomes at the end of the study. Estimates were developed to reflect both a temporary one-time capital funding reduction (in which funding levels are reduced for one year and then returned to previous levels thereafter) and a long term, or permanent capital

[1] Capital funding is provided annually to PHAs through HUD's Office of Capital Improvements and the Office of Public Housing Investments. PHAs receive annual capital grants based on a funding formula, which is calculated using the number of units at each PHA and other PHA-specific factors. These yearly grant amounts are the focus of this report. Additional capital investments can be made by HUD through Hope VI Grants and Choice Neighborhood Grants or by PHAs through access to private capital through the Capital Fund Financing Program or tax credits linked to mixed income development.

funding reduction (in which funding levels are reduced and not returned to previous levels thereafter).

Based on the conservative assumptions, a one-time 20 percent cut ($470 million) in capital grants to PHAs would result in negative impacts totaling $214 million, which is 46 percent of the supposed capital funding cuts. In other words, every dollar saved by HUD through capital grant cuts to PHAs would result in about $0.46 of negative impacts, thus cutting into the intended cost savings by almost one-half. Using "middle of the road" assumptions, a 20 percent temporary one-time cut would result in about $470 million in negative impacts, or about $1.00 in negative impacts for every dollar saved by HUD, thus completely reversing the intended cost savings (see Table ES.1).

It is important to note that both of these estimates are computed using a discount rate of 7 percent, which is commonly used in the evaluation of federal programs to understand fluctuation in the costs associated with long-term capital projects. This discount rate is almost certainly too high given today's interest low rates and the possibility that they will remain low for some time to come. A more appropriate 3 percent discount rate would yield estimates of negative impacts ranging from $0.68 to $1.54 for every dollar saved in cuts.

Table ES.1 – Estimated Negative Impacts from a Temporary One-Time 20 Percent Cut ($470 Million) in Capital Funding

Impact Category	Low-End Estimate	As a % of Funding Cut	Middle Estimate	As a % of Funding Cut
Increased Cost of Housing for Residents/ Applicants	$124M	26.4%	$199M	42.4%
Decreased Quality of Housing for Residents/ Applicants				
Increased governmental and nonprofit Social Services Expenditures	$10M	2.2%	$140M	29.8%
Resident/ Applicant exclusion from Information Technology Resources	$8M	1.7%	$40M	8.4%
Increased Blight on Immediate Neighborhood	$61M	13.1%	$70M	14.9%
Buildings Less Energy/Cost Efficient	$5M	1.0%	$10M	2.0%
More Expensive Repairs Later	$6M	1.3%	$13M	2.8%
Total Negative Impacts	$214M	45.6%	$471M	100.3%
Total Cut Amount	$470M		$470M	

Source: Econsult Corporation (2012)

Under the more likely scenario that capital funding cuts become long-term, so that annual capital funding amounts settle at a level 20 percent lower than before, the aggregate negative impacts are likely to be far greater. Such permanent capital funding cuts would, in the long run, lead to a reduction in the number of available PHA units, resulting in far greater negative impacts in the form of higher costs of housing and lower quality of housing for former PHA residents, increased homelessness, and greater property value loss in surrounding neighborhoods, as well as many other impacts.

Conservatively modeling the negative impacts resulting from a permanent 20 percent cut in capital grant funding of $6.7 billion in present value ($470 million per year in perpetuity) reveals negative impacts that become larger over time and eventually are as large as the capital spending reduction. Because it takes time for the full impact of the permanent cut to occur, the present value of negative impacts is $4.76 billion, which is about 71 percent of the supposed permanent cut. In this scenario, every dollar saved by HUD through capital funding cuts to PHAs would result in about $0.71 of negative impacts, thus cutting into the intended

cost savings by almost three-quarters. Using "middle of the road" assumptions, it was estimated that a 20 percent long-term, or permanent, cut would result in about $8.74 billion in negative impacts, or $1.30 in negative impacts for every dollar saved by HUD, thus generating negative impacts above and beyond the intended cost savings (see Table ES.2). These estimates use a discount rate of 7 percent; using a 3 percent discount rate would yield estimates of negative impacts ranging from $1.54 to $3.36 for every dollar saved in cuts.

In light of the magnitude of these estimates, especially given the conservative assumptions employed throughout this analysis, it is likely that cuts in capital funding to PHAs will result in significant amounts of negative impacts to a variety of stakeholders, of a magnitude that exceeds the intended cost savings from the cuts.

Table ES.2 – Estimated Negative Impacts from a Permanent 20 Percent Cut (Present Value of $6.7 Billion) in Capital Funding

Impact Category	Low-End Estimate	As a % of Funding Cut	Middle Estimate	As a % of Funding Cut
Increased Cost of Housing for Residents/ Applicants	$1.96B	29.2%	$3.19B	47.6%
Decreased Quality of Housing for Residents/ Applicants				
Increased governmental and nonprofit Social Services Expenditures	$163M	2.2%	$2.25B	33.6%
Resident/ Applicant exclusion from Information Technology Resources	$22M	0.3%	$174M	2.6%
Increased Blight on Immediate Neighborhood	$2.46B	36.6%	$2.8B	41.7%
Buildings Less Energy/Cost Efficient	$66M	1.0%	$136M	2.0%
More Expensive Repairs Later	$90M	1.3%	$185M	2.8%
Total Negative Impacts	$4.76B	70.9%	$8.74B	130.3%
Present Value of Cut Amount	$6.71B		$6.71B	

Source: Econsult Corporation (2012)

1.0 INTRODUCTION

1.1 Study Purpose

Creating and maintaining affordable housing has been a function of the federal government since the 1800s. Today, public housing authorities (PHAs) serve about 2.2 million people in the United States who cannot otherwise afford housing. PHAs exist in every state, and in most U.S. territories. By subsidizing the cost of renting a house or apartment, they afford many moderate and low-income households a decent place to live. The physical infrastructure of PHAs is maintained mainly through annual Capital Fund Program Grants administered by the Office of Capital Improvements. These grants are based on the number of units each PHA has under contract each year as well as other PHA-specific data. Additional capital funds are provided to PHAs to replace lost units (Replacement Housing Factor Grants), to revitalize severely distressed housing (Hope VI and Choice Neighborhood Grants), and for disaster relief. Capital Fund Program Grants are provided to complete repairs, update and modernize units, incorporate management improvements, and develop new units.

During periods of economic recession, the federal government often must cut funds to many programs and agencies in order to save money. The U.S. Department of Housing and Urban Development (HUD), faced with the reality of needing to make cuts to shrink a budget gap, is contemplating continued cuts (funding is already down by seventeen percent since 2000) in future federal funding to PHAs for capital expenditures. However, cuts to some programs may not create the intended savings if they impose offsetting negative impacts.

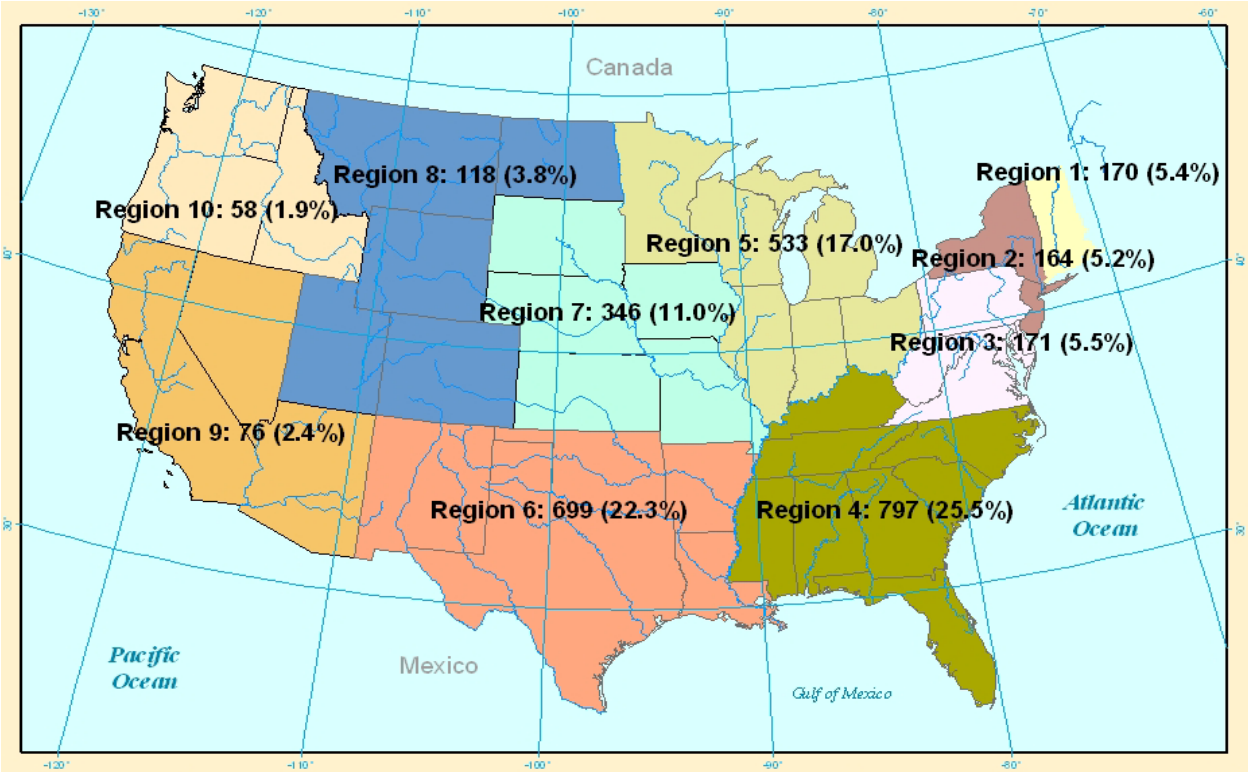
Capital funding cuts, while saving the federal government money, impose costly negative impacts on a wide range of stakeholders, from governments at all levels to PHA residents, neighborhoods, and business communities. Thus, the overall benefit to society of saving money through capital funding cuts may be partially or even completely offset by the negative effects to society that are caused by those cuts. This possibility should come as no surprise, for if current capital expenditures on public housing have a net positive effect on society exceeding the cost of those expenditures, then decreasing those expenditures would have a net negative effect on society. This possibility suggests that capital funding cuts will not reap their intended savings.

The Public and Affordable Housing Research Corporation (PAHRC) partnered with Econsult Corporation to estimate the potential net impacts of proposed reductions in federal funding of capital investment in public housing. This study examines the extent to which reductions in capital investment by PHAs impose costs on governments at all levels, as well as local communities, businesses, PHA residents, and society as a whole. The report narrates and estimates the incidence, distribution, and scale of these impacts. The aim of this effort is to inform current discussions regarding future funding cuts by HUD to PHAs for capital expenditures, by identifying potential negative impacts resulting from these cuts, and attempting to quantify those impacts and compare them against the cut amounts.

1.2 PHAs and PHA Capital Spending in the U.S.

There are currently about 3,300 PHAs throughout the U.S., 3,100 of which annual receive Capital Fund Grants (see Figure 1.1).[2] In 2010, PHAs operated an aggregate 1.16 million public housing units and received a combined $2.39 billion in capital funding from HUD. These numbers represent a steady decline in capital funding over the last decade (down 17 percent from $2.89 billion in 2000), and subsequently a reduction in the number of units available for families (down 10 percent from 1.28 million units in 2000).

Figure 1.1 – The Number (and Distribution) of Public Housing Authorities by U.S. Region[3]



Source: U.S. Department of Housing and Urban Development (2011), Econsult Corporation (2012)

[2] See also Appendix A for additional figures on the composition of PHAs and PHA units within the U.S.

[3] 1: Connecticut, Vermont, Massachusetts, Maine, New Hampshire, Rhode Island. 2: New York, New Jersey. 3: Pennsylvania, Virginia, West Virginia, Maryland, Delaware, Washington DC. 4: Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico, U.S. Virgin Islands. 5: Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin. 6: Arkansas, Louisiana, New Mexico, Oklahoma, Texas. 7: Kansas, Iowa, Missouri, Nebraska. 8: Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming. 9: California, Arizona, Hawaii, Nevada, Northern Marianas Islands, Guam, American Samoa. 10: Washington, Alaska, Idaho, Oregon.

PHAs serve approximately 2.2 million people across the U.S., and every state and most U.S. territories have at least one PHA. Of course, the demand for affordable housing is distributed unevenly across the U.S. The New York City Housing Authority (NYCHA) is by far the largest PHA with 178,000 units and $328 million in capital grants. It represents 15 percent of all PHA units in the U.S. and receives 14 percent of all HUD capital funding. In fact, the top ten PHAs by number of units represent 28 percent of all units and receive 33 percent of all HUD capital funding (see Table 1.1).

Table 1.1 – Capital Grant Amounts for the Ten Largest PHAs by Number of Housing Units in 2010

Housing Authority	2010 # Units (in Thousands)	2010 HUD Capital Grant Amount ($M)
All PHAs	1,155	$2,348
1. New York City Housing Authority	178	$328
2. Puerto Rico Public Housing Administration[4]	53	$137
3. Chicago Housing Authority	21	$111
4. Philadelphia Housing Authority	14	$76
5. Housing Authority of Baltimore City	12	$25
6. Boston Housing Authority	11	$28
7. Cuyahoga Metropolitan Housing Authority	10	$28
8. Miami Dade Housing Agency	9	$15
9. D.C Housing Authority	8	$20
10. Newark Housing Authority	8	$22

Source: U.S. Department of Housing and Urban Development (2011), Econsult Corporation (2012)

[4] Though it is the second largest PHA in the U.S. by number of housing units, Puerto Rico Public Housing Administration (PRPHA) is not included in this analysis. Its funding structure differs significantly from that of other PHAs, due in large part to the fact that it receives significant funds from the U.S. Department of Agriculture, as well as to the fact that its operating funds are calculated in a different manner from other PHAs. As such, excluding PRPHA from our analysis of the impacts of reduced capital funding on the overall public housing market has allowed for a more uniform comparison of impacts. PRPHA is often excluded from national analyses of PHAs for these and several other reasons. The 2010 "Capital Needs in the Public Housing Program" report, prepared by Abt Associates for HUD, excluded PRPHA, as did its original 1998 report.

1.3 Study Framework

This report explores the magnitude of the impacts of federal funding cuts to PHAs for capital expenditures. It does so in two steps:

- First (Section 2), a survey of PHAs was used to estimate the capital expenditure categories that would be cut, and by how much, if HUD were to cut annual Capital Fund Grants used for capital expenditures (see Table 1.2). These survey responses provide a useful perspective on the priorities of the PHAs. We assume that it would be those priorities, rather than any specific legislative guidelines that would determine how cuts would be made, since many local PHA funding decisions reflect the unique mix of local capital needs.

- Second (Section 3 and Section 4), existing literature and direct analysis of expenditure and other data were used to determine how these capital expenditure decreases would result in nine categories of negative impacts (See Table 1.3). Here, a cost-benefit analysis was conducted, with each negative impact estimated and compared against the cost savings from the funding cut.

Table 1.2 – Survey Expenditure Categories Potentially Reduced When Capital Funding is Cut[5]

Capital Expenditure Categories
A. Develop and finance new units
B. Demolition
C. Energy/green improvements
D. Modernize existing units
E. Deferred maintenance
F. Security
G. Management improvements
H. Resident self-sufficiency program
I. Homeownership

Source: Public and Affordable Housing Research Corporation (2012)

[5] These nine categories represented the choices offered to PHAs in a survey conducted by PAHRC in 2011 intended to better understand how PHAs would respond to cuts in capital funding. These choices were based on capital fund eligible uses outlined in the U.S. Housing Act and practical usage of PHAs.

Table 1.3 – Negative Impacts Potentially Occurring When Capital Funding is Cut

Negative Impacts That Occur as a Result of Cuts in Those Capital Expenditure Categories
1. Increased cost of housing
2. Decreased quality of housing
3. Increased social services expenditures
4. Exclusion from information technology resources
5. Reduced supply to employers of low wage earners
6. More crime
7. Increased blight on immediate neighborhood
8. Buildings less energy/cost efficient
9. More expensive repairs later

Source: Econsult Corporation (2012)

Section 4 covers each of these nine categories of negative impacts first by summarizing their estimated impact amount, and then by discussing the methodological approach undertaken to arrive at that estimate, stepping through the actual calculations, and discussing any additional considerations not accounted for in the estimate. Section 5 summarizes these negative impacts in the aggregate, and presents some high-level policy implications that emerge from them.

1.4 Study Limitations

This report focuses exclusively on cuts to funding for capital expenditures provided by Capital Fund Grants and not to funding for operating expenditures. The report is national in scope, although some localized effects are explored and some local examples are detailed. In the absence of directly available data for some PHAs, extrapolations were made based on PHA averages, as is further detailed in this report. Given the inconsistent nature of capital expenditure patterns and the many unknown drivers of setting capital expenditure levels, these extrapolations may be relatively inaccurate at a single PHA level, but are likely to be reasonably accurate when aggregated to a national level.

Generalizable data such as current financial structure and proposed cuts to each category were collected at local levels. These figures were used to aggregate national averages, which were then mapped onto the full population of PHAs. Thus, the calculated impacts are estimates arrived from a top-down approach (e.g. national averages extrapolated to the full inventory of PHAs), rather than precise amounts calculated from a bottom-up approach (e.g. specific amounts at a local level summed up to a national level). Nevertheless, they provide a sense of where and how cuts to capital funding result in negative impacts that offset the cost savings benefit of reducing funding, and in that sense inform current discussions about whether and how much federal funding for capital expenditures should be cut. Likewise in the absence of historical data, the survey data collected from PHA executives used to estimate possible cut impacts is assumed to be representative of actual cuts that would be made if such reductions came to fruition.

In general, care was taken to utilize extremely conservative assumptions where direct data were not available, and many categories of negative impacts were left unquantified, so results from the baseline conservative scenario should be considered low-end estimates. We also provide estimates using “middle of the road” assumptions that lead to significantly larger negative impacts.

Importantly, there is a significant difference in the negative impacts associated with a temporary capital funding cut and a permanent one. It was assumed, for the purposes of this report, that capital funding cuts could be temporary in nature (i.e. any reductions in funding amounts would be reversed in subsequent years). However, it is likely, in light of historical trends, that capital funding cuts would be permanent in nature if made (i.e. funding amounts would be reduced and would stay at those reduced levels or lower in subsequent years). Temporary funding cuts result in temporary disinvestment, while permanent funding cuts result in permanent disinvestment.

2.0 PHA CAPITAL FUNDING PRIORITIES: WHAT GETS CUT?

2.1 Survey of PHA Management

To better understand the likely impacts of capital funding cuts, PAHRC distributed a survey to each PHA receiving Capital Fund Grants from HUD. The survey asked PHA executive directors, chief financial officers, and other key decision-makers to describe the depth and mix of capital expenditure reductions they would implement should their capital funding be cut. The survey was distributed by email in three waves by PAHRC as well as the following industry groups: Council of Large Public Housing Authorities (CLPHA), National Association of Housing and Redevelopment Officials (NAHRO), and Public Housing Authority Director's Association (PHADA). Prior to receiving the survey via email link, a letter of announcement was sent by PAHRC to all PHAs. The survey then was completed online, with nearly one-third of PHAs responding in some way (809) and approximately 15 percent (487) providing robust survey data.[6] Survey respondents were representative of all PHAs in terms of number of units, region of the country, type of resident (family/elderly) and urban/rural location (see Tables A.2 and G.1). Their responses, in the aggregate, were used to create scenarios of the composition of capital expenditure cuts in response to funding cuts for all of the PHAs.[7] In the absence of historical data on reductions made by PHAs and their resulting impacts when capital funds were reduced, PHA directors' responses based on their own contingency plans are assumed to represent the actual reductions that would be made by PHAs.

[6] The 487 PHAs that responded to at least one survey encompassed the full gamut of PHAs (geographic location, urban vs. suburban vs. rural, number of units, and family/elderly), and represented about 15 percent of all PHA units within the US. Among the 20 largest PHAs, PHAs in the following cities completed a survey: Baltimore, Los Angeles, San Antonio, and Seattle.

[7] There were three waves of surveys distributed, each with different response rates to the survey questions that asked about the composition and scale of cuts in response to reduced HUD funding. Proportioning calculations were made in order to convert responses from different survey questions so that responses for a maximum number of PHAs could be directly obtained, rather than inferred through extrapolation.

There is significant variation in individual PHA responses to capital funding cuts, given the uniqueness of each PHA and its capital expenditure needs. However, the goal of this exercise is not to precisely predict any one PHA's response, but to provide a reasonable profile of the aggregate responses of all PHAs. Hence, this proportioning approach, combined with the direct knowledge derived from those PHAs that did respond to this survey, yields a suitable understanding of what PHAs will cut if faced with capital funding cuts. See Appendix B for additional detail on survey analysis methodology.

2.2 Capital Expenditure Categories

In order to assess what capital expenditure reductions would take place should capital funding be reduced, survey respondents were asked to prioritize their response to capital funding cuts into reductions in one or more of the following capital expenditure categories (see Table 2.1).[8] These categories were based on the categories of allowable capital expenditures found in the United States Housing Act (USHA) and expanded to include common 'in practice' capital expenditures of PHAs. Again, without historical data on PHA reductions during times of capital cuts, survey data based on PHA contingency plans must be used to estimate potential impacts. PHAs were asked to rank which expenditure categories would be cut first and also how much would be reduced in each category. PHAs not currently spending on any given category did not rank that category.

To determine historical capital expenditure patterns, capital expenditure data were requested from all PHAs receiving capital grants from HUD. To ease the complexity and time burden for PHAs of providing these data, HUD Form 50075.1, the "End of Year Performance and Evaluation Report" for each Capital Fund Grant for the years 2008 through 2010 was requested. This request also was made to HUD for all PHAs for the years 2000 through 2010 (see Figure 2.1). These data provide a useful understanding of capital funding in the aggregate as well as for individual PHAs. Due to the need to collect financial data in a pre-determined format, the accounting categories used on Form 50075.1 do not exactly correspond to the broader capital expenditure categories obtained from USHA. Categories on Form 50075.1 represent more

[8] PHAs may allocate capital funding to a finite number of capital expenditure categories. These categories were summarized by PAHRC into the nine categories listed in the survey. Not all PHAs spend on each of the nine categories delineated in the survey. PHAs did not have to rank or provide cut contingencies for each category of cut.

To simplify the resulting analytical exercise, the following decisions were made concerning these capital expenditure categories:

1. "Take Units Offline" was considered equivalent to "Demolition." Since it is less costly per unit to take a unit offline than to demolish it, maintaining their equivalency is a conservative assumption, because it results in an understatement in the cost of demolishing units and thus the number of units that are lost due to capital funding cuts. Therefore, making this assumption also understates the negative impact associated with such cuts.
2. "Offset Costs with Unobligated Funds" and "Other" were dropped, and any amounts assigned to it were reassigned proportionately to all other categories.
3. According to PAHRC, 80 percent of "Management Improvements" can be considered to represent investments in the PHAs and in their management and were therefore too diffuse in nature to assign to any specific negative impact category, while 20 percent of "Management Improvements" can be considered to represent investments in technology resources for PHA residents, and could therefore be discussed in terms of negative impacts associated with cutting those investments.

specific expenses that then were combined or extrapolated from to match the capital cut categories found in the survey for this analysis.[9]

Table 2.1 – Expenditure Categories Potentially Reduced When Capital Funding is Cut[10]

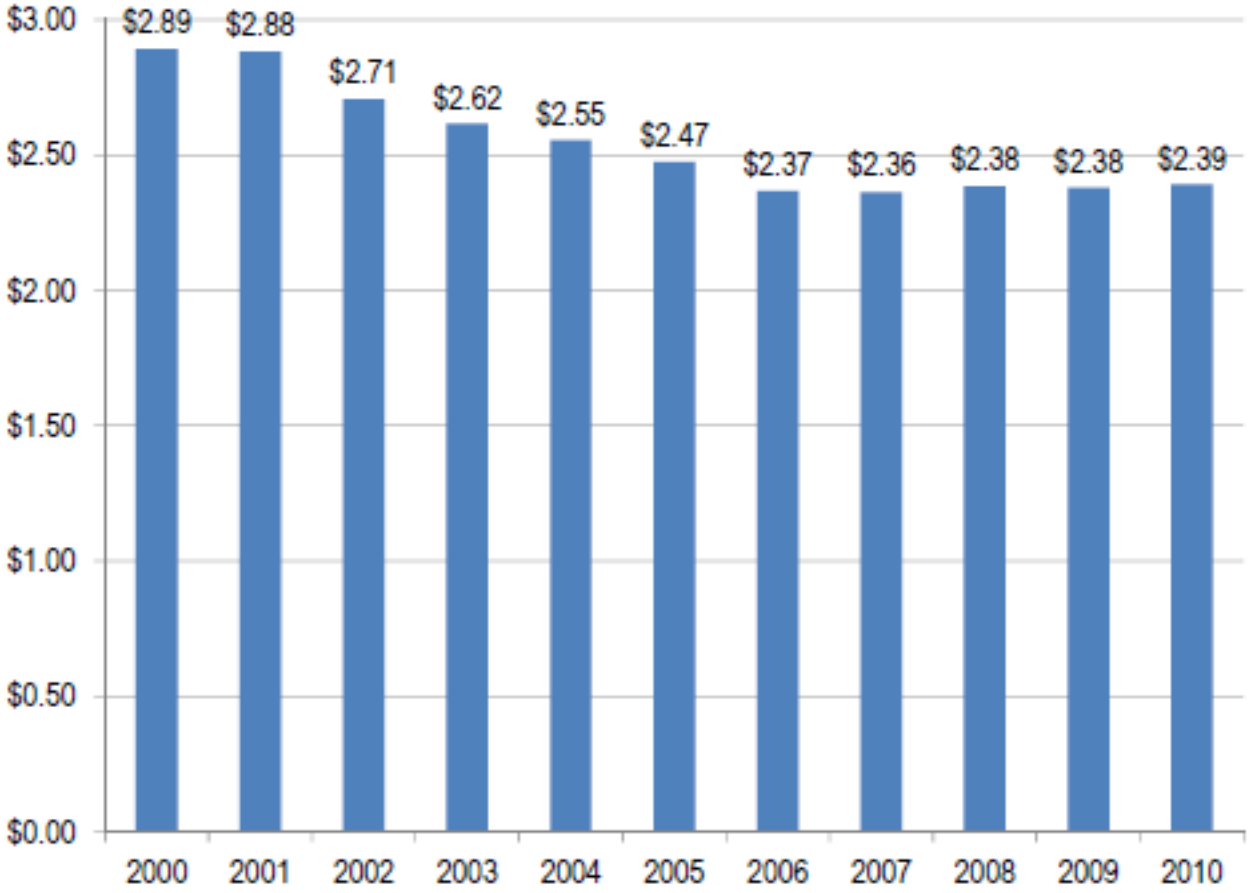
Category	Description
A. Develop and Finance New Units	Construction of new units
B. Demolition	Physical disposal of existing units
C. Energy/Green Improvements	Investments designed to improve the energy efficiency and sustainability of PHA facilities
D. Modernize Existing Units	Capital projects designed to upgrade existing units
E. Deferred Maintenance	Maintenance projects that have been deferred from previous years
F. Security	Security infrastructure projects designed to improve personal safety
G. Management Improvements	Technology infrastructure investments in PHAs, management training investments in PHA administration, and information technology resources for PHA residents
H. Resident Opportunity and Self-Sufficiency Program	Programs designed to increase the self-sufficiency of PHA residents by providing matching savings accounts and other financial resources
I. Homeownership	Programs designed to encourage homeownership of PHA residents, including costs associated with acquiring properties to be sold to PHA residents

Source: Public and Affordable Housing Research Corporation (2011), Econsult Corporation (2012)

[9] Not knowing an individual PHA's exact distribution of capital expenditures by category was not considered problematic, because past expenditure patterns do not necessarily provide direct information on future expenditure patterns at the PHA level of disaggregation. If, for example, a PHA that had historically spent an average of $1 million per year on a particular capital expenditure category in the past could respond in its survey that it would cut that particular category by $3 million in response to proposed cuts. In such a case, it is assumed that the PHA was planning to spend $3 million more in that category than its historical average is now choosing to spend $3 million less as a result of proposed cuts.

[10] These nine categories represented the choices offered to PHAs in a survey conducted by PAHRC in 2011 intended to better understand how PHAs would respond to cuts in capital funding. PHAs not expending in any given area did not rank or provide a cut estimate for that area.

Figure 2.1 – HUD Capital Fund Program Grant Funding to PHAs by Year (in Billions of Dollars)



Source: U.S. Department of Housing and Urban Development (2011), Econsult Corporation (2012)

2.3 Projected Distribution and Depth of Capital Expenditure Reductions

The projected distribution of capital expenditure reductions, based on the completed surveys of PHA executives, was then applied to financial data from all PHAs to determine the anticipated distribution and depth of capital expenditure reductions resulting from capital funding cuts.[11] Based on a 20 percent reduction in capital grant funding, the scale and distribution of expenditure reductions can be estimated (see Table 2.2).

Table 2.2 – Estimated Distribution of Capital Expenditure Cuts in One Year Given a Temporary One-Time 20 Percent Cut ($470 Million) in Capital Funding, Based on Survey of PHA Executives[12]

Cut Ranking	Survey Category	Estimated Percentage to be Cut	Estimated Dollar Value to be Cut (in Millions)	Percent of PHAs Indicating Category to be Cut[13]
1	Modernize existing units	54.6%	$256.2	86%
2	Deferred maintenance	16.1%	$75.7	75%
3	Energy/green improvements	7.0%	$33.1	70%
4	Develop and finance new units	6.2%	$29.1	43%
5	Security	4.7%	$22.2	42%
6	Resident self-sufficiency program	3.9%	$18.4	48%
7	Management improvements	3.6%	$17.1	73%
8	Demolition	2.4%	$11.5	26%
9	Homeownership	1.3%	$6.2	30%
	Total Capital Expenditure Cuts	100.0%[14]	$469.6	

Source: Individual PHAs (2011), Econsult Corporation (2012)

[11] As noted previously, because of the imprecise nature of extrapolations of survey results and historical capital expenditures, there may be variance at an individual PHA level, but it is assumed that the net effect of this variance is minimal at a national level.

[12] See Appendix B for additional detail on survey analysis methodology.

[13] That is, among those PHA survey respondents that ranked capital expenditure categories that would be cut in response to capital funding cuts. PHAs do not spend on all categories provided.

[14] Throughout this report, totals may not be exact sums of the numbers in question due to rounding.

A 20 percent cut level was chosen because it approximates the 17 percent cut experienced by PHAs between 2000 and 2010. The impacts of a cut amount smaller or larger than 20 percent can be roughly inferred from the estimates of the impacts resulting from a 20 percent cut, but are likely to deviate from those presented from a 20 percent funding cut. Inherently, the deeper the cut level, the more difficult cut decisions become: smaller cuts can be applied to more expendable categories, whereas larger cuts may necessitate cuts in relatively indispensable categories. It is reasonable to assume that categories generating the smallest net benefit to all stakeholders would be the most likely to be cut by the largest amounts, and that as more cuts are needed, categories that generate larger net benefits to all stakeholders would also have to be cut.

Survey questions which asked respondents their likely response to increasingly severe funding reductions (10 percent, 20 percent, 30 percent, and 40 percent) confirm that the higher cut levels would necessitate particularly difficult cuts. For example, several respondents reported that a 40 percent cut would necessitate a level of disinvestment in existing units so significant that over time the PHA would need to greatly reduce the number of units under management or shutter operations altogether.[15] Therefore, it is likely the negative impacts associated with a 10 percent cut would be less than half as much as those associated with a 20 percent cut, while the negative impacts associated with a 40 percent cut would be more than twice as much as those associated with a 20 percent cut.

[15] See Appendix C for a list of illustrative comments by survey respondents regarding their response to a 40 percent cut in capital funding.

2.4 Temporary Cuts vs. Permanent Cuts

As previously mentioned, this report considered both a temporary one-time 20 percent reduction in capital funding (in which funding levels are reduced for one year and then returned to previous levels thereafter), and a long-term, or permanent 20 percent reduction in capital funding (in which funding levels are reduced and not returned to previous levels thereafter). While results are estimated for both temporary and permanent cuts, greater emphasis is given to the analysis of the impacts of permanent cuts, since they are the more likely scenario.

The negative impacts associated with a permanent reduction in capital funding will be much larger than those associated with a one-time reduction. A permanent cut is clearly far more damaging than a temporary one, as it necessitates a response that eventually results in a commensurate reduction in the number of units under management.

History shows that funding cuts to the public housing program often remain permanent.[16] While capital funding fell by 17 percent from 2000 to 2010 (from $2.89 billion to $2.39 billion, or by $500 million), the number of PHA units was reduced by 10 percent (from $1.28 million to $1.16 million, or by 120,000 units) (see Table 2.3 and Figure 2.2). Significant permanent reductions in capital expenditures unavoidably result in reductions of public housing units; these reductions, and the negative impacts that ensue from them, are dramatically larger than those resulting from temporary cuts.

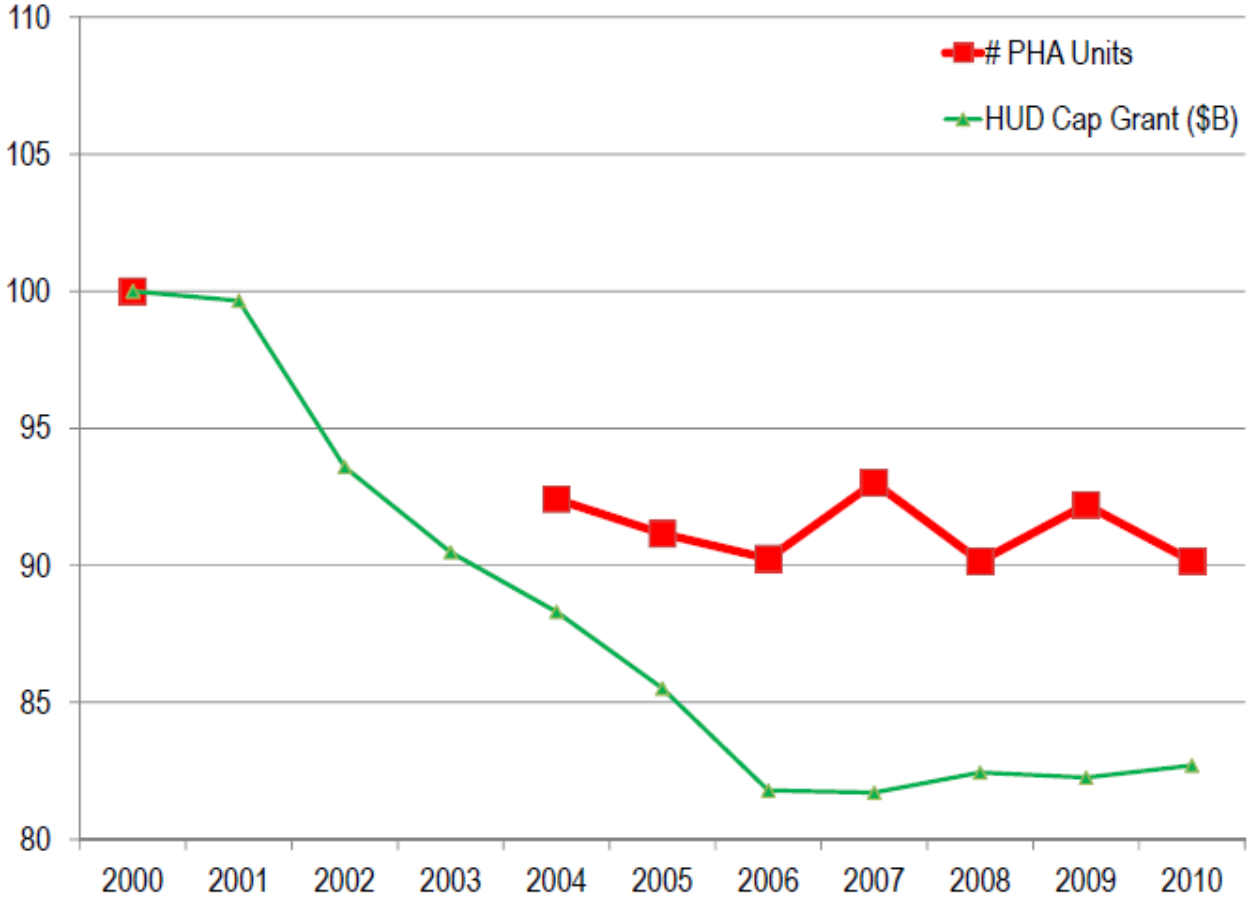
Table 2.3 – Number of PHA Units and HUD Capital Funding by Year

Year	# PHA Units	HUD Cap Grant ($B)	Year	# PHA Units	HUD Cap Grant ($B)
2000	1,281,608	$2.89	2006	1,156,577	$2.37
2001	N/A	$2.88	2007	1,192,148	$2.36
2002	N/A	$2.71	2008	1,155,377	$2.38
2003	N/A	$2.62	2009	1,181,726	$2.38
2004	1,184,367	$2.55	2010	1,155,455	$2.39
2005	1,168,250	$2.47	2000-2010 %Change	-10%	-17%

Source: U.S. Department of Housing and Urban Development (2011), Econsult Corporation (2012)

[16] See, for example, "Cuts in Federal Housing Assistance Are Undermining Community Plans to End Homelessness," Center on Budget and Policy Priorities (2007).

Figure 2.2 – HUD Capital Funding and Number of PHA Units by Year (Indexed: 2000 = 100)



Source: U.S. Department of Housing and Urban Development (2011), Econsult Corporation (2012)

3.0 MEASURING THE IMPACTS OF CAPITAL FUNDING CUTS: ANALYTICAL APPROACH

3.1 Methodological Framework

There are numerous impacts that result from cuts in capital funding to PHAs. They affect a wide range of stakeholders, from governments to communities to PHA residents. This section highlights the nature and ramifications of these impacts and offers a framework for estimating them.

The first step in a rigorous cost benefit analysis is to define the alternatives to be evaluated. The distribution of spending reductions described in Section 2 and the status quo are the alternatives being considered in this study. The next steps are to:

- Delineate the potential categories of impacts (Section 3.2)
- Determine who is affected by the expenditure reduction (Section 3.3)
- Estimate the magnitude of the impacts (Section 4)
- Monetize the impacts (Section 4)
- Discount the monetary value of impacts over time (Section 4)
- Calculate the net present value of the impacts (Section 4)
- Evaluate sensitivity and uncertainty (Section 4)
- Compare impacts with cost savings (Section 4 and Section 5)

To the greatest extent possible, this study follows these steps. A discount rate of 7 percent is employed, as it represents a commonly used discount rate in federal government net present value calculations. In reality, borrowing rates may be far lower, so utilizing so high a discount rate is conservative, as it yields upfront equivalent amounts that are lower than they would be had a lower discount rate been employed. Also, unless otherwise indicated, a 40-year time horizon is assumed, commensurate with a conservative estimate of the life of a PHA unit and also a time horizon standard used in federal government real estate calculations. In reality, PHA units may fully depreciate over a longer time horizon, thus extending the lifetime of the negative impact, but 40 years is used to be conservative.

3.2 Delineating Potential Impacts

Delineating the potential impacts of capital expenditure reductions is one of the core issues addressed in this report. In order to properly assess whether reductions in capital funding to PHAs are appropriate policy choices, one must examine the existence and scale of potential impacts.

Nine broad categories of negative impacts of the capital expenditures were identified (see Table 3.1). To estimate a negative impact amount for each category at a national level, a range of methodological approaches were employed, reflecting the best availability of data, literature, and statistical techniques. In some cases, results from relevant existing literature are used to extrapolate a national estimate, while in other cases direct analysis of available data was undertaken. The methodologies utilized to analyze each of these categories, and their resulting impact estimates are detailed in the following sections.

Table 3.1 – Negative Impacts Potentially Occurring When Capital Funding is Cut

1. Increased cost of housing (Section 4.2)
2. Decreased quality of housing (Section 4.2)
3. Increased cost of social services (Section 4.3)
4. Exclusion from information technology resources (Section 4.4)
5. Reduced supply to employers of low wage earners (Section 4.5)
6. More crime (Section 4.6)
7. Increased blight on immediate neighborhood (Section 4.7)
8. Buildings less energy/cost efficient (Section 4.8)
9. More expensive repairs later (Section 4.8)

Source: Econsult Corporation (2012)

3.3 Matrix of Incidence of Impacts

Capital expenditure reductions have impacts that affect all levels of government, PHAs, residential communities, businesses and public housing residents. Table 3.2 maps the intersection of expenditure reductions, resulting impacts, and affected parties. Each of the capital expenditure reduction categories is a column in the matrix, and each of these reductions results in one or more negative impacts, which are the rows in the matrix. Cells (i.e. row-column pairs) are populated with the parties affected by the reduction found in the column in the negative way described in the row.

Furthermore, cell contents are given in either upper case, to signify a primary effect, or else in lower case, to signify a secondary effect. Primary effects are discussed and calculated in further detail based on direct analysis of survey and financial data and/or extrapolation of impacts derived from other studies and secondary effects are more loosely discussed and are not included in quantitative estimates of overall national impact. For example, the first cell indicates primary cost-of-living effects of reduction of development and financing of new units on PHA residents, for which a negative impact estimate is calculated, and PHA applicants and secondary effects on governments and non-profits, which also likely represent significant negative impacts but which are discussed only qualitatively.

Table 3.2 – Matrix of Negative Impacts of Capital Expenditure Reductions and Affected Parties (UPPER CASE = primary effect, lower case = secondary effect)

Affected Parties: R = PHA residents A = PHA applicants PHA = public housing authorities G = federal, state, and/or local governments RC = residential communities near PHAs BC = business communities near PHAs NP = non-profit social service providers S = society as a whole	Develop and finance new units	Demolition	Energy/green improvements	Modernize existing units	Deferred maintenance	Security	Management improvements	Resident self-sufficiency program	Homeownership
Increased cost of housing	R A g np			R A g np					
Decreased quality of housing	R A g np	r	r	R A g np	r				
Increased social services expenditures	r a G NP							r g np	r g np
Exclusion from information technology resources							R BC		
Reduced supply to employers of low wage earners	bc								
More crime		r g rc				r g rc			
Increased blight on immediate neighborhood	G RC	G RC		G RC	G RC				
Buildings less energy/cost efficient	r pha s	r pha s	R PHA S	r pha s					
More expensive repairs later				pha	PHA				

Source: Econsult Corporation (2012)

4.0 MEASURING THE IMPACTS OF CAPITAL FUNDING CUTS: IMPACT ESTIMATES

4.1 Summary of Findings

Cutting capital grant funding to PHAs results in negative impacts in nine different categories, which are discussed in detail in the ensuing section. The aggregate estimate of negative impacts from a temporary one-time 20 percent cut ($470 million) range from to $214 million to $471 million, which is the equivalent of about 46 to 100 percent of the approximately $470 million that would be saved from such a cut (see Table 4.1). It is also estimated that the negative impacts from a permanent 20 percent cut (present value of $6.7 billion) range from $4.76 billion to $8.74 billion, which is the equivalent of about 71 to 130 percent of the approximately $6.7 billion that would be saved from such a cut (see Table 4.2).

Table 4.1 – Estimated Negative Impacts Resulting from a Temporary One-Time 20 Percent Cut ($470 Million) in Capital Funding to PHAs (Expressed in One-Time Upfront Terms by Discounting All Ongoing Impacts to the Present)

Negative Impact Category	Low-End Estimate	Middle Estimate
Increased cost of housing	$124M	$199M
Decreased quality of housing		
Increased social services expenditures	$10M	$140M
Exclusion from information technology resources	$8M	$40M
Reduced supply to employers of low wage earners		Not Estimated
More crime		Not Estimated
Increased blight on immediate neighborhood	$61M	$70M
Buildings less energy/cost efficient	$4M	$10M
More expensive repairs later	$6M	$13M
Total Negative Impacts	$214M	$471M
Negative Impacts as Percent of Total Cut Amount	45.6%	100.3%

Source: Econsult Corporation (2012)

Table 4.2 – Estimated Negative Impacts Resulting from a Permanent 20 Percent Cut (Present Value of $6.7 Billion) in Capital Funding to PHAs

Negative Impact Category	Low-End Estimate	Middle Estimate
Increased cost of housing	Rises to $360M per year, or $1.96B total	Rises to $590M per year, or $3.19B total
Decreased quality of housing		
Increased social services expenditures	Rises to $30M per year, or $163M total	Rises to $415M per year, or $2.25B total
Exclusion from information technology resources	$8M per year for three years, or $22M total	$40M per year for five years, or $174M total
Reduced supply to employers of low wage earners	Not Estimated	
More crime	Not Estimated	
Increased blight on immediate neighborhood	Rises to $2.8B in five years	Rises to $2.8B in one year
Buildings less energy/cost efficient	$5M per year, or $66M total	$10M per year, or $136M total
More expensive repairs later	$6M per year, or $90M total	$13M per year, or $185M total
Total Negative Impacts	$4.76B	$8.74B
Negative Impacts as Percent of Present Value of Total Cut Amount	70.9%	130.3%

Source: Econsult Corporation (2012)

In a number of cases, additional adverse impacts are discussed but not quantified. Therefore, the numerical results estimated here should be considered conservative estimates, as they do not attempt to assign a dollar value to all possible negative outcomes.

4.2 Increased Cost of Housing, Decreased Quality of Housing

4.2.1 Summary of Findings

PHAs represent a housing subsidy for individuals and families who cannot afford market rate housing. Reduced funding to public housing results in fewer new units built and modernized, reducing the stock of public housing. This results in fewer individuals and families being served. These households are negatively impacted in one of three ways: 1) they bear a higher cost for the same quality of housing, 2) they bear a reduced quality of housing for the same cost, or 3) they become homeless. The first two are discussed in this section (see Table 4.3), and the third is discussed in Section 4.3.

Table 4.3 – Capital Expenditure Cuts and Affected Parties Associated with Increased Cost of Housing and Decreased Quality of Housing Due to Reduced Total Units

Affected Parties: R = residents A = applicants PHA = public housing authorities G = federal, state, and/or local governments RC = residential communities near PHAs BC = business communities near PHAs NP = non-profit service providers S = society as a whole	Develop and finance new units	Demolition	Energy/green improvements	Modernize existing units	Deferred maintenance	Security	Management improvements	Resident self-sufficiency program	Homeownership
1) Increased cost of housing	R A g np			R A g np					
2) Decreased quality of housing	R A g np	r	r	R A g np	r				

Source: Econsult Corporation (2012)

It is conservatively estimated that a 20 percent permanent cut ($470 million per year) in capital funding to PHAs will result in 126,000 to 231,000 fewer units, and that the aggregate negative impact of the higher cost of living, or decreased quality of housing, borne by those affected individuals and families ranges from about $1.96 billion to $3.19 billion (see Table 4.4).

Table 4.4 – Estimated Negative Impacts Associated with Increased Cost of Housing and Decreased Quality of Housing Due to Reduced Total Units Resulting from a 20 Percent Cut ($470 Million) in Capital Funding

Main Affected Group(s)	Residents, Applicants
Estimated Capital Expenditure Reduction in Developing and Financing New Units and in Modernizing and Rehabilitating Existing Units	$285M
Units Estimated to Be Lost as a Result of a Temporary Cut	3,200 to 5,900
Estimated Annual Impact from 90% of Households Who Will bear Higher Cost of Housing or Lower Quality of Housing	$9M to $15M
Present Value of Negative Impact from Temporary Funding Cut (40-Year Horizon)	$124M to $199M
Units Estimated to Be Lost as a Result of a Permanent Cut	126,000 to 231,000
Estimated Annual Impact from 90% of Households Who Will bear Higher Cost of Housing or Lower Quality of Housing	Rises to $360M to $590M per year within 40 years
Present Value of Negative Impact from Permanent Funding Cut (40-Year Horizon)	$1.96B to $3.19B
Other Considerations Not Included in Above Estimate	Every $10/month in decline in housing quality from deterioration of existing units is equivalent to an additional $140 million in aggregate negative impact to PHA residents

Source: Econsult Corporation (2012)

4.2.2 Methodological Approach

PHAs provide affordable housing for individuals and families who cannot afford market rate housing. Public housing residents directly benefit from the availability of adequate housing for a rental price that is far lower than what the same quantity and quality of housing would cost in the marketplace.

At any point in time, 2.2 million individuals and families benefit from housing provided by PHAs, and many additional families are applicants on waiting lists for public housing. The number and quality of public housing units that are available to low income households are directly

related to the level of funding for PHAs. Although housing is durable, it depreciates over time and must be renovated or replaced in time, which requires investment capital. In the long run, the size of the public housing stock is related to the size of public housing funding: it is no accident that as public housing capital expenditures declined (by 17 percent decline from 2000 to 2010), public housing units also declined (by 10 percent during the same period).

If capital expenditure reductions resulting from capital funding cuts lead to new units not being developed or older units being taken off line, then some individuals and families who would have otherwise had access to public housing will no longer have access to public housing[17]:

1. Reductions in the stock of public housing mean that some existing PHA residents would cease to have access to public housing.

2. Some individuals and families who are applicants on waiting lists to move into public housing would have had a new unit to move into, but now do not, and so will continue to be without public housing.

3. Reductions in the stock of public housing would lower the federal government's future operating subsidies.

Thus, reductions in the number of public housing units will result in additional costs for PHA residents, and in some cases, increases in costs for states and local governments. These costs must be weighed against the capital funding reduction and the reduction in required future operating subsidies.

There are three possibilities for households who will no longer have access to public housing due to reduced availability from funding cuts. The first of these two possibilities is discussed in this sub-section, the last is discussed in the next sub-section:

1. Some households will choose to pay the market rate to maintain their current quantity and quality of housing. This represents an increase in their cost of living, because they are now paying higher monthly rent than they were before for the same quantity and quality of housing than they had before. A loss of housing support may also lead to increased costs for related budget items such as healthcare and childcare. From a cost-benefit point of view, this is a transfer from public housing residents to the federal

[17] Currently the federal government has tenant protection measures in place, should a PHA experience a loss of units. As a result, in reality these savings from fewer units may be shifted to increased cost for the voucher program or they may not be realized as tenants are relocated to other housing authorities. This assumption is a conservative one that may understate net costs.

government, and the federal savings will be partially offset by the amount of the increase in resident's cost.[18]

2. Some households will choose to maintain their current monthly rent level for housing that can be obtained at that rent level (if they are currently PHA residents; if they are applicants, they will pay the market rate for housing that is equivalent to the monthly rent level of housing they would have paid within a PHA), and will have to settle for diminished quantity and/or quality of housing. This represents a decrease in their quality of life, because they are now paying the same monthly rent that they were before for a lower quantity and/or quality of housing than they had before. The federal savings will be partially offset by the amount of the reduction in quality of life of those who would reside in PHA housing but for the reduction in federal expenditure.

3. Some individuals and families will become homeless, and live in homeless shelters or on the street. While they are reducing their cost of living (if in fact they were paying for rent before), they are also significantly reducing their quality of life, future earnings ability, and personal health. The federal savings will be partially offset by the amount of the reduction in quality of life of the newly homeless who would reside in PHA housing but for the reduction in federal expenditure. Homelessness also results in increased costs for the governments and non-profit organizations that bear the responsibility for providing homeless shelters and attendant resources and services. From a societal perspective, those expenditures will partially offset federal savings.

In simple terms, the provision of public housing enables some individuals and families to receive higher quality housing for a rental price that is far lower than what that quantity and quality of housing would cost in the marketplace. For example, renovations of common spaces in an Akron, Ohio public housing facility allowed homebound disabled residents, their families, and community members to enjoy a variety of activities together that would not have been available in a complex with smaller, lower quality public spaces.[19] Capital expenditure reductions that result in a reduction in public housing units, and thus a reduction in the number of PHA residents and applicants that have access to that benefit, therefore lead some individuals and families to have to pay more for the same level of housing (Increased Cost of Housing), some to pay the same for a lower level of housing (Decreased Quality of Housing), and some to become homeless (Increased Cost of Social Services).

For the proportion of individuals and families that do not become homeless. The negative impact is similar: it is the difference between the rent level within a PHA and the market rent

[18]Because federal capital expenditures are funded through taxes which may reduce economic efficiency, there may be some additional benefits from expenditure reductions. Those benefits are not considered in this report.

[19] In Akron, Ohio, capital funds of $276,000 supported the construction of a community building and outdoor patio for the disabled residents of Dorothy Jackson Terrace. Functions are now held at this center, which allow residents and their families to interact with others outside of their particular units.

level for housing of that quantity and quality. If, for example, a family of four pays $300 per month for public housing that is valued in the marketplace at $1,000, and that family subsequently no longer has access to public housing, they can either pay $1,000 for housing of the same quantity and quality (and therefore pay $700 per month more than they used to) or they can pay $300 for housing that is worth $300 in quantity and quality (and therefore receive $700 per month less in housing quantity and quality) (see Figure 4.1).[20]

In fact, there is literature to suggest that low-income families do value housing in this way. A study by Van Ommermen and Koopman[21] found that low-income families valued improvements to their housing at the cost of providing the improvements: each dollar in improvements was worth a dollar in housing quality to the residents. One can infer from this study that the correlation runs in the opposite direction as well: each dollar in reduced housing cost is valued at exactly that lower value, and so a family that used to live in $1,000 per month housing that then moves to $300 per month housing has suffered a decline in their quality of life that they would value at $700 per month.

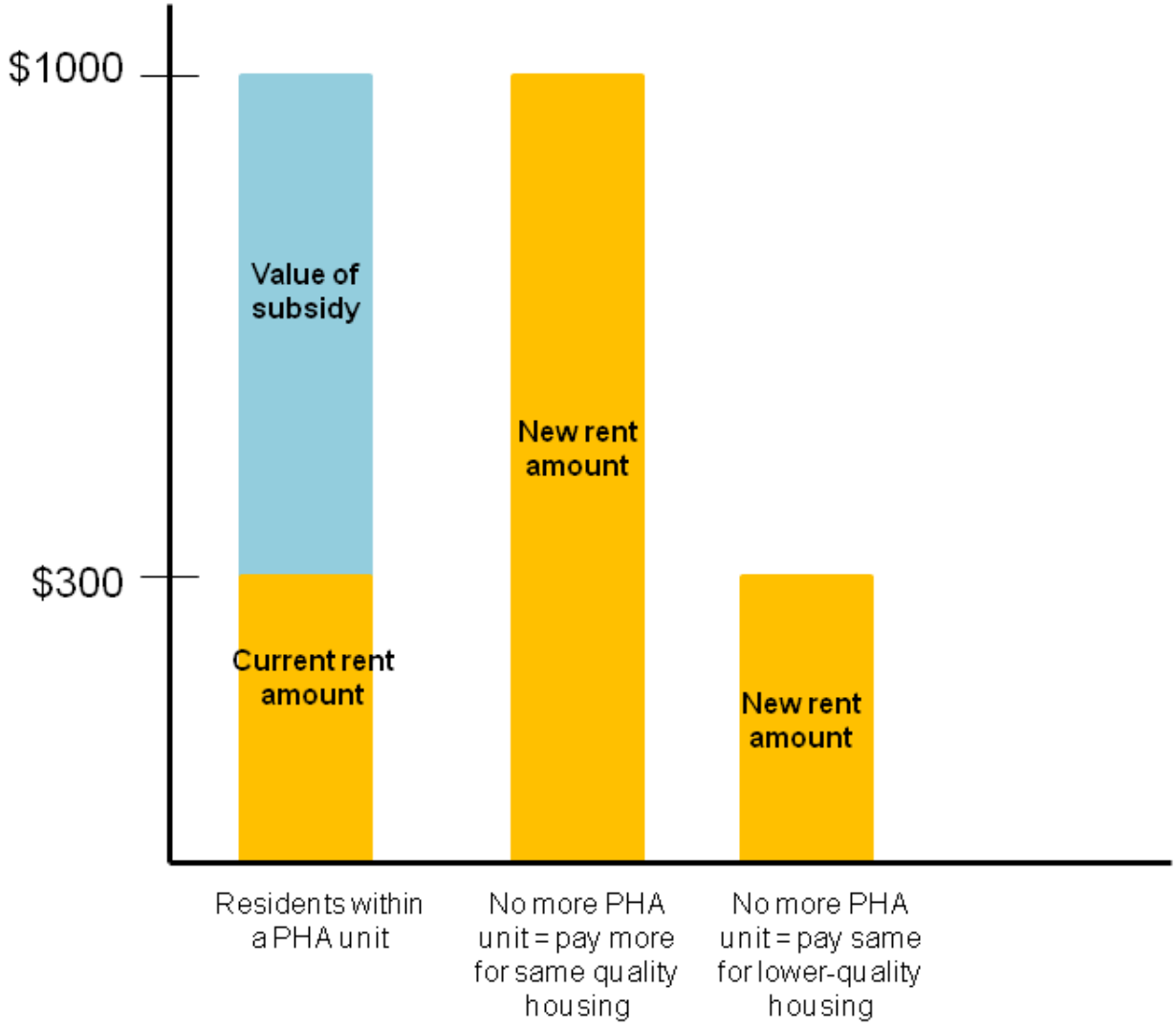
There is another aspect to the issue of residents' diminished residents' benefits. Reductions in maintenance expenditures will invariably lower the quality of public housing units, and reduce the value of those units to all tenants. In other words, a $1,000 per month unit may now only provide $900 per month or less in housing quality if it is allowed to deteriorate due to disinvestment. We do not attempt to quantify this impact, but since it potentially affects all public housing residents, the impact could be large: every $10 per unit per month in reduced quality results in about $140 million in housing quality lost per year.[22]

[20] There may be additional cost-of-living increases associated with capital expenditure reductions. PHAs are not allowed to increase monthly rents for any other reason than residents earning higher incomes (and therefore paying 30 percent of their income now means paying more). Therefore, should PHAs experience funding cuts in capital expenditure categories, they may respond by increasing monthly rents in this way to help recoup those losses. This amount is likely to be small and is not included in these negative impact estimates, but it warrants mentioning.

[21] "Public Housing and the Value of Apartment Quality to Households", Tinberg Institute (August 2010).

[22] 1.16 million PHA units x $10 per month in decline in housing quality x 12 months per year = $140 million per year in aggregate reduced housing quality.

Figure 4.1 – Illustration of Higher Cost of Housing or Reduced Quality of Housing Due to Reduced Total Units



Source: Econsult Corporation (2012)

4.2.3 Estimated Negative Impacts

In order to determine the aggregate negative impact resulting from the Increased Cost of Housing or the Decreased Quality of Housing arising from a reduction in the number of housing units, four estimates must be made; each of these components of the estimate is discussed in turn below:

1. First, one must estimate the reduction in public housing stock resulting from the capital funding reduction. This estimate has two components:

a) The number of new units not added as a result of capital expenditure reductions (i.e. money previously allocated to build new units no longer being available for this purpose); and

b) The reduction in the size of the stock resulting from less investment in rehabilitation and modernization (i.e. disinvestment in maintenance of existing units leading to some of those units no longer being available).[23]

2. Second, one must estimate the future savings in operating subsidies resulting from the smaller capital stock.

3. Third, one must determine the proportion of individuals that choose to increase their monthly rent levels, decrease their housing quantity or quality, or become homeless.

4. Fourth, one must determine the gap between current monthly rental levels within PHAs and the value of that quantity and quality of housing in the market.

The number of new units that would not be constructed can be estimated using publicly available local estimates of construction costs per square foot (roughly $300 per square foot) and data on average unit size by PHA. Given survey results citing expenditure reductions in new construction and using the construction costs in the area, these figures were translated to reductions of the number of new units that are not added as a result of those cuts.[24] Because only 6.2 percent, or $29.1 million, of the capital expenditure reductions are projected to be from the construction of new units, a one-time 20 percent decrease in capital funding is expected to reduce the number of new dwellings by 91 units. This amount is no doubt a conservative estimate, as currently the construction of new units is linked to additional revenues from Low Income Housing Tax Credits and rents from market rate units often included in mixed finance development.

The number of units that drop from the housing stock because of reduced modernization expenditures is much larger. To estimate this, it is first assumed that the current capital

[23] Modernization and rehabilitation of existing units ensures their compliance with building standards, and is often done by improving insulation, boiler systems, lighting, heating, and remodeling of kitchens and bathrooms as appliance technology advances. These expenditures are necessary to keep units functioning and up-to-date; conversely, disinvestment eventually results in units becoming unlivable.

[24] Data on average unit size by PHA was provided by HUD. Data on construction costs per square foot was obtained from RS Means; estimates for each PHA were based on the zip code in which they were located. Construction cost per square foot was multiplied by the average square footage of a unit in each PHA. This represents that cost of constructing one new unit. The extrapolated total of cuts to developing new units was divided by this cost, resulting in a total number of new units that would not be constructed. By using construction cost averages for new market-rate units, it is possible that the per-unit costs are overstated, but this is intentional, so as to intentionally understate the number of units that would not be built if capital funding were cut.

expenditures are large enough to maintain the current stock. This is a very conservative assumption, since it is estimated that PHAs currently have an aggregate $20 billion to $30 billion in deferred maintenance projects,[25] suggesting that a significant number of PHA units are on the brink of becoming unlivable absent capital investment. Therefore, a reduction in rehabilitation expenditures would result only in a proportionate reduction in the stock of units, rather than a larger reduction. Assuming a 40-year life for PHA units, this means that roughly 29,000 units must be replaced or modernized each year to maintain the 1.16 million units of public housing.

To be more conservative yet, we will model an even smaller loss in PHA units. Based on our survey, a 20 percent reduction in capital expenditures results in a reduction in modernization and rehabilitation expenditures of $256 million, or about an 11 percent reduction in the total capital budget.[26] Given that the current stock of units is about 1.16 million, this means that 3,152 units would be lost to depreciation each year. Added to this figure are the 91 new units that are not constructed, for a total 3,243-unit decline in the overall stock of public housing units resulting from an 11 percent reduction in capital funding. Alternatively, should there be a one-for-one correlation between capital funding cuts and PHA unit decline, the decline in units would be 5,868.

However, reducing the size of the public housing stock also reduces the government's future liability for operating subsidies (if operating funds are not cut in tandem with capital funds), so there is some cost savings associated with having a smaller number of units to maintain. Based on PHA-level data, operating subsidies per unit average $4,211 annually, which represents the per-unit amount that would be saved with fewer units.[27]

While the number of housing units would diminish by over 3,000, not all potential PHA residents would enter the housing market. It is conservatively assumed that 90 percent of individuals who no longer have a PHA unit will choose to either increase their monthly rent levels or decrease their housing quantity or quality, while 10 to 20 percent of individuals will become homeless. As a point of reference, the proportion of PHA residents who earn less than $10,000 per year, and who are therefore most vulnerable to becoming homeless should PHA units no longer be available, ranges from 33 percent to 68 percent in some of the largest cities

[25] "Joint Statement from Housing Groups on Public Housing Funding in the FY11 Budget.", Council of Large Public Housing Authorities (CLPHA), National Association of Housing and Redevelopment Officials (NAHRO), the National Low Income Housing Coalition (NLIHC), and the Public Housing Authorities Directors Association (PHADA) (April 8, 2011).

[26] In other words, instead of only modeling a 20 percent capital funding cut, which would result in a commensurate decrease in the number of PHA units, an 11 percent capital funding cut is also modeled, representing the amount of capital funding that is estimated to be cut specifically in the category of modernization and rehabilitation expenditures.

[27] Based on HUD's 2011 Financial Report.

in the US, suggesting that there could be a much higher incidence of homelessness resulting from a reduction in the number of PHA units (see Table 4.5).

Table 4.5 – Distribution of Public Housing Resident Household Income for Selected U.S. Cities

City	0%	$1-$5,000	$5,001-$10,000	$0-$10,000
Dallas	2%	23%	43%	68%
Jacksonville	6%	21%	39%	66%
Houston	3%	21%	40%	64%
Phoenix	4%	20%	36%	60%
Chicago	6%	14%	36%	56%
Philadelphia	2%	9%	35%	46%
Washington, DC	2%	9%	30%	41%
San Francisco	2%	7%	30%	39%
Los Angeles	1%	9%	24%	34%
New York City	0%	3%	30%	33%

Source: U.S. Department of Housing and Urban Development (2012), Econsult Corporation (2012)

Reducing the stock of public housing results in greater costs for public housing residents either from higher rental payments or through living in inferior housing. These costs can be estimated by first finding, at the county level, the median income for all residents of a given PHA. From this figure an estimated monthly rental level within a PHA can be derived, by assuming that PHA residents pay 30 percent of their income on monthly rent, which is a standard often used by HUD. Second, the median two-bedroom fair market rent (FMR) for each county is available from HUD. This figure can be seen as the typical value of housing available to a low-income individual and family.

The gap between rents paid by PHA residents and FMR is an estimate of the increased cost that PHA residents who no longer have access to public housing would endure. What that gap represents, for any and all regions, is the increase in cost of living if an individual or family in that county chooses to pay more for the same quantity and quality of housing, or alternatively the decrease in quality of life if an individual or family chooses to pay the same for a reduced quantity and quality of housing.

To calculate the increased costs for residents of reducing the number of public housing units, we use the gaps between PHA rents and FMR which are estimated at the county level. The average gap between the PHA and FMR rent is $7,391 per year. The gap amount for each PHA is multiplied by the estimated decline in units at that PHA as a result of the capital expenditure reduction. We then take 80 to 90 percent of this value to exclude the 10 to 20 percent of the residents who do not enter the normal housing market; this figure is the aggregate negative impact to residents and applicants from the sum of the Increased Cost of Housing to those individuals and families now paying more, and the Decreased Quality of Housing to those individuals and families now living in less valuable housing. This method results in a conservative estimate as many public housing residents are elderly or disabled and would need to seek housing in a supportive living facility, which are often much more expensive than standard housing arrangements valued here at the FMR. This figure amounts to an estimated $21.6 million to $34.7 million per year in negative impacts (see Table 4.6).

Table 4.6 – Estimate of Negative Impacts Resulting from Increased Cost of Housing and Decreased Quality of Housing Due to Reduced Total Units Resulting from a Temporary One-Time Cut ($470 Million) in Capital Funding

Capital Expenditure Reduction Type	Estimated Capital Expenditure Reduction	Reduction in Units (# Residents/Applicants Estimated to be Affected)	% Affected Households Who Will Pay More for Housing or Move to Lower-Value Housing[28]	Average Gap Between Annual Rent and Value of Housing[29]	Aggregate Negative Impact on Residents
(assuming low-end conservative estimate)					
Build New Units	$29M	91	90%	$7,391	$0.6M
Modernize	$256M	3,152	90%	$7,391	$21.0M
Total	$285M	3,243	90%	$7,391	$21.6M
(assuming middle-of-the-road estimate)					
Build New Units	$29M	91	80%	$7,391	$0.6M
Modernize	$256M	5,777	80%	$7,391	$34.1M
Total	$285M	5,868	90%	$7,391	$34.7M

Source: Econsult Corporation (2012)

[28] That is, those who will not respond to the loss of a housing unit by becoming homeless.

[29] While the average gap is displayed here for purposes of this calculation the actual gap for each PHA, based on the metropolitan region of which it is a part, was used.

These negative impacts are partially offset by a reduction in federal operating subsidies of $4,211 per unit annually, or $12.3 million. The net annual impact of losses associated with reducing the number of public housing units on resident cost of living less operating savings is therefore $9.3 million per year that the cut is in place. This means that over a 40-year time frame, the net present value is about $124 million to $199 million (see Table 4.7). This is about 43 to 70 percent of the $285 million reduction in expenditures on new units and rehabilitation.

Table 4.7 – Estimate of Net Impacts Resulting from Increased Cost of Housing and Decreased Quality of Housing Due to Reduced Total Units, Including Savings from Reduced Federal Subsidy Requirements, Resulting from a Temporary One-Time Cut ($470 Million) in Capital Funding

Reduction in Units (# Households Estimated to be Affected)	Estimated Annual Negative Impact on Residents	Estimated Annual Savings from Reduced Subsidy	Estimated Annual Net Negative Impact	Present Value of Negative Impact over 40-Year Horizon
(assuming low-end conservative estimate)				
3,243	$21.6M	$12.3M	$9.3M	$124M
(assuming middle-of-the-road estimate)				
5,868	$34.7M	$19.8M	$14.9M	$199M

Source: Econsult Corporation (2012)

4.2.4 Additional Considerations

Negative impacts may be borne by more than just residents and applicants. Low-income individuals and families who must now pay higher monthly rents may reduce or eliminate expenditures in other categories, such as food or health care, resulting in diminished health outcomes, which then creates additional burden on governments and non-profit social service providers. Similarly, low-income individuals and families who must now move to lower-rent housing may experience reduced health outcomes and overall well-being, if the lower-rent

housing is in more dangerous neighborhoods or is unsanitary. To be conservative, these negative impacts are not included in the low-end estimates of negative impacts.[30]

There may be additional cost of living increases and decreases in quality of life resulting from other reduced modernization capital expenditures. Less efficient buildings may cost more to operate, and to the extent that residents bear some or all of the utility costs, their monthly expenditure may go up if PHAs under-invest in capital improvements and ongoing maintenance. These consequences are addressed later in this section. Facilities with reduced investment may also result in diminished housing quality, lowering quality of life for residents. These consequences are also addressed later in this section.

It is possible that, should the 20 percent cut in capital funding turn into a permanent reduction in capital funding, the reduction in the overall stock of public housing will be significantly larger than the 3,243 lost units as estimated above. Assuming a 40-year replacement cycle, about 29,000 of the 1.16 million PHA units in the US would need to be replaced each year. Many public housing buildings have experienced a shorter lifespan, which if characteristic of the public housing portfolio would increase this estimate. Permanently reducing funding to build and modernize units will eventually lead to significant decreases in the number of units operated by PHAs.

Specifically, a permanent 20 percent cut in capital funding would, in the absence of dramatic efficiency improvements, require a commensurate reduction in the number of units. This correlation was seen in the related declines in capital funding (minus 17 percent) and in the number of units (minus 10 percent) between 2000 and 2010. A permanent 20 percent capital funding cut is therefore likely to eventually result in a commensurate reduction in the number of units operated by PHAs.

If we assume, based on our survey, that rehabilitation expenditures would constitute only a little more than half of the capital cuts (i.e. 11 percent instead of 20 percent), the reduction in

[30] For example, Wood and Mills found that housing assistance increased per capita food expenditures and that the financial assistance enabled purchases of clothing and school supplies, which reduced stress for and helped the emotional well-being of children: "Housing Affordability and Family Well Being: Results from the Housing Voucher Evaluation," Housing Policy Debate (2008). Fertig and Reingold established a strong connection between public housing and positive health outcomes, citing additional resources to spend on food and health care, higher quality of housing made available and more accessible health care resources: "Public Housing and Health: Is There a Connection?" National Bureau of Economic Research (March 28, 2006). Also, Currie and Yelowitz found that low-income children who do not live in public housing are more likely to live in overcrowded settings and suffer negative health outcomes as a result: "Are Public Housing Projects Good for Kids?" National Bureau of Economic Research (December 1997).

Finally, in reporting on plans in 2005 by Boston Housing Authority (BHA) to require up to $200 more per month from tenants as a result of reduced federal funding, the Boston Globe cited a current PHA resident for whom even a $40 per month increase would mean reduced spending on food, medicine, bills, and/or transportation: "BHA Plans Cuts in Rent Subsidies," Boston Globe (June 30, 2005).

new total units would eventually be 126,000. Assuming a reduction in units commensurate with capital funding, that would represent the eventual loss of 231,000 units. This is a reduction that is 40 times larger than that modeled above, and would therefore yield an annual negative impact on PHA residents (net of government savings on operating subsidies) that would rise over time to about $360 million to $588 million per year after 40 years, or the equivalent of $1.96 billion to $3.19 billion in present value terms (see Table 4.8).[31]

Table 4.8 – Estimate of Net Impacts Resulting from Increased Cost of Housing and Decreased Quality of Housing Due to Reduced Total Units, Including Savings from Reduced Federal Subsidy Requirements Resulting from a Permanent Cut (Present Value of $6.7 Billion) in Capital Funding

Reduction in Units (# Households Estimated to be Affected)	Estimated Annual Net Negative Impact	Present Value of Negative Impact over 40-Year Horizon
(assuming low-end conservative estimate)		
126,076	$361M	$1.96B
(assuming middle-of-the-road estimate)		
231,091	$588M	$3.19B

Source: Econsult Corporation (2012)

One can also make a case there is a multiplier effect, at a local level, to the disinvestment in building new units and rehabilitating existing units. When PHAs build new units and modernize existing units, they put people to work, who then spend some of their earnings within the local economies of the construction sites, and they buy supplies, causing vendors to ramp up production to meet the new demand. These spillover impacts, known respectively as the "induced effect" and the "indirect effect," can be estimated using standard input-output

[31] This estimate of the present value of negative impacts resulting from permanent funding cuts takes into account the fact that negative impacts take time to reach the estimated figure. This is because units lost through disinvestment are lost over time and not all at once.

Specifically, the negative impact of permanent funding cuts on increased cost of housing and decreased quality of housing rises to $360 million over a 40-year period. So to calculate the present value of that magnitude of negative impacts, it was assumed that 1/40th of that amount took place in Year 1, 2/40th in Year 2, 3/40th in Year 3, and so on, and those negative impacts were discounted to the present at a discount rate of 7 percent.

modeling techniques. Hence, a $5 million construction project will likely result in more than $5 million of economic impact within the local economy in which the project site is located, with attendant increase in employment and tax revenue generation. Conversely, the loss of a $5 million construction project will likely result in more than $5 million in economic impact lost, with attendant loss in jobs supported and tax revenues generated. To be conservative, these spillover effects are not accounted for in this analysis.

4.3 Impact Category: Higher Costs Associated with Increased Homelessness and Social Service Program Cuts

4.3.1 Summary of Findings

While some PHA residents will be negatively affected by a reduction in the number of available units by having to bear a higher cost for the same quality of housing or a lower quality of housing for the same cost, some will be negatively affected by becoming homeless. In addition to the negative effects of homelessness on these former PHA residents, this outcome also results in higher social service costs associated with the provision of homeless shelters (see Table 4.9).

Table 4.9 – Capital Expenditure Cuts and Affected Parties Associated with Increased Homelessness and Other Social Service Program Cuts Due to Reduced Total Units

Affected Parties: R = residents A = applicants PHA = public housing authorities G = federal, state, and/or local governments RC = residential communities near PHAs BC = business communities near PHAs NP = non-profit service providers S = society as a whole	Develop and finance new units	Demolition	Energy/green improvements	Modernize existing units	Deferred maintenance	Security	Management improvements	Resident self-sufficiency program	Homeownership
3) Increased social services expenditures	r a G NP							r g np	r g np

Source: Econsult Corporation (2012)

It is conservatively assumed that 10 to 20 percent of the individuals and families affected by the reduction in PHA units will become homeless. Assigning a conservative estimate of the cost of providing homeless shelter space for these affected individuals and families yields an aggregate negative impact ranging from $1 million to $11 million per year, or from about $10 million to $140 million as expressed as a one-time upfront impact (see Table 4.10). Actual impacts may

be far greater, as chronic homelessness often results in far higher per-person social service costs than what was used in this report.

Table 4.10 – Estimated Net Impacts Resulting from Increased Homelessness Due to Reduced Total Units Resulting from a 20 Percent Cut ($470 Million) in Capital Funding

Main Affected Group(s)	Governments, Non-Profits
Estimated Capital Expenditure Reduction in Developing and Financing New Units and in Modernizing and Rehabilitating Existing Units	$285M
Units Estimated to Be Lost as a Result of a Temporary Cut	3,200 to 5,900
Estimated Annual Impact from 10% of Households Who Will Become Homeless	$1M to $11M
Present Value of Negative Impact (40-Year Horizon)	$10M to $140M
Units Estimated to Be Lost as a Result of a Permanent Cut	126,000 to 231,000
Estimated Annual Impact from 10% of Households Who Will Become Homeless	Rises to $30M-$415M per year within 40 years
Estimated Effect of a Permanent Funding Cut	$163M to $2.25B
Other Considerations Not Included in Above Estimate	These households suffer significant decline in housing quality and possibly declines in health care and education outcomes; other households who do not become homeless may still require temporary shelters en route to more permanent housing, further increasing costs to society

Source: Econsult Corporation (2012)

4.3.2 Methodological Approach

Some of the current PHA residents and applicants who no longer have access to public housing as a result of capital funding cuts will be forced to become homeless. Homelessness generates a significant decrease in quality of life and exacts high costs on government and non-profit social service providers for homeless shelters and other social services such as health care, child

care, and workforce training. Therefore, a reduction in subsidized housing creates a cost where these benefits once existed.

In addition to preventing homelessness, subsidized housing offers other social benefits to the individuals and families who live there. In general PHAs are sources of social services for their residents, therefore any reductions in the number of residents that are served are likely to lead to an increase in the need for social services for those residents outside of the confines of the PHAs. These social services may include child care, elderly care, and health care, either provided by the PHAs themselves or made more available through geographic proximity or programmatic arrangement. To be conservative, no negative impacts are assigned to these social services.[32]

Also conservatively excluded are any negative impacts resulting from cuts in expenditures for resident self-sufficiency programs and homeownership programs. There is general consensus that these programs benefit PHA residents and that they have some positive return to society: resident self-sufficiency programs provide matching funds for PHA residents willing to commit to regularly contributing to personal savings accounts, thus allowing them to accelerate wealth creation and reduce their dependency on financial aid, while homeownership programs provide counseling and other resources to transition PHA residents from being recipients of subsidized housing to being able to afford and manage their own housing. In both cases, the goal is for participants to become independent, better off than before and benefit society by no longer requiring public subsidy. However, insufficient relevant research quantifying these gains to residents and to the governments and non-profit organizations that serve them is such that it is conservatively assumed that there are no negative impacts from cuts in these areas.

4.3.3 Estimating Negative Impacts

The one area in which negative impacts, in the form of increased social service costs for newly homeless people, are quantified is the increased number of individuals and families served in homeless shelters rather than in public housing. As noted above, it is assumed that 10 to 20 percent of the individuals and families who will no longer have access to public housing will become homeless as a result of capital funding cuts. This yields an estimated 324 to 1,174 households that will become homeless in response to a 20 percent cut in capital expenditure totaling $470 million.

[32] There is a vast body of literature that discusses the role of PHAs in decreasing the need for social services and therefore the cost of social services upon governments and non-profit social service providers. These points are not directly relevant to this report, because this report is not comparing the existence of PHAs with the non-existence of PHAs, but rather the difference between PHAs as they are now and PHAs as they will be in response to capital funding cuts.

Some of the 80 to 90 percent of the individuals and families who do not become homeless (i.e. they choose to increase their monthly rent levels or decrease their housing quantity or quality) will actually be homeless for a very short period of time, incurring some costs to society associated with emergency shelter. Conservatively, the costs associated with short-term provision of homeless shelters for individuals and families who will require them en route to a more permanent housing situation is not included.

There are a number of studies estimating the per-person or per-family cost of homelessness. This literature suggests a range of per-person cost from thousands to into the hundreds of thousands. However, many of the studies address the costs associated with housing and caring for individuals and families who are chronically homeless and/or who have significant health issues that are costly to address. This is not an appropriate comparison group, as those costs will be higher since the needs of those populations are higher.

A more appropriate estimate is provided by HUD's recent calculation of per capita expenditure amounts for extended period shelter provision for homeless families. These costs ranged from $6,574 to $38,742 for stays that ranged from 8 to 18 months (see Table 4.11).[33] The low-end estimate of $6,574 for providing a year of shelter for a family and a middle-of-the-road estimate of $13,148 (double the low-end estimate but still comfortably within the lower half of the range of estimates seen in the existing literature) will conservatively be used in this study. It will also be conservatively estimated that 10 to 20 percent of the residents that would have been in PHA units that are eliminated because of capital budget cuts will become homeless.

Table 4.11 – HUD Estimates of the Per Household Cost of Providing Homeless Shelters

Permanent (emergency shelter, transitional housing, permanent supportive housing)	Utilization Description	Average Costs per Household
Individuals	4-12 months	$3,103-$14,418
Families	8-18 months	$6,574-$38,742

Source: U.S. Department of Housing and Urban Development (2012), Econsult Corporation (2012)

Multiplying through by the number of individuals and families who will become homeless, and subtracting the savings to HUD in the form of reduced operating subsidies for units no longer being operated, yields a conservative estimate of added annual social service cost of about $2.1

[33] "Costs Associated with First-Time Homelessness for Families and Individuals," U.S. Department of Housing and Urban Development (March 1, 2010).

million to $15.4 million (see Table 4.12). The net present value of the increased costs to society over a 40-year time horizon (assuming a seven percent discount rate) is estimated at between $10 million and $140 million, even when backing out the cost savings from reduced operating subsidies due to fewer PHA units (see Table 4.13). This is about 3.5 to 50 percent of the $285 million reduction in expenditures on new units and rehabilitation. It is important to note that carrying these impact estimates out over the long term does not necessarily mean that individuals and families who become homeless as a result of a reduction in PHA units become permanently homeless. Rather, the assumption is simply that the reduction in PHA units results in a certain number of individuals and families being homeless in any given year, not necessarily the same individuals and families every year.

Table 4.12 – Estimate of Negative Impacts Resulting from Increased Homelessness Due to Reduced Total Units Resulting from a Temporary One-Time Cut ($470 Million) in Capital Funding

Capital Expenditure Reduction Type	Estimated Capital Expenditure Reduction	Reduction in Units (# Residents/ Applicants Estimated to be Affected)	% Affected Individuals/Families Who Will Become Homeless[34]	Average Cost to Provide Homeless Shelter for A Family	Estimated Annual Negative Impact on Residents
(assuming low-end conservative estimate)					
Build New Units	$29M	91	10%	$6,574	$0.1M
Modernize/Rehab	$256M	3,152	10%	$6,574	$2.1M
Total	$285M	3,243	10%	$6,574	$2.1M
(assuming middle-of-the-road estimate)					
Build New Units	$29M	91	20%	$13,148	$0.1M
Modernize/Rehab	$256M	5,777	20%	$13,148	$15.3M
Total	$285M	5,868	10%	$6,574	$15.4M

Source: Econsult Corporation (2012)

[34] That is, those who will not respond to the loss of a housing unit by choosing to pay more for their existing quality of housing or to pay the same for a reduced quality of housing.

Table 4.13 – Estimate of Net Impacts Resulting from Increased Homelessness Due to Reduced Total Units Resulting from a Temporary One-Time Cut ($470 Million) in Capital Funding

# Households That Become Homelessness as a Result of Reduced Total Units	Estimated Annual Additional Social Service Expenditures Borne by Governments and Non-Profits	Estimated Annual Savings from Reduced Operating Subsidy	Estimated Annual Net Negative Impact	Present Value of Negative Impact over 40-Year Horizon
(assuming low-end conservative estimate)				
324	$2.1M	$1.4M	$0.8M	$10M
(assuming middle-of-the-road estimate)				
1,174	$15.4M	$4.9M	$10.5M	$140M

Source: Econsult Corporation (2012)

4.3.4 Additional Considerations

As noted above, if capital funding cuts are permanent, the reduction in number of new units may be 40 times larger. This would yield a negative impact from the provision of short-term and long-term homeless shelters of $30 million to $415 million per year, or the equivalent of $163 million to $2.25 billion in present value terms (see Table 4.14).[35]

[35] This estimate of the present value of negative impacts resulting from permanent funding cuts takes into account the fact that negative impacts take time to reach the estimated figure. This is because units lost through disinvestment are lost over time and not all at once.

Specifically, the negative impact of permanent funding cuts on increased homelessness rises to $30 million over a 40-year period. So to calculate the present value of that magnitude of negative impacts, it was assumed that 1/40th of that amount took place in Year 1, 2/40th in Year 2, 3/40th in Year 3, and so on, and those negative impacts were discounted to the present at a discount rate of 7 percent.

Table 4.14 – Estimate of Net Impacts Resulting from Increased Homelessness Due to Reduced Total Units, Including Savings from Reduced Federal Subsidy Requirements Resulting from a Permanent Cut (Present Value of $6.7 Billion) in Capital Funding

Reduction in Units (# Households Estimated to be Affected)	Estimated Annual Net Negative Impact	Present Value of Negative Impact over 40-Year Horizon
(assuming low-end conservative estimate)		
126,076	$30M	$163M
(assuming middle-of-the-road estimate)		
231,091	$415M	$2.25B

Source: Econsult Corporation (2012)

Furthermore, to the extent that temporary or permanent cuts in capital funding result in former PHA residents becoming more structurally homeless, the social service expenditures associated with providing housing and related support services will increase, as their needs will increase from basic shelter to more complex social and medical interventions. This is a story currently being played out in countless communities throughout the U.S., as households on wait-lists for PHA units remain homeless and suffer from the lack of stability. For example, about 85,000 children attending public schools in Texas do not have permanent residences; in San Antonio alone, there are 16,000 families on the San Antonio Housing Authority's waiting list.[36]

[36] "Homeless Families Find Retreat from SAHA," San Antonio News-Express (October 7, 2011).

4.4 Impact Category: Exclusion from Information Technology Resources

4.4.1 Summary of Findings

Management improvements take many forms in PHAs. In addition to personnel acting as a liaison between PHAs and residents and PHA infrastructure improvements, management can come in the form of resources for residents, such as computer labs. Access to always-on broadband at home is commonplace in modern America but largely out of the reach of low-income individuals and families. PHAs that offer information technology resources such as computer labs help their residents access the gains that accrue from digital inclusion. Conversely, digital exclusion is increasingly costly, in the form of reduced educational and employment opportunities, diminished health care and public safety resources, and less consumption of personal communications and entertainment (see Table 4.15). The estimated $17 million permanent reduction in capital investments in these resources is estimated to cost PHA residents from $22 million to $174 million per year in aggregated foregone benefits (see Table 4.16).

Table 4.15 – Capital Expenditure Cuts and Affected Parties Associated with Exclusion from Information Technology Resources Due to Disinvestment in Management Improvements

Affected Parties: R = residents A = applicants PHA = public housing authorities G = federal, state, and/or local governments RC = residential communities near PHAs BC = business communities near PHAs NP = non-profit service providers S = society as a whole	Develop and finance new units	Demolition	Energy/green improvements	Modernize existing units	Deferred maintenance	Security	Management improvements	Resident self-sufficiency program	Homeownership
4) Exclusion from Information Technology Resources							R BC		

Source: Econsult Corporation (2012)

Table 4.16 – Estimated Negative Impacts Resulting from Exclusion from Information Technology Resources Due to Disinvestment in Management Improvements Resulting from a 20 Percent Cut ($470 Million) in Capital Funding

Main Affected Group(s)	Residents, Business Communities
Estimated Capital Expenditure Reduction in Developing and Financing New Units and in Modernizing and Rehabilitating Existing Units	$17M
# Households Who No Longer Have Access to Information Technology Resources	5,700 to 28,300
Estimated Per-Household Annual Negative Impact from Digital Exclusion	$1,400
Present Value of Negative Impact (One-Year Horizon)	$8M to $40M
Estimated Effect of a Permanent Funding Cut	$8M-$40M per year for three to five years, or $22M-$174M in present value of negative impacts
Other Considerations Not Included in Above Estimate	Estimate above does not include negative impacts borne by former PHA residents who are now no longer PHA residents as a result of a decrease in the number of available units, and who as a result no longer have access to information technology resources

Source: Econsult Corporation (2012)

4.4.2 Methodological Approach

An additional social service resource affected by capital expenditure cuts is associated with the capital expenditure category known as "Management Improvements." While management improvements often fund PHA infrastructure improvements and staff training, 20 percent of estimated cuts are assumed to go towards investments in computer and Internet laboratories for use by PHA residents.[37]

[37] The other 80 percent of management improvements expenditures is in the form of PHA-wide infrastructure investments and investments in training of PHA management. Cutting these expenditures is likely to impose some negative impact on PHA operational efficiency and on PHA residents, so it is conservative to exclude these cuts from negative impact estimates.

Recent studies in Colorado and Philadelphia[38] established a cost of about $1,800 per computer lab workstation. Assuming a three-year depreciation for a workstation,[39] and very conservatively assuming that a computer lab serves one household per workstation,[40] this yields a cost per household served of about $600.

Econsult Corporation conducted a study in 2010 of the negative economic impact of digital exclusion, finding that the cost of having 100 million individuals (40 million households) being digitally excluded cost somewhere on the order of $55 billion per year to the U.S., which works out to about $550 per individual or about $1,400 per household (see Table 4.17). It is conservatively assumed that individuals living in PHA units would be equally disadvantaged by digital exclusion, even though their relative lack of technology and other resources is such that their impact is likely to be even larger.

[38] "How to Create a Public Computer Center," Preston Rhea (June 7, 2011); "Public Computer Centers in Colorado Libraries," Colorado Department of Education (2011).

[39] Three years was chosen to be conservative: the standard depreciation schedule is five years, which would yield an even lower cost per household served.

[40] Of course, in reality, a computer lab can serve many more individuals and families than it has workstations, and since the vast majority of PHA residents do not have computer and Internet access on their own, a computer lab is likely to yield many more users than it has workstations.

Table 4.17 – Estimated Negative Impact of Digital Exclusion on US Households in 2010

Economic Impact Category	Estimate of Current Annual Costs of Digital Exclusion in the US
Health Care	$15B
Education	$4B
Economic Opportunity	$15B
E-Government	$2B
Energy	$100M
Public Safety and Emergency Response	$4B
Transportation	$100M
Personal Financial Management	$2.5B
Consumer Benefits	$5B
Personal Communications and Entertainment	$7.5B
Total	$55.2B
Estimated Impact per Affected Household	$1,400

Source: Econsult Corporation (2010)

4.4.3 Estimating Negative Impacts

Therefore, given an estimated $3.4 million disinvestment in the capital expenditure category, "Management Improvements,"[41] this represents about 5,700 households not served and therefore about $8 million to $40 million in positive annual economic and social impact not achieved. This represents about half to double of the $17 million reduction in management improvement (see Table 4.18).[42]

[41] This accounts for 20 percent of what was allocated to this expenditure category, since it is assumed that 80 percent of it goes towards PHA-wide investments in management training and physical infrastructure, and only 20 percent of it goes towards direct information technology resources for residents.

[42] $17 million disinvestment x 20 percent allocated to computer and Internet resources for PHA residents (vs. the remaining 80 percent allocated to overall management training and technology investments for the PHA as a whole) x $600 per household cost = 5,700 households affected. 5,700 households affected x $1,400 in economic and social costs per household = $8 million in economic and social costs. Note that these figures are likely an underestimate of the impact because of they do not take into account the losses in internet services that result from the shrinkage of the overall stock of PHA units that result from capital cuts.

Table 4.18 – Estimate of Negative Impacts Resulting from Exclusion from Information Technology Resources Due to Disinvestment in Management Improvements Resulting from a Temporary One-Time Cut ($470 Million) in Capital Funding

Estimated Capital Expenditure Reduction in Technology Resources Portion of Management Improvements Category	# Households Estimated to be Affected	Average Impact per Household	Aggregate Negative Impact
(assuming low-end conservative estimate)			
$17M	5,700	$1,400	$8M
(assuming middle-of-the-road estimate)			
$17M	28,300	$1,400	$40M

Source: Econsult Corporation (2012)

4.4.4 Additional Considerations

A permanent, rather than temporary, reduction in capital funding would result in an extended period of digital exclusion, with larger negative impacts. While it is likely that such information technology resources will eventually become universally available, it is not likely to happen for at least a few years, so it is likely that the annual aggregate $8 million in negative impacts to PHA residents will be borne for multiple years: $8 million per year in negative impacts borne over three years, for example, would be $22 million in negative impacts expressed in present value terms, while $40 million per year in negative impacts borne over five years would be $174 million in negative impacts expressed in present value terms (see Table 4.19).

Table 4.19 – Estimate of Net Impacts Resulting from Exclusion from Information Technology Resources Due to Disinvestment in Management Improvements Resulting from a Permanent Cut (Present Value of $6.7 Billion) in Capital Funding

# Households Estimated to be Affected	Aggregate Negative Impact	Present Value of Negative Impact over 3-Year to 5-Year Horizon
(assuming low-end conservative estimate)		
5,700	$8M	$22M over 3 years
(assuming middle-of-the-road estimate)		
28,300	$40M	$174M over 5 years

Source: Econsult Corporation (2012)

The per-household impact number is likely larger now given the even greater reliance people have on technology to live, work, and play. This population is particularly gaining from technology access and technology skills, given the vast difference in earning power between jobs that can be had without technology access and technology skills and those that can be had with. Indeed, in a recent Tampa Tribune article, Tampa Housing Authority officials asserted the importance of Internet access for residents to access the necessary employment, educational, and informational resources to graduate from subsidized housing.[43] Therefore, it is conservative to use the 2010 figure estimated by Econsult.

The above calculations also do not account for the fact that the number of households excluded from information technology resources is likely to be larger than that estimated from the disinvestment in management improvements expenditures. As noted earlier, overall declines in capital expenditures are likely to result in a decrease in the number of PHA units available to households. It is likely that some of those households that no longer have access to a PHA unit will go from a living situation in which they had access to information technology resources (through a PHA computer lab) to a living situation in which they do not have access. Therefore, the number of households negatively affected, and therefore the aggregate negative impact from digital exclusion, is likely to be larger than estimated here.

[43] "Coming soon to Tampa public housing: Free Internet access," Tampa Tribune (December 23, 2010).

4.5 Reduced Supply to Employers of Low Wage Earners

A potential but not often discussed broad benefit of PHAs is that they allow low wage earners to be located near employment opportunities in areas where low wage earners would not otherwise be able to afford to live. Housing subsidies for low wage earners are a form of subsidy to the industries that employ them, thus reducing housing subsidies not only negatively impacts low wage earners but also has a potentially stunting effect on certain industries that rely on local low wage workers, and more broadly on regional labor markets and economies (see Table 4.20).[44] Some housing authorities also help teenage residents find employment and build job experience. For example in the District of Columbia Housing Authority (DCHA), a summer youth program matches youths with summer jobs.[45]

Table 4.20 – Capital Expenditure Cuts and Affected Parties Associated with Reduced Supply to Employers of Low Wage Earners Due to Reduced Total Units

Affected Parties: R = residents A = applicants PHA = public housing authorities G = federal, state, and/or local governments RC = residential communities near PHAs BC = business communities near PHAs NP = non-profit service providers S = society as a whole	Develop and finance new units	Demolition	Energy/green improvements	Modernize existing units	Deferred maintenance	Security	Management improvements	Resident self-sufficiency program	Homeownership
5) Reduced supply to employers of low wage earners	r a bc								

Source: Econsult Corporation (2012)

This can particularly be the case in metropolitan areas with high housing costs that have not highly suburbanized, where the gap between low-skilled wage levels and even the lowest rent

[44] See, for example, "The Role of Affordable Housing in Creating Jobs and Stimulating Local Economic Development: A Review of the Literature," Center for Housing Policy (January 2011) and "Employer-Based Homeownership Programs: A Business Case," National Community Investment Fund (November 2004).

[45] 2009. "Ahead of the Curve" District of Columbia Housing Authority Annual Report 2009.

levels is significant (see Table 4.21). It is likely that if there is an adverse effect on labor markets resulting from less accessibility to housing subsidies, it will be felt in such locations primarily if not exclusively.

Table 4.21 – Metropolitan Regions in Which Housing Prices Greatly Exceed What is Affordable to Low Wage Earners ("Affordable" is Usually Considered Paying No More Than 30 Percent of Income)

Metropolitan Region	# PHA Residents	Monthly HH Income of PHA Residents	Avg PHA Affordable Rent	Fair Market Rent for 2BR
Boston	43,000	$1,217	$416	$1,270
New York	461,000	$1,725	$430	$1,421
San Francisco	18,000	$1,167	$499	$1,585
Washington	12,000	$1,033	$422	$1,506

Source: US Census Bureau (2011), Econsult Corporation (2012)

However, to be conservative, no negative impact has been assigned here. The number of new units not being built is not likely to be large enough in any of these locations to have a noticeable effect on local labor markets. Furthermore, unemployment rates are still relatively high, so it is likely that there is sufficient excess labor supply to absorb the loss of any PHA residents forced outside of high-cost areas from a contraction in the number of PHA units.

Should HUD consider a permanent 20 percent cut, a discernible negative impact may be experienced in some labor markets. The shrinkage in the number of PHA units nationwide of 126,000 to 230,000 units will, in some cases, result in a noticeable loss in labor supply at the local level. For example, NYCHA currently operates about 178,000 units. Should it sustain a permanent 20 percent in capital cuts, its inventory of units may decline by something on the order of 11 to 20 percent,[46] or 20,000 to 35,000 units. The loss of that many households, with attendant loss in labor supply, may have a meaningful and negative effect on certain industries in New York City that depend on low-income workers.

[46] Twenty percent, assuming a reduction in number of units commensurate to its reduction in capital funding; or 11 percent, commensurate with the proportion of capital funding cut assigned to rehabilitation and modernization of existing units.

4.6 Crime

Crime and blight are expensive to overcome, and have considerable spillover impacts to their immediate surroundings: the existence of either or both has the effect of making a neighborhood less appealing, lowering property values and thus reducing both household wealth and the property tax base upon which municipalities and school districts derive a large portion of their revenues. Therefore, disinvestments by PHAs have a very real negative impact, as security infrastructure not installed/maintained and unusable units not demolished create an environment in which crime and blight can thrive (see Table 4.22)[47].

Table 4.22 – Capital Expenditure Cuts and Affected Parties Associated with More Crime Due to Disinvestment in Units and in Security Infrastructure

Affected Parties: R = residents A = applicants PHA = public housing authorities G = federal, state, and/or local governments RC = residential communities near PHAs BC = business communities near PHAs NP = non-profit service providers S = society as a whole	Develop and finance new units	Demolition	Energy/green improvements	Modernize existing units	Deferred maintenance	Security	Management improvements	Resident self-sufficiency program	Homeownership
6) More crime		r g rc				r g rc			

Source: Econsult Corporation (2012)

As noted above, the comparison here is not between the existence of a PHA and the non-existence of a PHA, but rather between a PHA that is adequately maintaining its capital investments and one which is forced by funding cuts to disinvest in its physical structures. In fact, if PHAs are located in high crime and high blight areas (and many are, relative to the overall regions within which they are located), then the negative effect of disinvestment should

[47] For more information on crime in the public housing and urban context, see Cityscape, Volume 13, Number 3.

be even greater, and the positive effect of avoiding disinvestment should also be even greater.[48]

As it relates to the effect of capital disinvestment on crime levels, a 2010 Federal Reserve Bank of Cleveland study is instructive. It found that in Chicago, there was a reduction of 0.5 murders per 100,000 people per year for every 100 high-rise PHA units closed.[49] This suggests that the elimination of high concentrations of fully depreciated PHA units (like those in found in Chicago at one time) creates a surrounding environment that reduces violent crime. A 2010 Econsult study of HOPE VI demolitions and redevelopments found similarly significant effects on violent crime levels, as did a 2012 study by Urban Institute.[50]

To be conservative, these findings are not extrapolated against the anticipated cuts to demolition, because it cannot be assumed that these cuts are similar in nature (and in their effect on crime and environment) to past large-scale redevelopment efforts in which older, high-density developments were imploded in exchange for newer, more spatially distributed developments. Nevertheless, it is likely that disinvestment in capital expenditures, and in particular the foregoing of demolitions of deteriorating units, will have an adverse effect on crime levels.

Security measures such as cameras and other physical improvements designed to increase perception of safety have a huge difference in reducing crime and the costs associated with crime. For example, Akron Public Housing Authority spent capital funds on the construction of a fence around one of their public housing properties to both increase security and beautify the neighborhood. This project was also endorsed by the community's public officials[51]. In the District of Columbia Housing Authority (DCHA), a central monitoring system uses the latest technology to prevent potential incidents in DCHA buildings.[52] This has benefits for PHA residents themselves, as well as for the immediate neighborhoods around PHAs, and for the state and local governments that bear the cost of law enforcement. While there is relatively

[48] For example, Econsult conducted a study of vacant land in the City of Philadelphia in 2011 that found that proximity to vacant parcels resulted in an average 6.5 percent property value decline throughout the City, but that that decline was as high as 20 percent in particularly blighted neighborhoods. Similarly, it is likely that the difference in crime levels between investment and disinvestment in PHAs in high-crime areas is greater than the difference in crime levels between investment and disinvestment in other structures in low-crime areas.

[49] "Blowing it Up and Knocking it Down: The Effect of Demolishing High Concentration Public Housing on Crime," Federal Reserve Bank of Cleveland (December 2010).

[50] "HOPE VI and Neighborhood Economic Development: The Importance of Local Market Dynamics," Cityscape: A Journal of Policy Development and Research (2010); "Public Housing Transformation and Crime: Making the Case for Responsible Relocation" Urban Institute (April 2012).

[51] A security fences was installed around a portion of Akron Housing Authority's Van Buren Homes. The Safety Director, Chief of Police, and Fire Chief of Barberton commended the safety improvement as well as the improvement to the look of the neighborhood.

[52] 2009 "Ahead of the Curve" District of Columbia Housing Authority Annual Report 2009.

little in the way of existing studies that make a direct correlation between security disinvestment and crime, the many security infrastructure investments made by governments and by private developers suggest that making such capital expenditures is deemed to be worthwhile, in terms of conveying a stronger perception of safety. More than half of residents of severely distressed public housing sites surveyed by the Urban Institute indicated they did not feel safe just outside their buildings and two thirds of respondents reported shootings and general violence to be major problems.[53] Conservatively, no negative impact is assigned to the $22 million in aggregate security disinvestment estimated by survey results.

In sum, to be conservative, no dollar amount of negative impact from crime is assigned to the anticipated disinvestment in demolition and in security infrastructure even though it is likely that such disinvestments will in fact have some effect on crime levels. While an increase in crime levels does exact significant costs on society through court systems, police departments, pain and suffering of victims (including costs associated to their potential loss of wages), these impacts are broad and variable, therefore measurement of them is outside the scope of this report.

However, the negative impact of more crime is partially accounted for in two direct analyses conducted as part of this report. First, the negative effects of crime are somewhat (although not fully) capitalized into changes in property value from capital disinvestment, which is discussed next. Second, the negative effects of crime are somewhat (although, again, not fully) accounted for in changes in insurance claims levels resulting from capital disinvestment, which is discussed later in this section.

Nevertheless, this only represents a partial coverage of the negative impact of increased crime from disinvestment in PHAs. What is not included in such analyses is the administrative cost to society related to crime: law enforcement, the court systems, and related social services; the negative impacts on victims of crime such as death, disability, pain and suffering; the effect of reported crime on neighborhood property values; and related losses resulting from their victimization, such as reduced productivity, absence in labor markets, unavailability for other important social functions. Therefore, it is extremely conservative to assign no negative impact to the increase in crime resulting from capital funding cuts to PHAs.

[53] Turner, Margery Austin, et al. “Keeping Residents Safe with Closed-Circuit TV,” New York City Housing Authority Journal (December 2006/January 2007).

4.7 Blight

4.7.1 Summary of Findings

Physical disinvestment has a blighting effect on immediate surroundings, diminishing property values and resulting in smaller property tax revenues to municipalities and school districts (see Table 4.23). By examining historic correlations between capital funding, physical building quality, and nearby house values, we project that a permanent 20 percent cut (present value of $6.7 billion) in capital funding would result in an aggregate property value decline ranging from $2.5 billion to $2.8 billion (see Table 4.24).

Table 4.23 – Capital Expenditure Cuts and Affected Parties Associated with Blighting Effect on Neighboring Properties Due to Physical Disinvestment

Affected Parties: R = residents A = applicants PHA = public housing authorities G = federal, state, and/or local governments RC = residential communities near PHAs BC = business communities near PHAs NP = non-profit service providers S = society as a whole	Develop and finance new units	Demolition	Energy/green improvements	Modernize existing units	Deferred maintenance	Security	Management improvements	Resident self-sufficiency program	Homeownership
7) Increased blight on immediate neighborhood	G RC	G RC		G RC	G RC				

Source: Econsult Corporation (2012)

Table 4.24 – Estimated Negative Impacts Resulting from Blighting Effect on Neighboring Properties Due to Physical Disinvestment Resulting from a 20 Percent Cut ($470 Million) in Capital Funding

Main Affected Group(s)	Residential Communities, Governments
Estimated Capital Expenditure Reduction in Developing and Financing New Units and in Modernizing and Rehabilitating Existing Units	$469M
Estimated One-Time Reduction in Property Values Associated with a Temporary $469M Reduction in Capital Investment (Assuming Effect Takes Place Over a Five-Year Period)	$61M to $70M
Estimated Effect of a Permanent Funding Cut	$2.8B in reduced property values, and $28 million to $40 million in lost property tax revenues to municipalities and school districts each year
Other Considerations Not Included in Above Estimate	If that property value decline were properly assessed, it would result in an annual loss of $700,000 to $1 million in property tax revenues to municipalities and school districts

Source: Econsult Corporation (2012)

This section of the report is based on an in-depth econometric analysis of the relationships among capital expenditures, physical condition of public housing and nearby neighborhood property values. This new primary research is presented in the context of the large literature on the determinants of property value. It is, however, one of the only studies to carefully examine the relationship between the physical condition of properties and the value of neighboring properties.[54]

4.7.2 Approach

There is widespread recognition that neighborhood quality has important welfare effects for households. There are many models of the determinants of neighborhood quality, including the condition of various physical, social, and economic factors. While quality of a neighborhood

[54] See Appendix D for a partial bibliography of literature reviewed for this report, and Appendix E for a more detailed explanation of the methodologies employed for this analysis.

may be important, the multidimensional nature of its determinants make it difficult to measure concisely. For this reason, house prices are often used as a proxy for quality.

The physical condition of a property is thought to have spillover effects on the value of neighboring property. Furthermore, measurement of the spillover impacts of building condition on neighboring property value is, in fact, much more straightforward for public housing than for measurement of the spillover impacts of changes in physical conditions of private properties. Unlike the private investment decision where investment decisions depend on the choices of other private property owners, the decision to invest or not in a public housing site is likely to be independent of the investment choices of neighboring property owners. Thus, the measure impacts of public housing conditions on a neighborhood can be viewed as unidirectional and causal.

Unlike private properties, there is a consistent ranking system for the physical condition of public housing properties. The U.S. Department of Housing and Urban Development's (HUD) Real Estate Assessment Center (REAC) has developed a program to evaluate the condition of public housing properties. Properties are periodically evaluated to produce a score (the REAC score) that rates the physical condition of a property on a scale of 0 (worst condition) to 100 (best condition). While this score is not a measure of housing quality, due to the often technical nature of compliance, it does provide some rough information on the physical condition of the property.

4.7.3 Estimated Impacts

Based on the model of neighborhood property value impacts, we can link declines in REAC scores from 2000 to 2010 to changes in property values. There are 12,152 public housing properties for which we have data on changes in REAC scores, and there are over 44.3 million houses within a ½-mile of these properties. The aggregate value of these properties is $2.9 trillion. Based on the coefficients in the model and data on the median home value in each tract, a 20 percent cut ($470 million) in capital funding was estimated to result in a 1.2 percent drop in REAC scores, and the projected impact of that 1.2 percent drop in REAC scores on nearby property values was estimated. Aggregating these across block groups, the total impact is estimated to be $2.8 billion in decreased property values.

That $2.8 billion property decline represents a conservative estimate of the effect of a permanent 20 percent cut ($ 470 million) decrease in HUD funding. A temporary 20 percent decrease can be construed as having $1/40^{th}$ of the impact, assuming a 40-year depreciation cycle for PHA units. Thus, the equivalent one-time property decline, for the purposes of this report, is $1/40^{th}$ of $2.8 billion, or about $70 million. If it is assumed that that property value

decline would take five years to take effect,[55] the present value of that property value decline would be about $61 million (see Table 4.25).

Table 4.25 – Estimate of Negative Impacts Resulting from Blighting Effect on Neighboring Properties Due to Physical Disinvestment Resulting from a Temporary One-Time Cut ($470 Million) in Capital Funding

Estimated Capital Expenditure Reduction	Estimated Decline in REAC Scores	Estimated Property Value Effect of Permanent Decrease in HUD Funding	Estimated Property Value Effect of Temporary Decrease in HUD Funding (Assuming Effect Takes Place Over a 1-Year to 5-Year Period)
$469M	1.19%	$2.8B	$61M if within 5 years $70M if within 1 year

Source: Econsult Corporation (2012)

4.7.4 Additional Considerations

As property owners lose household wealth as a result of the blighting effect of disinvested PHA units, the taxing jurisdictions that their properties are a part of may experience a reduction in their property tax base. If these property value reductions were properly assessed, a $70 million reduction in market value would result in something on the order of $700,000 to $1 million per year in lost property tax revenues to municipalities and school districts. If the capital funding cuts were permanent, there is estimated to be a $2.5 to $2.8 billion aggregate reduction in the market value of nearby properties, which would represent a loss of $28 million to $40 million per year in lost property tax revenues to municipalities and school districts (see Table 4.26).

[55] It is more likely that the property value decline will take place much faster. In fact, there is significant literature that finds that the mere announcement of capital investment or disinvestment can have an effect on property values, well in advance of actual investment or disinvestment. To be conservative, the property value decline is assumed to take effect over an extended period of time, thus reducing the present value of the property value decline.

Table 4.26 – Estimate of Negative Impacts Resulting from Blighting Effect on Neighboring Properties Due to Physical Disinvestment Resulting from a Permanent Cut ($Present Value of $6.7 Billion) in Capital Funding

Estimated Capital Expenditure Reduction	Estimated Property Value Effect of Permanent Decrease in HUD Funding	Estimated Property Value Effect of Temporary Decrease in HUD Funding (Assuming Effect Takes Place Over a 1-Year to 5-Year Period)	Estimated Impact on Property Tax Revenues to Municipalities and School Districts
$469M	$2.8B	$2.5B if within 5 years $2.8B if within 1 year	$28M to $40M per year

Source: Econsult Corporation (2012)

4.8 Buildings Less Energy/Cost Efficient, More Expensive Repairs Later

4.8.1 Summary

Deferring maintenance and forgoing energy-efficiency projects will result in higher operating costs over time. In the same way that dealing with inefficient building systems and implementing energy-saving techniques generates some return on that initial investment (money spent up front is at least in part recouped through reduced costs over time), not being able to undertake those action items results in lost opportunities to reduce annual operating costs (see Table 4.27). For example, Akron Metropolitan Housing Authority estimates that the $9 million in energy improvements completed throughout its housing developments save $1,346,566 yearly[56]. And in Washington DC, a comprehensive energy modernization plan allowed the housing authority to form its own Energy Services Company (ESCO), potentially saving $3 million.[57]

[56] Energy improvements at Akron Metropolitan Housing Authority (AMHA) include high efficiency heating and air conditioning units, interior lighting upgrades, energy efficient windows, water conservation elements, green roofs, solar panels, and weatherization and insulation efforts.

[57] 2009 "Ahead of the Curve" District of Columbia Housing Authority Annual Report 2009.

Table 4.27 – Capital Expenditure Cuts and Affected Parties Associated with Buildings Being Less Energy/Cost Efficient and Requiring Expensive Repairs Later Due to Disinvestment in Energy/Green Improvements and Deferred Maintenance

Affected Parties: R = residents A = applicants PHA = public housing authorities G = federal, state, and/or local governments RC = residential communities near PHAs BC = business communities near PHAs NP = non-profit service providers S = society as a whole	Develop and finance new units	Demolition	Energy/green improvements	Modernize existing units	Deferred maintenance	Security	Management improvements	Resident self-sufficiency program	Homeownership
8) Buildings less energy/cost efficient	r pha s	r pha s	R PHA S	r pha s					
9) More expensive repairs later				pha	PHA				

Source: Econsult Corporation (2012)

Based on conservative extrapolations of existing studies, it is estimated that the expected $33 million in energy efficiency projects foregone as a result of a temporary one-time cut will result in $1.7 million more per year in operating costs, or the equivalent of $5 million to $10 million as expressed as an upfront one-time impact. A permanent cut would further extend these losses to $66 million to $136 million in present value terms (see Table 4.28). Similarly, it is projected that the estimated $75 million in deferred maintenance projects foregone will result in $2.3 million more per year in operating costs, or the equivalent of about $6 million to $13 million as expressed as an upfront one-time impact. A permanent cut would further extend these losses to $90 million to $185 million in present value terms (see Table 4.29).

Table 4.28 – Estimated Negative Impacts Resulting from Buildings Being Less Energy/Cost Efficient Due to Disinvestment in Energy/Green Improvements Resulting from a 20 Percent Cut ($470 Million) in Capital Funding

Main Affected Group(s)	PHAs
Estimated Capital Expenditure Reduction in Energy and Green Investments	$33M
Estimated Return on Investment in Energy and Green Investments	5%
Present Value of Negative Impact (Three-Year Horizon)	$5M to $10M
Estimated Effect of a Permanent Funding Cut	$5M-$10M per year, or $66M-$136M total in present value of negative impacts
Other Considerations Not Included in Above Estimate	If there is lost ROI from modernization and rehabilitation, the negative impacts would be even greater

Source: Econsult Corporation (2012)

Table 4.29 – Aggregate Net Impacts Resulting from Buildings Requiring Expensive Repairs Later Due to Disinvestment in Deferred Maintenance Resulting from a 20 Percent Cut ($470 Million) in Capital Funding

Main Affected Group(s)	PHAs
Estimated Capital Expenditure Reduction in Deferred Maintenance	$75M
Estimated Return on Investment in Deferred Maintenance	3%
Present Value of Negative Impact (Three-Year Horizon)	$6M-$13M
Estimated Effect of a Permanent Funding Cut	$6M-$13M per year, or $90M-$185M total in present value of negative impacts
Other Considerations Not Included in Above Estimate	If there is lost ROI from modernization and rehabilitation, the negative impacts would be even greater

Source: Econsult Corporation (2012)

4.8.2 Methodological Approach

A problem with capital disinvestment is that it can prove costly, and in some cases costlier than the initial costs foregone. This is definitely the case with disinvestments in energy efficiency and in deferred maintenance.

The purpose and outcome of many "green" improvements is to become more energy efficient, thus having not only a broader environmental impact (reduced resource consumption) but a direct bottom line impact (reduced operating expenditure). Therefore, failure to demolish inefficient units, perform energy improvements, and modernize existing units may save money in the short term, but has the effect of increasing operating costs over time.

Furthermore, deferring maintenance may save money in the immediate term, but possibly at the expense of making those maintenance tasks more expensive, in real terms, in the future. It is estimated that PHAs currently have an aggregate $20 billion to $30 billion in deferred maintenance projects.[58] This suggests that PHAs have more than enough possible projects they could undertake if only they had the funds, and that many deferred maintenance projects have been deferred for a very long time, and are likely now at a point where they are much costlier to undertake than if they had been dealt with sooner. Sadly, deferring maintenance sometimes leads not only to financial loss but human loss: the New York Times reported in 2008 the story of a boy who died in an elevator that was set to be repaired in 2004 but was not due to lack of funding.[59]

4.8.3 Estimating Negative Impacts – Energy and Green Improvements

As it relates to energy and green improvements, existing literature is generally straightforward – investments have a return, in terms of trading off upfront weatherization and efficiency expenditures for ongoing impact of energy efficiency. For example, a 2009 study of 27 affordable housing developments found that while building to green specifications incurred an extra cost of $4.52 per square foot, such building practices yielded lifetime energy and water savings of $5.43 per square foot, for a net benefit of $0.91 per square foot, and they typically recouped upfront costs within eight years.[60] A 2005 study of green retrofits made to affordable

[58] "Joint Statement from Housing Groups on Public Housing Funding in the FY11 Budget," Council of Large Public Housing Authorities (CLPHA), National Association of Housing and Redevelopment Officials (NAHRO), the National Low Income Housing Coalition (NLIHC), and the Public Housing Authorities Directors Association (PHADA) (April 8, 2011).

[59] "A History of Problems, in a Time of Dwindling Budgets," New York Times (August 20, 2008).

[60] "Incremental Cost, Measurable Savings: Enterprise Green Communities Criteria," Enterprise Community Partners (2009).

housing found the project benefits outweighed project costs over a 30-year building life, with a mean net present value benefit of greater than $15,000 per unit.[61]

Green improvements to relatively older structures are likely to have an even greater return on initial investment. Additionally, PHAs that had planned to make green investments are likely to have had such plans in place because they had already identified ongoing opportunities for significant cost savings. If a capital fund cut is realized, they will have to cut back on such improvements. Thus it is conservative to assume only a 5 percent annual cost savings lost for every dollar not invested in green improvements.[62] Multiplying through by the estimated $33 million cut to energy and green improvement investments yields an estimated $1.6 million in annual cost savings lost; assuming a three-year or seven-year horizon on returns, this is the equivalent of about $4.6 million to $9.5 million expressed as an upfront one-time loss (see Table 4.30).[63]

[61] "The Costs and Benefits of Green Affordable Housing," New Ecology and the Tellus Institute (2005).

[62] The Enterprise Community Partners, which looked at new construction, estimates $5.42 per square foot in total savings for an extra one-time cost of $4.52 per square foot. Spreading that $5.43 in total savings over a ten-year period means receiving $0.54 per square foot year in savings for ten years as a result of an upfront outlay of $4.52 per square foot, for an annual internal rate of return of about 3.5 percent. Meanwhile, the New Ecology and the Tellus Institute study, which looked at major rehabilitation and is therefore more relevant to PHAs current energy and green improvements situation, estimates a mean net present value benefit of over $15,000 per unit. Assuming upfront costs of $10,000 and spreading that net present value benefit over ten years yields an annual internal rate of return of 8.1 percent.

[63] In reality, green improvements' benefits are likely to last longer than three years; a longer time horizon would yield a larger impact. Three years was chosen to be conservative.

Table 4.30 – Estimate of Negative Impacts Resulting from Buildings Being Less Energy/Cost Efficient Due to Disinvestment in Energy/Green Improvements Resulting from a Temporary One-Time Cut ($470 Million) in Capital Funding

Estimated Capital Expenditure Reduction in Energy and Green Improvements	Estimated Return on Investment in Energy and Green Improvements	Estimated Annual Negative Impact	Present Value of Negative Impact over 3-Year or 7-Year Horizon
(assuming low-end conservative estimate)			
$33M	5%	$1.7M	$4.6M (assuming 3-year horizon)
(assuming middle-of-the-road estimate)			
$33M	5%	$1.7M	$9.5M (assuming 7-year horizon)

Source: Econsult Corporation (2012)

4.8.4 Additional Considerations – Energy and Green Improvements

Furthermore, one can make a case that some portion of the expected $256 million in modernization expenditures not undertaken also represents lost opportunity for ongoing cost reduction: boilers left in beyond their useful life run more inefficiently, windows not replaced are a similar drag on monthly utility bills, and even seemingly cosmetic projects such as floor replacement can have consequences on a unit's insulation levels. To be conservative, no return on investment is assigned to undone modernization expenditures, although it is likely they too represent foregone cost savings.

A permanent, rather than temporary, cut in capital funding results in successive waves of lost opportunities for energy efficiency through green improvements. Disinvestment of $33 million one year represents the forgoing of capital projects that yield an annual dividend of $1.7 million in reduced operating costs; disinvestment of $33 million every year represents the forgoing of multiple years' worth of capital projects that each yield annual dividends of $1.7 million in reduced operating costs (present value of $4.6 million), or about $66 million to $136 million in total (present value of $4.6 million to $9.5 million in lost return on uncompleted energy and green projects each year) (see Table 4.31).

Table 4.31 – Estimate of Negative Impacts Resulting from Buildings Being Less Energy/Cost Efficient Due to Disinvestment in Energy/Green Improvements Resulting from a Permanent Cut (Present Value of $6.7 Billion) in Capital Funding

Estimated Capital Expenditure Reduction in Energy and Green Improvements	Estimated Return on Investment in Energy and Green Improvements	Estimated Annual Negative Impact	Present Value of Negative Impact over 3-Year or 7-Year Horizon
(assuming low-end conservative estimate)			
$33M	5%	$4.6M	$66M (assuming 3-year horizon)
(assuming middle-of-the-road estimate)			
$33M	5%	$9.5M	$136M (assuming 7-year horizon)

Source: Econsult Corporation (2012)

4.8.5 Estimating Negative Impacts – Deferred Maintenance

There is also a vast body of literature about the costliness of deferring repairs. The most relevant study to this exercise is one commissioned by HUD in 2010 on the accrual of costs associated with deferring maintenance tasks. The study found $25.6 billion in total deferred maintenance tasks – a number that exceeds HUD's annual capital funding to all PHAs by a factor of over 10 – and estimated that, including new maintenance tasks that arise, $3.4 billion per year would be needed in perpetuity for properties to meet all these needs.

Over a 12-year period, median capital needs increased from $1,627 per unit ($2,245 in 2011 dollars) to $3,155 in 2010 ($3,255 in 2011 dollars), for an annual increase of about 3 percent per year. This suggests that deferring maintenance adds 3 percent to maintenance costs annually, in real terms. Multiplying through by the estimated $75 million cut to deferred maintenance in an overall 20 percent cut ($470 million) of capital funding yields an estimated $2.3 million in annual cost escalation; assuming a three-year or seven-year horizon on returns, this is the equivalent of about $6.3 million to $13.0 million expressed as an upfront one-time loss (see Table 4.32).[64]

[64] In reality, deferred maintenance projects' benefits are likely to last longer than three years; a longer time horizon would yield a larger impact. Three years was chosen to be conservative.

Table 4.32 – Conservative Estimate of Negative Impacts Resulting from Buildings Requiring Expensive Repairs Later Due to Disinvestment in Deferred Maintenance Resulting from a Temporary One-Time Cut ($470 Million) in Capital Funding

Estimated Capital Expenditure Reduction in Deferred Maintenance	Estimated Return on Investment in Deferred Maintenance	Estimated Annual Negative Impact	Present Value of Negative Impact over 3-Year or 7-Year Horizon
(assuming low-end conservative estimate)			
$75M	3%	$2.3M	$6.3M (assuming 3-year horizon)
(assuming middle-of-the-road estimate)			
$75M	3%	$2.3M	$13.0M (assuming 7-year horizon)

Source: Econsult Corporation (2012)

4.8.6 Additional Considerations – Deferred Maintenance

Furthermore, one can make a case that some portion of the expected $256 million in modernization expenditures not undertaken also represents a form of deferring maintenance and incurring more expensive repairs later: heating systems that are left to break down are most costly to replace down the road, roof repairs left undone may lead to further physical damage, and appliances may be more costly to replace later than to repair now. Again, to be conservative, no return on investment is assigned to undone modernization expenditures, although it is likely they too represent foregone cost savings.

Over time, the burden of higher operating expenditures and more expensive repairs later resulting from disinvestment in energy and green improvements, deferred maintenance, and modernization and rehabilitation is likely to grow precipitously if that disinvestment is permanent instead of temporary as is assumed in this analysis. Permanent disinvestment will result in an inventory that is perennially deteriorated beyond what is optimal from the standpoint of cost savings from operations, repair, and replacement. Not only will that result in successive waves of increased costs from deferred maintenance, but the costliness of each deferred project is likely to increase even further, as physical infrastructure reaches a point of greater deterioration.

A permanent, rather than temporary, cut in capital funding results in successive waves of continued deferral of maintenance projects, with attendant cost escalation. Disinvestment of $75 million one year represents the forgoing of deferred maintenance projects that yield an

annual dividend of $2.3 million in cost escalation avoided; disinvestment of $75 million every year represents the forgoing of multiple years' worth of deferred maintenance projects that each yield annual dividends of $2.3 million in cost escalation avoided (present value of $6.3 million to $13.0 million), or about $90 million to $185 million in total (present value of $6.3 million to $13.0 million in lost return on uncompleted deferred maintenance projects each year) (see Table 4.33). Given that PHAs are currently faced with $20 billion to $30 billion of deferred maintenance projects, it is likely that actual cost escalation will be even more significant.

Table 4.33 – Estimate of Negative Impacts Resulting from Buildings Requiring Expensive Repairs Later Due to Disinvestment in Deferred Maintenance Resulting from a Permanent Cut (Present Value of $6.7 Billion) in Capital Funding

Estimated Capital Expenditure Reduction in Deferred Maintenance	Estimated Return on Investment in Deferred Maintenance	Estimated Annual Negative Impact	Present Value of Negative Impact over 3-Year or 7-Year Horizon
(assuming low-end conservative estimate)			
$33M	5%	$1.7M	$4.6M (assuming 3-year horizon)
(assuming middle-of-the-road estimate)			
$33M	5%	$1.7M	$9.5M (assuming 7-year horizon)

Source: Econsult Corporation (2012)

5.0 SUMMARY OF FINDINGS

5.1 Conservative Estimates of Temporary One-Time Cuts

The 20 percent cut ($470 million) in capital grant funding to PHAs results in nine categories of negative impacts described in this report. In the aggregate, these nine categories sum to the equivalent of $214 million in upfront, one-time negative impacts using low end estimates and assuming that cuts are temporary. This is about 46 percent of the approximately $470 million in capital funding cuts (see Table 5.1 and Table 5.2). Thus, for every dollar saved by HUD through capital funding cuts to PHAs, about 46 cents of negative impact would be borne by governments, PHA residents, neighborhoods, business communities, and society as a whole, with increased cost of housing and reduced quality of housing for former PHA residents representing the largest category of negative impacts (see Figure 5.1).

Table 5.1 – Conservative Estimate of Negative Impacts Resulting from a Temporary One-Time Cut ($470 Million) in Capital Funding to PHAs, Expressed in One-Time Upfront Terms by Discounting All Ongoing Impacts to the Present

Year	Cost of Housing / Quality of Housing	Homeless	IT Resources	Blight	Energy / Green	Deferred Maint	Total
1	$9.3M	$0.8M	$7.9M	$14.0M	$1.7M	$2.3M	$35.9M
2	$9.3M	$0.8M		$14.0M	$1.7M	$2.3M	$27.9M
3	$9.3M	$0.8M		$14.0M	$1.7M	$2.3M	$27.9M
4	$9.3M	$0.8M		$14.0M			$24.0M
5	$9.3M	$0.8M		$14.0M			$24.0M
4+	$9.3M	$0.8M					$10.0M
Present Value of Negative Impacts	$123.7M	$10.2M	$7.9M	$61.4M	$4.6M	$6.3M	$214.3M

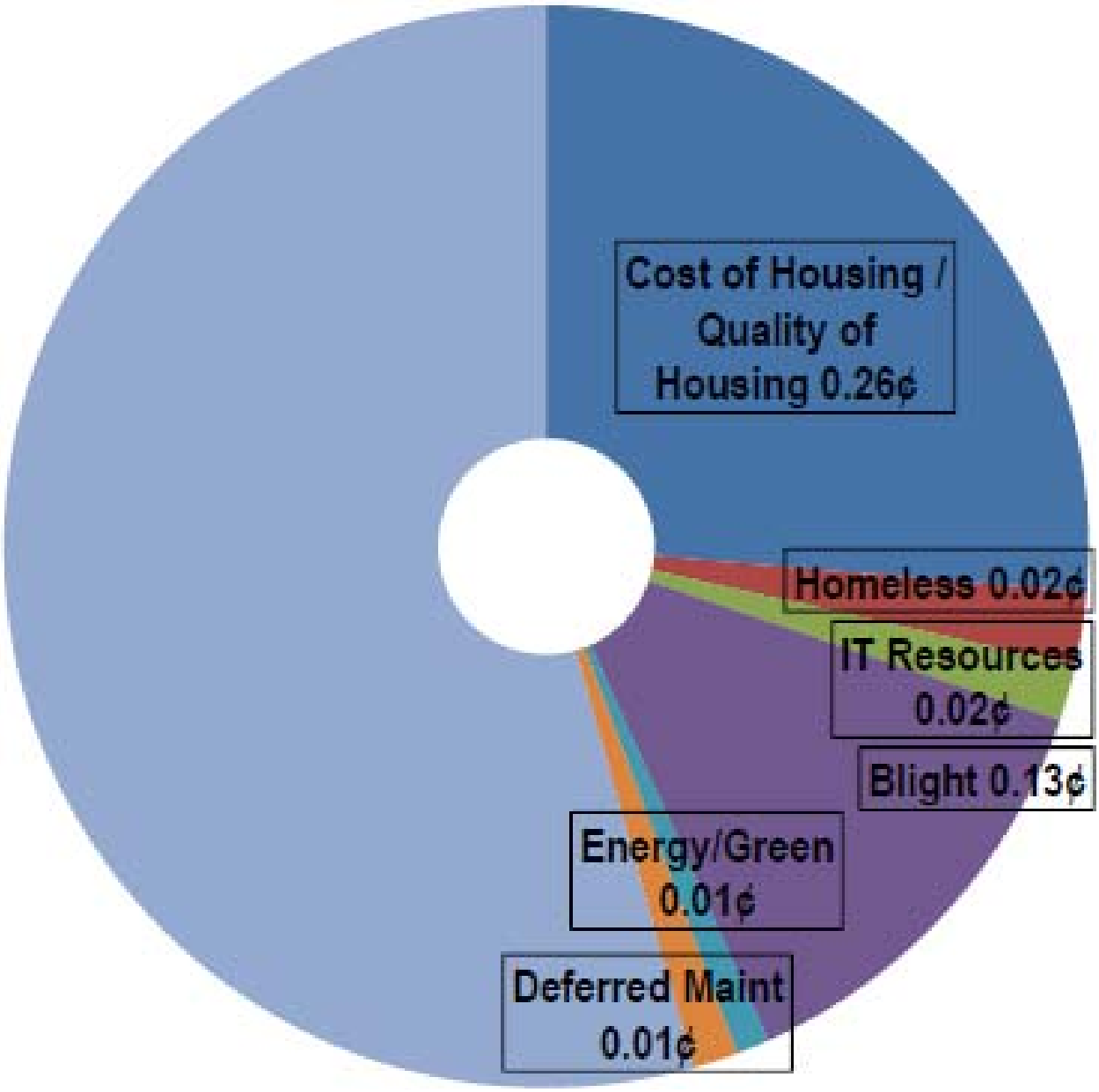
Source: Econsult Corporation (2012)

Table 5.2 – Conservative Estimate of Negative Impacts Resulting from a Temporary One-Time Cut ($470 Million) in Capital Funding to PHAs Expressed in One-Time Upfront Terms by Discounting All Ongoing Impacts to the Present

Negative Impact Category	Main Affected Group(s)	Present Value of Impact	As a % of Funding Cut Amount
Increased Cost of Housing	PHA residents/applicants	$124M	26.4%
Decreased Quality of Housing			
Increased social services expenditures	Governments, non-profits	$10M	2.2%
Exclusion from information technology resources	PHA residents, business communities	$8M	1.7%
Reduced supply to employers of low wage earners	Business communities	Not Estimated	
More crime	Governments	Not Estimated	
Increased blight on immediate neighborhood	Residential communities, governments	$61.4M	13.1%
Buildings less energy/cost efficient	PHAs	$4.6M	1.0%
More expensive repairs later	PHAs	$6.3M	1.3%
Present Value of Negative Impacts		$214M	45.6%

Source: Econsult Corporation (2012)

Figure 5.1 – Conservative Estimate of Negative Impacts Resulting from a Temporary One-Time Cut ($470 Million) in Capital Funding to PHAs (Expressed in One-Time Upfront Terms by Discounting All Ongoing Impacts to the Present) (Expressed on a Per Dollar Saved Basis)



Source: Econsult Corporation (2012)

5.2 Conservative Estimates of Permanent One-Time Cuts

Should capital funding cuts become long-term, such that annual capital funding amounts settle at a level 20 percent lower than before, the aggregate negative impacts are likely to be far greater. In fact, since this is the likelier scenario, these are the more useful results to consider.

In the long run, the size of the public housing stock is related to the size of public housing funding: it is no accident that as public housing capital expenditures declined from 2000 to 2010 (by 17 percent), public housing units also declined during the same time period (by 10 percent). Permanent capital funding cuts would constrict the number of available PHA units, resulting in far greater negative impacts in the form of higher costs of living and lower quality of life for former PHA residents, increased chronic homelessness, and far greater property value loss in surrounding neighborhoods, as well as many other significant impacts.

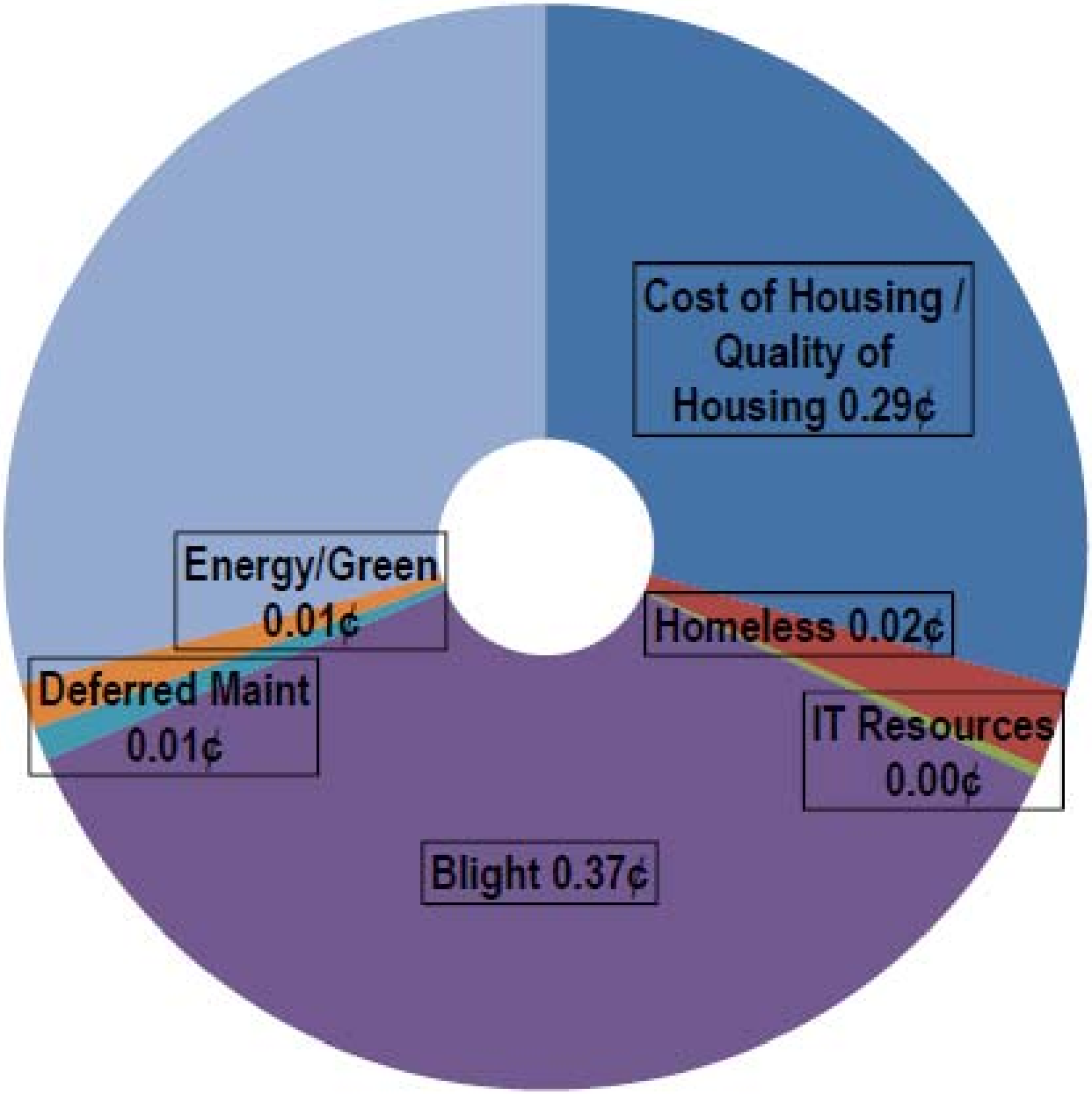
Modeling the negative impacts resulting from a permanent 20 percent cut, or $470 million, in capital funding to PHAs, and using low-end estimates yields a present value of negative impacts of $4.9 billion, which compares to a present value of funding cuts of $6.7 billion ($470 million per year in perpetuity) (see Table 5.3). Thus, for every dollar saved by HUD through capital funding cuts to PHAs, about $0.71 of negative impact would be borne by governments, PHA residents, neighborhoods, business communities, and society as a whole, with increased blight on neighborhoods near PHA units representing the largest category of negative impacts (see Figure 5.2).

Table 5.3 – Conservative Estimate of Negative Impacts Resulting from a Permanent 20 Percent Cut (Present Value of $6.7 Billion) in Capital Funding to PHAs (in Millions of Dollars)

Negative Impact Category	Impact	Present Value of Impact	As a % of Funding Cut Amount
Increased Cost of Housing	Rises to $360M per year	$1.96B	29.2%
Decreased Quality of Housing			
Increased social services expenditures	Rises to $30M per year	$163M	2.4%
Exclusion from information technology resources	$8M per year for three years	$22M	0.3%
Reduced supply to employers of low wage earners	Not Estimated		
More crime	Not Estimated		
Increased blight on immediate neighborhood	Rises to $2.8B	$2.5B	36.6%
Buildings less energy/cost efficient	$4M per year	$66M	1.0%
More expensive repairs later	$6M per year	$90M	1.3%
Total Negative Impacts		$4.76B	70.9%

Source: Econsult Corporation (2012)

Figure 5.2 – Conservative Estimate of Negative Impacts Resulting from a Permanent 20 Percent Cut (Present Value of $6.7 Billion) in Capital Funding to PHAs Expressed in One-Time Upfront Terms by Discounting All Ongoing Impacts to the Present (Per Dollar Saved)



Source: Econsult Corporation (2012)

5.3 Middle-of-the-Road Estimates

Throughout this report, low-end assumptions were utilized to provide a conservative estimate of the negative impacts resulting from cuts in capital funding by HUD to PHAs. Low-end estimates that appear in this report should be considered lower-bound figures, with the actual impacts, described as "middle of the road" estimates throughout the paper, likely to be much larger.

Utilizing mid-range assumptions instead of low-end estimates, provides some insight as to how much higher actual impacts might be. Mid-range estimates take into account the real possibility of a higher proportion of public housing residents becoming homeless as well as a greater cost amount to provide these families with shelter. These estimates also assume a greater per year depreciation rate for computer work stations, greater use per household, and a longer time horizon for digital exclusion eradication. In addition, a seven year life cycle was used for estimating the cost savings of energy improvements and timely maintenance of buildings and the impact of disinvestment on local housing prices was estimated over a one year period. Finally, it was assumed that the total disinvestment in public housing properties was equal to the total cut rather than simply the portion of the reduction that was assigned to modernize or build new units.

Based on such an approach, it is estimated that a temporary 20 percent cut ($470 million) in capital funding to PHAs would generate $470 million in negative impacts, which is equivalent to 100 percent of a temporary $470 million funding cut (see Table 5.4 and Figure 5.3). This means that savings to HUD from cuts would be completely offset by the resulting negative impacts; every dollar saved by HUD would generate $1.00 in negative impacts.[65]

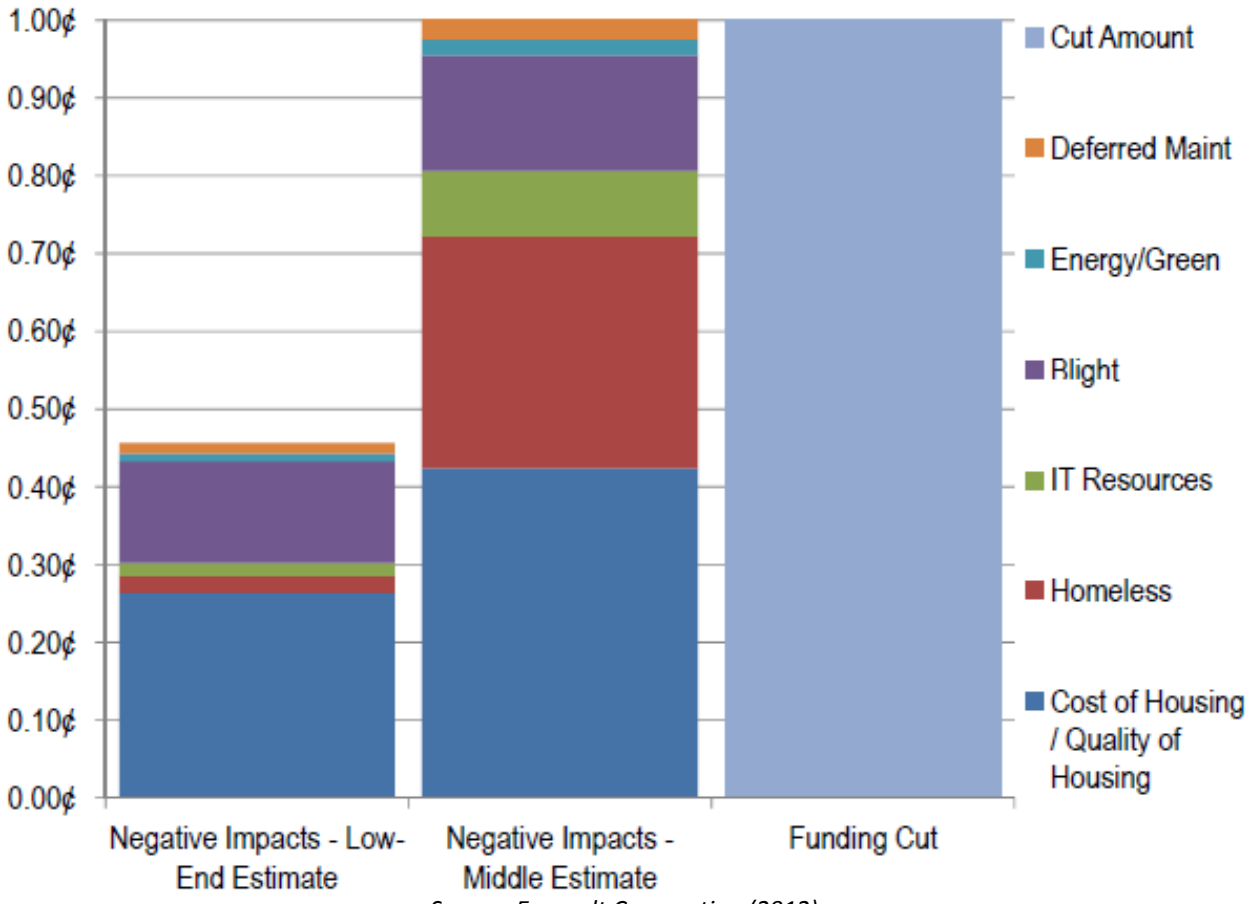
[65] See Appendix F for additional detail on the mid-range assumptions used to arrive at middle-of-the-road estimates.

Table 5.4 – Middle Estimate of Negative Impacts (Based on Mid-Range Assumptions Rather Than Low-End Assumptions) Resulting from a Temporary One-Time Cut ($470 Million) in Capital Funding to PHAs, Expressed in One-Time Upfront Terms by Discounting All Ongoing Impacts to the Present (in Millions of Dollars)

Negative Impact Category	Low-End Estimate	Percentage of Savings from Cut	Middle Estimate	Percentage of Savings from Cut
Cost of Housing / Quality of Housing	$124	26.4%	$199	42.4%
Homeless	$10	2.2%	$140	29.8%
IT Resources	$8	1.7%	$40	8.4%
Blight	$61	13.1%	$70	14.9%
Energy/Green	$5	1.0%	$10	2.0%
Deferred Maintenance	$6	1.3%	$13	2.8%
Total Negative Impacts	$214	45.6%	$471	100.3%
Total Cut Amount	$470		$470	

Source: Econsult Corporation (2012)

Figure 5.3 – Middle Estimate of Negative Impacts (Based on Mid-Range Assumptions Rather Than Low-End Assumptions) Resulting from a Temporary One-Time Cut ($470 Million) in Capital Funding to PHAs, Expressed in One-Time Upfront Terms by Discounting All Ongoing Impacts to the Present (Per Dollar Saved)



Source: Econsult Corporation (2012)

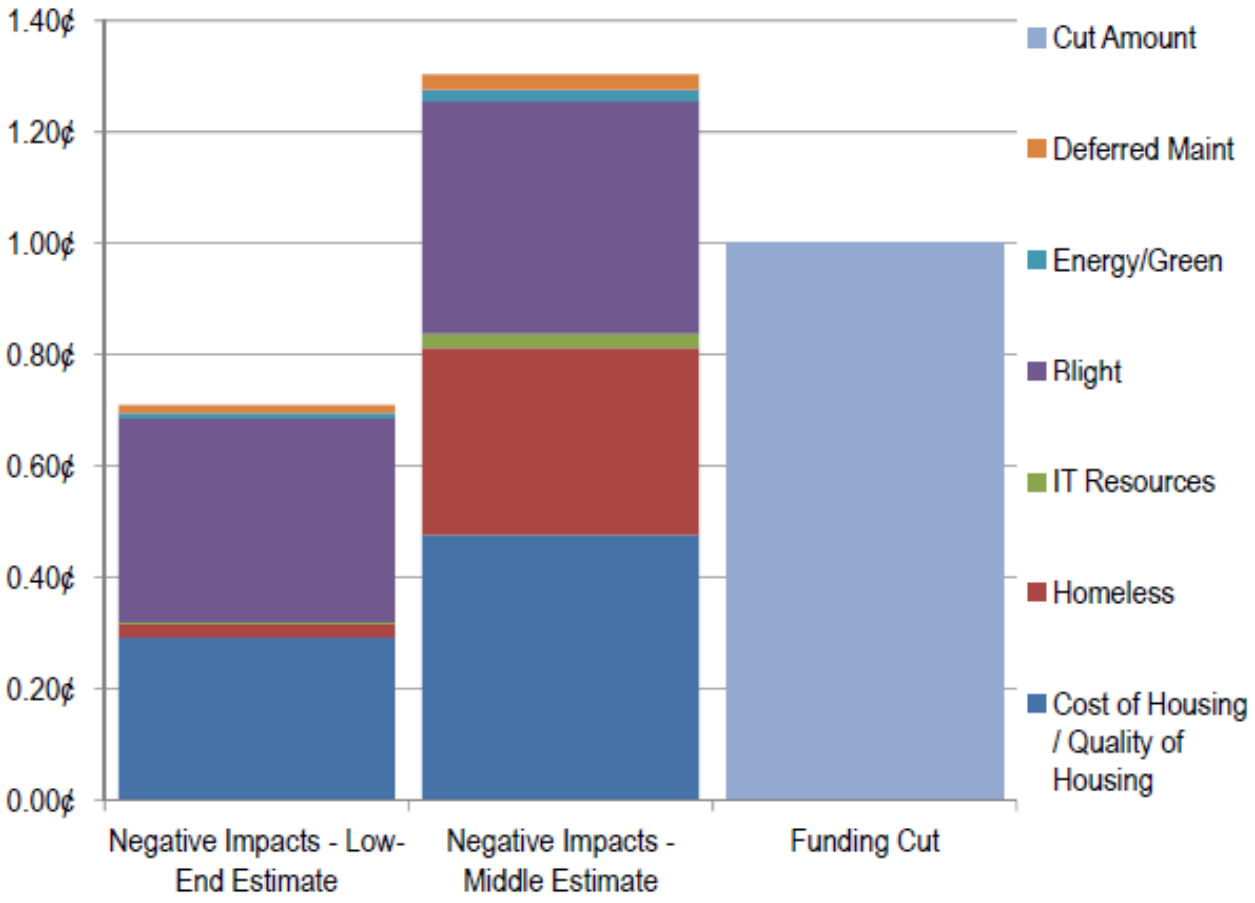
It is also estimated that a permanent 20 percent cut in capital funding to PHAs would generate $8.74 billion in negative impacts, which is equivalent to 130 percent of the present value of a permanent $470 million funding cut (see Table 5.5 and Figure 5.4). This means that savings to HUD from cuts would be more than offset by the resulting negative impacts; every dollar saved by HUD would generate $1.30 in negative impacts.

Table 5.5 – Middle Estimate of Negative Impacts (Based on Mid-Range Assumptions Rather Than Low-End Assumptions) Resulting from a Permanent 20 Percent Cut (Present Value of $6.7 Billion) in Capital Funding to PHAs, Expressed in One-Time Upfront Terms by Discounting All Ongoing Impacts to the Present

Negative Impact Category	Low-End Estimate	Percentage of Savings from Cut	Middle Estimate	Percentage of Savings from Cut
Cost of Housing / Quality of Housing	$1,961M	29.2%	$3,194M	47.6%
Homeless	$163M	2.4%	$2,253M	33.6%
IT Resources	$22M	0.3%	$174M	2.6%
Blight	$2,457M	36.6%	$2,800M	41.7%
Energy/Green	$66M	1.0%	$136M	2.0%
Deferred Maint	$90M	1.3%	$185M	2.8%
Total Negative Impacts	$4,759M	70.9%	$8,743M	130.3%
Present Value of Cut Amount	$6,709M		$6,709M	

Source: Econsult Corporation (2012)

Figure 5.4 – Middle Estimate of Negative Impacts (Based on Mid-Range Assumptions Rather Than Low-End Assumptions) Resulting from a Permanent 20 Percent Cut (Present Value of $6.7 Billion) in Capital Funding to PHAs, Expressed in One-Time Upfront Terms by Discounting All Ongoing Impacts to the Present (Per Dollar Saved)



Source: Econsult Corporation (2012)

These middle estimates by no means express the median or mean amount of negative impacts that might result from capital funding cuts. As noted, mid-range assumptions were used, rather than high-end assumptions. Also, a number of additional adverse impacts were discussed in this report but not quantified, so excluding them from these estimates understates the true magnitude of negative impacts. Since public housing has such a wide range of stakeholders in local communities, capital disinvestment has a large ripple effect in the aggregate. Therefore, in light of the magnitude of these estimates, especially given the conservative assumptions employed throughout this analysis, it is likely that cuts in capital funding to PHAs will result in significant amounts of negative impacts to a variety of stakeholders, of a magnitude that exceeds the intended cost savings from the cuts.

5.4 Estimates Based on a More Realistic Discount Rate

The estimates in this report were based on a discount rate of 7 percent, which is a standard rate used in evaluating the financial implications of government programs over time. However, a strong case could be made that a much lower rate could be employed. A discount rate is used to normalize cash flows at different time periods, so that cash flows expected further in the future can be properly compared to cash flows expected closer to the present. A discount rate of 7 percent essentially means that one is indifferent between $100 million today and $107 million in one year.

One could argue that, with borrowing rates so low in the present day, and with the prospects that they will remain low for some time to come, a much lower discount rate should be utilized to express future cash flows in present terms. Based on a discount rate of 3 percent, instead of 7 percent, the negative impacts resulting from cuts in capital funding become much larger (see Table 5.6 and Table 5.7).

Table 5.6 – Estimate of Negative Impacts Resulting from Cuts in Capital Funding to PHAs (Based on Discount Rate of 7 Percent)

	(Temporary One-Time Cut)				(Permanent Cut)			
Negative Impact Category	Low-End Estimate	% of Savings from Cut	Middle Estimate	% of Savings from Cut	Low-End Estimate	% of Savings from Cut	Middle Estimate	%of Savings from Cut
Cost of Housing / Quality of Housing	$124M	26.4%	$199M	42.4%	$1,961M	29.2%	$3,194M	47.6%
Homeless	$10M	2.2%	$140M	29.8%	$163M	2.4%	$2,253M	33.6%
IT Resources	$8M	1.7%	$40M	8.4%	$22M	0.3%	$174M	2.6%
Blight	$61M	13.1%	$70M	14.9%	$2,457M	36.6%	$2,800M	41.7%
Energy/Green	$5M	1.0%	$10M	2.0%	$66M	1.0%	$136M	2.0%
Deferred Maintenance	$6M	1.3%	$13M	2.8%	$90M	1.3%	$185M	2.8%
Total Negative Impacts	$214M	45.6%	$471M	100.3%	$4,759M	70.9%	$8,743M	130.3%
Total Cut Amount	$470M		$470M		$6,709M		$6,709M	

Source: Econsult Corporation (2012)

Table 5.6 – Estimate of Negative Impacts Resulting from Cuts in Capital Funding to PHAs (Based on Discount Rate of 3 Percent)

	(Temporary One-Time Cut)				(Permanent Cut)			
Negative Impact Category	Low-End Estimate	% of Savings from Cut	Middle Estimate	% of Savings from Cut	Low-End Estimate	% of Savings from Cut	Middle Estimate	%of Savings from Cut
Cost of Housing / Quality of Housing	$215M	45.7%	$345M	73.5%	$6,729M	100.3%	$10,964M	163.4%
Homeless	$18M	3.8%	$242M	51.6%	$558M	8.3%	$7,733M	115.3%
IT Resources	$8M	1.7%	$40M	8.4%	$23M	0.3%	$187M	2.8%
Blight	$66M	14.1%	$70M	14.9%	$2,642M	39.4%	$2,800M	41.7%
Energy/Green	$5M	1.0%	$11M	2.3%	$160M	2.4%	$353M	5.3%
Deferred Maintenance	$7M	1.4%	$14M	3.1%	$219M	3.3%	$481M	7.2%
Total Negative Impacts	$318M	67.6%	$722M	153.8%	$10,330M	154.0%	$22,518M	335.7%
Total Cut Amount	$470M		$470M		$6,709M		$6,709M	

Source: Econsult Corporation (2012)

A temporary one-time 20 percent cut ($470 million) in capital funding is estimated to result in $318 million to $722 million in negative impacts, or 68 percent to 154 percent of the savings generated by the funding cut. A permanent 20 percent cut (present value of $6.7 billion) in capital funding is estimated to result in $10.3 billion to $22.5 billion in negative impacts, or 154 to 336 percent of the savings generated by the funding cut. In other words, based on a discount rate that is closer to today's borrowing rates, the negative impacts estimated to result from capital funding cuts are likely to well more than offset the savings generated by the funding cut.

5.5 Policy Implications

The findings of this study demonstrate that reductions in capital funding result in meaningful amounts of negative impacts to a variety of stakeholders, and that negative impacts become even more significant if funding cuts are permanent in nature. Even using low-end assumptions, it is estimated that capital funding cuts generate negative impacts that partially offset the cost savings ($0.46 for every dollar, if the cuts are temporary, and $0.71 for every dollar, if the cuts are permanent, and even greater negative impacts if a more realistic discount rate is employed). Using mid-range assumptions, it is estimated that capital funding cuts generate negative impacts that fully offset the cost savings ($1.00 for every dollar, if the cuts are temporary, and $1.30 for every dollar, if the cuts are permanent, and even greater negative impacts if a more realistic discount rate is employed).

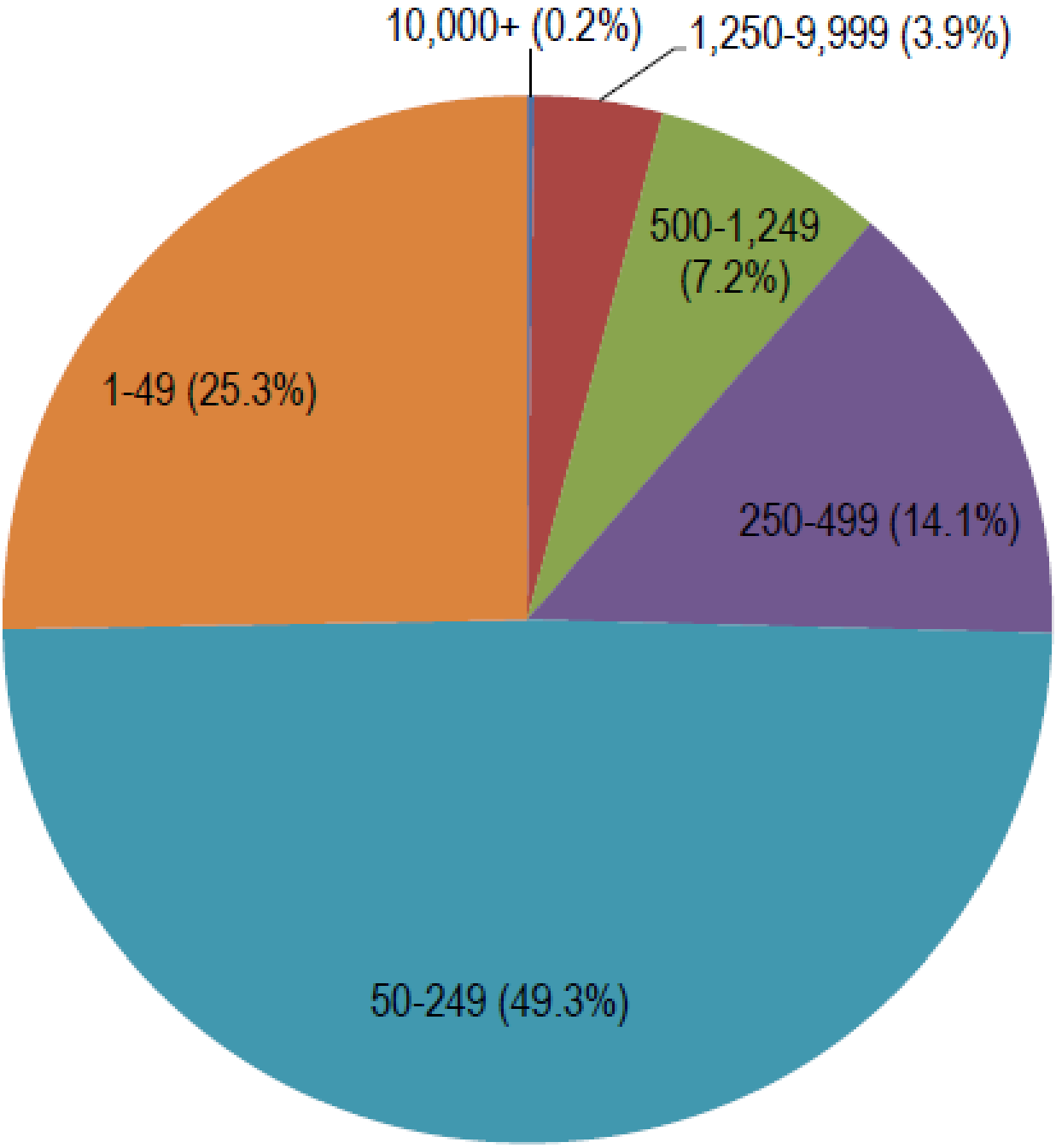
Our findings suggest that cuts in capital funds do not save as much as intended. Thus cuts in public housing capital funding may not be the most cost effective cuts to make in a climate of belt-tightening. Such cuts can rob both previous investments made in the nation's housing stock as well as future revenues. In addition to further the shrinking affordable housing portfolio, these cuts can also set back impoverished and working class families struggling to graduate from federal assistance. In the long term, capital fund cuts can also contribute to disinvestment in surrounding neighborhoods and local communities.

The policymaking process by which capital funding cuts are discussed should therefore consider the scale and composition of these negative impacts. Decisions about if, when, and how much funding is cut should particularly take into account the fact that such cuts will not only negatively impact PHAs and the vulnerable households that they serve, but will also have adverse effects on surrounding neighborhoods, state and local governments, business communities, and non-profit social service providers.

The importance of capital investment in PHAs, and the negative consequences of capital disinvestment, also indicates that PHAs should be given greater flexibility in accessing and spending capital funding. Increased agility in obtaining capital funds from various federal and private sources helps avoid any adverse consequences from disinvestment resulting from funding interruptions. Meanwhile, greater leeway in deploying scarce resources towards capital projects of greatest needs ensures that those scarce resources are more efficiently used and that the negative consequences of capital disinvestment are staved off as best as possible.

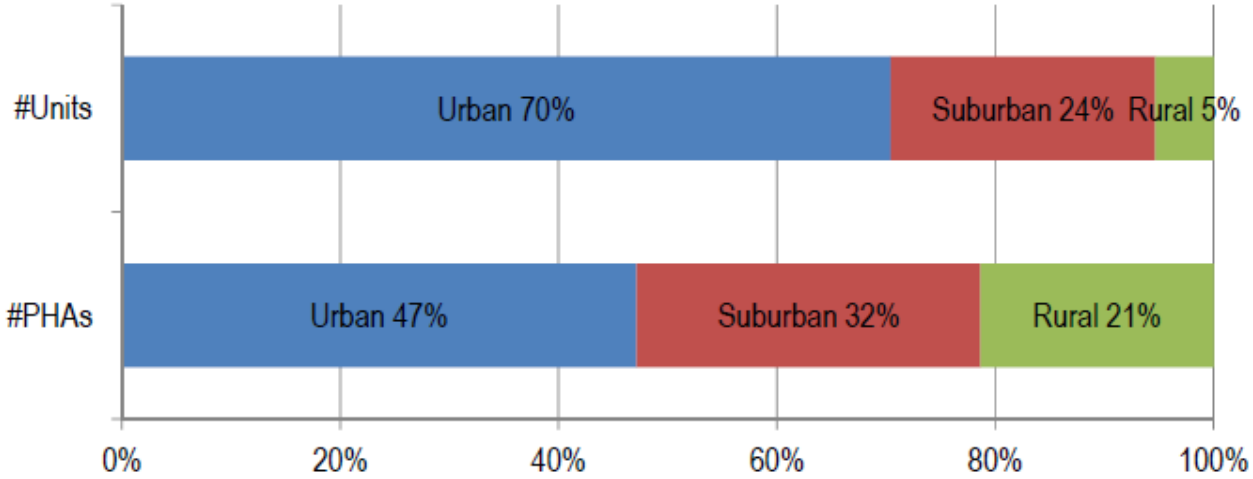
APPENDIX A – THE COMPOSITION OF PHAS AND PHA UNITS WITHIN THE U.S.

Figure A.1 – Distribution of PHAs in the U.S. by Number of Units



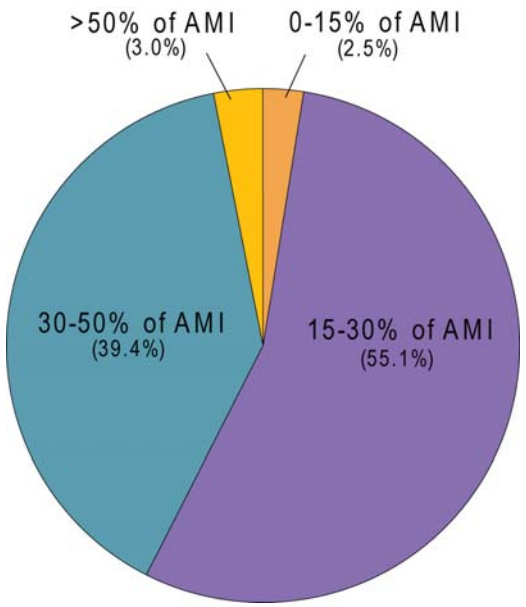
Source: U.S. Department of Housing and Urban Development (2011), Econsult Corporation (2012)

Figure A.2 – Distribution of PHAs in the U.S. by Density Type[66]



Source: U.S. Department of Housing and Urban Development (2011), Econsult Corporation (2012); PAHRC (2011)

Figure A.3 – Distribution of PHAs in the U.S. by Resident Income (as a Percentage of Area Median Income)[67]



Source: U.S. Department of Housing and Urban Development (2011), Econsult Corporation (2012)

[66] See Appendix G for the methodology for designating PHAs as urban, suburban, or rural. Non-census-designated places (291) were not included in this total.

[67] Average household income of residents of the PHA as a percentage of the median household income of the metropolitan region within which the PHA is located.

APPENDIX B – SURVEY ANALYSIS METHODOLOGY AND RESULTS

In conjunction with PAHRC, several waves of surveys were distributed to all PHAs between June 2011 and December 2011. Because of the slightly different wording of waves of surveys, and the various ways in which respondents interpreted survey questions, there were a number of somewhat overlapping ways in which survey responses reflected PHAs' estimate of how they would distribute their capital funding by capital expenditure category. Over 450 PHAs responded with information on their capital expenditure cut priorities, of which 66 of those responses were used for determining a nationwide distribution of cuts (see Table B.1 and Table B.2).

Table B.1 – Summary of Distribution of Usable Survey Respondents (1st #/%) and PHAs (2nd #/%) by Size-Region Pairs

	Regions 1-3	Regions 4-10
<500 Units	6 (9.1%) / 264 (8.3%)	29 (43.9%) / 2,060 (65.0%)
500+Units	11 (16.7%) / 265 (8.4%)	20 (30.3%) / 581 (18.3%)

Source: Individual PHAs (2011), Econsult Corporation (2012)

Table B.2 – Summary of Distribution of All Survey Respondents (1st #/%) and PHAs (2nd #/%) by Size-Region Pairs

	# of Survey Respondents	% of Survey Respondents	# of PHAs Managing Public Housing Units	% of PHAs Managing Public Housing Units
Region				
1	34	7.0%	170	5.4%
2	24	4.9%	164	5.2%
3	37	7.6%	171	5.5%
4	107	22.0%	797	25.5%
5	94	19.3%	533	17.0%
6	71	14.6%	699	22.3%
7	62	12.7%	346	11.1%
8	16	3.3%	118	3.8%
9	25	5.1%	76	2.4%
10	17	3.5%	58	1.9%
Total	487	100.0%	3,132	100.0%
HA Total Units				
1 to 49	70	14.6%	786	25.4%
50 to 249	217	45.2%	1,532	49.5%
250 to 499	89	18.5%	422	13.6%
500 to 1,249	57	11.9%	227	7.3%
1,250 to 9,999	43	9.0%	123	4.0%
10,000 Plus	2	0.4%	6	0.2%
Total	480	100.0%	3,096	100.0%
HA Family/Elderly Units				
Family	148,143	59.1%	704,336	61.0%
Elderly	102,476	40.9%	451,079	39.0%
Total	250,619	100.0%	1,155,415	100.0%
HA Suburban/Urban/Rural				
Urban	228	52.7%	1,261	47.4%
Suburban	153	35.3%	837	31.5%
Rural	52	12.0%	560	21.1%
Total	433	100.0%	2,658	100.0%

Source: Individual PHAs (2011), Econsult Corporation (2012)

I. Some PHAs ranked capital expenditure categories, assigning a "1" to the first category they would cut, a "2" to the second category they would cut, and so on. This yielded useful information in how PHAs would prioritize capital expenditure categories (see Table B.3). However, there was insufficient overlap and correlation between the answers of survey respondents who ranked categories and those who assigned dollar values or percentages of cuts to determine how rankings might translate into cut proportions. Therefore, any survey responses that only ranked capital expenditure categories could not be used in determining estimates of cut proportions or amounts, but rather provided important information about cut priorities.

II. Some PHAs assigned percentages to capital expenditure categories, denoting cut amounts as a percentage of historical expenditures in those categories. Since historical expenditure data by capital expenditure category by PHA was not available, these figures could not be used in determining estimates of cut proportions or amounts.

III. Some PHAs assigned dollar values to capital expenditure categories, denoting cut amounts in each category. These dollar values were converted into proportions of cut totals by category, and then sized up or down to sum to an overall capital funding cut of 20 percent.

IV. Some PHAs assigned percentages to capital expenditure categories, denoting cut amounts as a percentage of total cuts. Since distribution of historical expenditure data by PHA was available, a total cut amount, and the distribution of those cuts across categories, could be determined.

Table B.3 – Summary of Distribution of Survey Respondent Rankings of Capital Expenditure Categories to Cut

Capital Expenditure Category	Response Rate[68]	Rank of Response Rates	Average Rank[69]	Rank of Average Ranks
Develop and finance new units	43%	6	3.3	1
Modernize existing units	86%	1	3.8	5
Deferred maintenance	75%	2	4.3	7
Management improvements	73%	3	3.7	3
Demolition	26%	11	4.5	8
Resident self-sufficiency program	48%	5	3.7	4
Security	42%	7	4.7	9
Offset against unobligated funds	29%	10	5.5	10
Homeownership	30%	9	3.8	6
Energy/green improvements	70%	4	3.6	2
Take units offline	31%	8	6.7	11
Other	18%	12	6.8	12

Source: Individual PHAs (2011), Housing Authority Insurance Group (2011), Econsult Corporation (2012)

Survey respondents of Type III and IV could therefore be consolidated together, yielding a respondent pool whose answers could be extrapolated to all PHAs. To further simplify this exercise, the following capital expenditure cut categories were adjusted:

[68] That is, among those PHA survey respondents that ranked capital expenditure categories that would be cut in response to capital funding cuts.

[69] 1 = cut first, 2 = cut second, etc.

1. "Offset against unobligated funds" and "Other" were proportionally reassigned to other expenditure categories.

2. "Take units offline" was reassigned to "Demolition." Since it is less costly per unit to take a unit offline than to demolish it, this is a conservative assumption, because it results in an understatement of the number of units that are lost due to capital funding cuts, and therefore results in an understatement of the negative impact associated with such cuts.

3. 80 percent of "Management improvements" was proportionally reassigned to other expenditure categories, to signify the proportion used for PHA-wide improvements such as management training and infrastructure investments, and the remaining 20 percent was left in "Management improvements," to signify the proportion used for direct information technology resources for PHA residents.

In taking this approach, it is being assumed that the aggregate distribution of capital expenditure cuts for the 66 usable survey respondents is a reasonable proxy for the aggregate distribution of capital expenditure cuts for all PHAs. This appears to be a difficult assumption to make, yet, consider the variable nature of capital expenditures and capital expenditure cut decisions. It is possible that knowing the capital expenditure cut proportions for 99 percent of PHAs provides little additional confidence in predicting the capital expenditure cut proportions for the remaining 1 percent of PHAs, since needs and preferences are so different. It is also possible that knowing the capital expenditure cut proportions for any PHA provides little additional confidence in predicting that same PHA's capital expenditure cut proportions barely a year later, since needs and preferences are so time-sensitive. In other words, capital expenditure decisions are near impossible to predict with any level of accuracy, and therefore, this approach is taken with the caveat that it involves the assumption described above.

Apportioning total cut amounts by the aggregate proportions represented by the 66 usable survey respondents results in an estimate of the distribution of capital expenditure cuts from a 20 percent cut of capital funding for every single PHA in the US. Summing these estimated cuts provides an approximate amount of capital expenditures not made in each capital expenditure category (see Table B.4).

The composition and scale of actual cuts by PHAs in response to funding cuts may differ from their survey responses for a variety of reasons. PHAs may change their mind when making real decisions (e.g. capital expenditures are variable in nature and unanticipated needs may have arisen since survey completion). They may be constrained in their allocation of cuts by a variety of regulatory restrictions (e.g. the extent to which operating funds can or cannot be used to offset cuts in capital funds). Or, they may be able to offset reduced funding from HUD by identifying other funding sources (e.g. private financing of mixed-income developments).

Table B.4 – Estimated Distribution of Capital Expenditure Cuts in One Year Given a Temporary One-Time 20 Percent Cut ($470 Million) in Capital Funding, Based on Survey of PHA Executives

Rank	Category	Percent to be Cut	Amount Cut (in Millions of Dollars)
1	Modernize existing units	54.6%	$256.2
2	Deferred maintenance	16.1%	$75.7
3	Energy/green improvements	7.0%	$33.1
4	Develop and finance new units	6.2%	$29.1
5	Security	4.7%	$22.2
6	Resident self-sufficiency program	3.9%	$18.4
7	Management improvements	3.6%	$17.1
8	Demolition	2.4%	$11.5
9	Homeownership	1.3%	$6.2
	Total Capital Expenditure Cuts	100.0%	$469.6

Source: Individual PHAs (2011), Econsult Corporation (2012)

These deviations do not materially affect the results in this report. It is assumed that survey responses reflect the true will of PHAs and represent an accurate portrayal of what they can and cannot cut. It is also assumed that replacing reduced HUD funding with any non-HUD funding sources does not reduce the estimated negative impact from the reduced funding, since any use of non-HUD funding sources represents a loss of those funds for other positive use. Finally, it is assumed that past spending levels in individual capital expenditure categories do not necessarily reflect anticipated future spending levels. This is because capital expenditure needs may vary greatly from year to year between capital expenditure categories. This is also because PHAs have considerable leeway in determining their allocation of capital funding across capital expenditure categories. Therefore, it is not necessarily incorrect for them to suggest that they will make a spending cut in a particular capital expenditure category that exceeds their historical spending in that capital expenditure category.

APPENDIX C – SELECTED SURVEY COMMENTS: INVESTMENT RESPONSE TO A CAPITAL FUNDING CUT OF 40 PERCENT

All rounds of surveys included space for respondents to comment narratively on their capital investment response to different levels of capital funding cuts. Here are some illustrative comments concerning a 40 percent cut (they are presented in their totality, without editing):

- "A 40% reduction would mean no additional developments would be built and units will have to be taken off line to complete the projects that have the most impact."
- "Cancel all improvements."
- "Close."
- "Closing the HA."
- "I'm uncertain how we could effectively operate--or operate at all."
- "Likely take some properties offline."
- "No worth responding to, because we are talking about not enough to do anything."
- "Only conduct extremely essential modernization activities which affect the safety and security of our tenants."
- "Probably cannot continue to operate for more than 6 mos."
- "Reduce modernization of units and grounds because 95% of the Cap Fund is used to modernize and upgrade units."
- "Shut down."
- "Start moving people out and close the doors."
- "Take units offline."
- "The doors would be closed as this is unacceptable - no improvements, replacements would be made."
- "There basically would be only security systems updated. The buildings will be falling down but we will do our best to keep the residents safe of fire."
- "Unable to operate."
- "We would be taking units off line and start talking about running a section 8 program only."

APPENDIX D – PROPERTY VALUE IMPACTS: BIBLIOGRAPHY OF SELECTED SOURCES

Ding, Chengri and Gerrit-Jan Knaap. "Property Values in Inner-City Neighborhoods: The Effects of Homeownership, Housing Investment, and Economic Development". Housing Policy Debate, 2003.

Goetz, Edward, Hin Kim Lam, and Anne Heitlinger. "There Goes the Neighborhood? The Impact of Subsidized Multi-Family Housing on Urban Neighborhoods". University of Minnesota Center for Urban and Regional Affairs, 1996.

Nguyen, Mai Thi. "Does Affordable Housing Detrimentally Affect Property Values? A Review of the Literature". Journal of Planning Literature, 2005.

Nourse, Hugh. "The effect of public housing on property values in St. Louis". Land Economics, 1963.

Pendall, Rolf. "Opposition to Housing: NIMBY and beyond". Urban Affairs Review, 1999.

Santiago, Anna, George Galster, and Peter Tatian. "Assessing the property value impacts of the dispersed housing subsidy program in Denver". Journal of Policy Analysis and Management, 2001.

Zielenbach, Sean and Richard Voith. "HOPE VI and Neighborhood Economic Development: The Importance of Local Market Dynamics". Cityscape: A Journal of Policy Development and Research, 2010.

APPENDIX E – PROPERTY VALUE IMPACT METHODOLOGY

E.1 Approach

There is widespread recognition that neighborhood quality has important welfare effects for households. There are many models of the determinants of neighborhood quality, generally reflected by the condition of various physical, social, and economic factors. While quality of a neighborhood may be important, the multidimensional nature of its determinants make it difficult to measure concisely. For this reason, home prices are often used as a proxy for quality.

The physical condition of a property is thought to have spillover effects on the value of neighboring property. For example, both vacant properties and properties in foreclosures have negative impacts on nearby properties. These spillover effects are thought to result from potential antisocial activity occurring on vacant properties, declining physical quality of the neighborhood as maintenance expenditures are foregone, as well as the excess supply of housing that is also associated with fire sale disposition of properties by foreclosing banks. The maintenance decisions of neighbors are also thought to have an impact on one's own household investment choices. Spillovers associated with home improvement investment decisions imply that there are self-reinforcing external effects of the decision to make or not make home improvement investments. The endogeneity of home improvement investment decisions greatly complicate efforts to empirically measure the impact of property upgrades or deterioration on neighboring house values.

One argument for supporting public housing is that providing higher quality housing causes positive spillover effects into the neighborhood. In contrast, public housing projects have sometimes been opposed by local community members due to concerns of negative externalities and declining property values (Pendall, 1999). Similar to the public perception, the literature is divided on the issue as well.

Overall, the literature suggests that the effect of public housing on neighborhood qualities varies, and can depend on the structure of the affordable housing and neighborhood characteristics. Earlier studies, dating back to at least 1963 (Nourse, 1963) used the approach of selecting particular control areas without public housing to compare to areas with public housing to see if either has a faster growth rate in home prices. Nguyen (2005) surveyed studies using this methodology and found that all nine studies from 1963 to 1985 found that affordable housing – including public housing, section 8 vouchers, subsidized units, and other types – has either positive or statistically insignificant effects on home prices.

However, these early studies suffered from lack of proper controls and often small sample size (Nguyen, 2005). In recent years, a new wave of research has improved upon the earlier research with more rigorous methodologies using Geographic Information Systems (GIS) and hedonic regression models. These studies attempt to decompose the value of housing into the

monetary values of the various characteristics of the houses. For instance, a dollar value[70] may be estimated for square footage of property, number of bedrooms, quality of the housing exterior, and lot acreage. In addition, valuations can be estimated for various characteristics external to the physical property, like distance from various amenities, quality of nearby schools, and distance from a central business district. This technique can be used to "price" disamenities as well as amenities, which means the negative valuation that households place on pollution, for instance, can be estimated. This allows researchers to estimate whether being located near public housing is an amenity or a disamenity, and how much it affects nearby housing prices.

Reviewing these newer hedonic studies, Nguyen concludes that affordable housing may reduce property values, however when they do have negative impacts, they tend to be small. In addition, several studies show that affordable housing can increase values as well.

More importantly, Nguyen argues that property value impacts depend on the characteristics of the affordable housing. One important determinant is the quality of the affordable housing. Santiago, Galster, and Tatian (2001) found that rehabilitating public housing sites lead to significant appreciation in nearby neighborhoods. Goetz, Lam, and Heitlinger provide evidence that better managed public housing increases property values, while poorly managed sites decrease property values. Zielenbach and Voith (2010) found that the reason that HOPE VI redevelopments in Boston and Washington, D.C. were more likely to have positive spillovers is they were in communities with other development pressures, and stable institutions. Nguyen concludes that the balance of the literature shows that the best ways to ensure that public housing increases rather than decreases neighborhood housing values is to make sure the affordable housing is "of quality design and management".

There have been other studies specifically examining the relationship between government housing investment and neighborhood quality. For example, Ding and Knaap looked at new housing investment built with government or community development corporation subsidies in Cleveland, and found that the investment had a positive impact on nearby housing values. They found that every dollar invested in new housing increased the sale value of houses within 150 feet by $0.10 per acre, and those between 150 and 300 feet by $0.02 per acre.

The overall conclusion of the literature then is that while the impact of public housing can be either positive or negative, decreases in quality or investment are likely to have a negative impact on housing.

[70] When estimated using the natural log of prices or prices per square foot, which is often the case, these will be interpreted as percentage increase in prices due to various amenities. For instance, house prices per square foot may be an estimated 6% higher for every additional bedroom instead of, say, an estimated $10 per square foot.

E.2 Estimating Negative Impacts on PHA Residents

In this section of the report, we examine the potential impacts of changes in the physical condition of public housing sites on neighboring property values and we evaluate the impact of capital expenditures by public housing authorities on the physical condition of public housing sites. Does improving the physical condition of public housing sites positively affect the property value of the surrounding neighborhood? Or, on the other hand, does physical deterioration of public housing adversely affect the neighborhood? What are the likely impacts of reductions in public housing capital budgets on property values in neighborhoods close to the public housing sites?

We examine this issue by measuring the relationship between public housing building conditions and neighborhood house value. We then evaluate the likely impacts of capital budget cuts on building conditions to determine the neighborhood impacts of the budget cuts. Note, however, that our estimates are solely focused on the impacts related to deteriorating physical conditions at public housing sites. It is also conceivable, and perhaps likely, that capital budget reductions for public housing authorities affect neighborhood property values through other channels as well.

Measurement of the spillover impacts of building conditions on neighboring property value is, in fact, much more straightforward for public housing than for measurement of the spillover impacts of changes in physical conditions of private properties. Unlike the private investment decision where investment decisions depend on the choices of other private property owners, the decision to invest or not in a public housing site is likely to be independent of the investment choices of neighboring property owners. Thus, the measure impacts of public housing conditions on neighborhoods can be viewed as unidirectional and causal.

E.3 Data

Unlike private properties, there is a consistent ranking system for physical conditions of public housing properties. The U.S. Department of Housing and Urban Development's (HUD) Real Estate Assessment Center (REAC) has developed a program to evaluate the conditions of public housing properties. REAC's evaluation system, which is called the Physical Assessment Sub System (PASS), is intended to generate accurate and replicable physical evaluations of public housing properties. PASS is a complex rating system based on inspections of the:

- Site;
- Building exterior;

- Building systems;
- Common areas; and
- Dwelling units.[71]

Properties are periodically evaluated to produce a score (frequently called the REAC score) that rates the physical condition of a property on a scale of 0 (worst) to 100 (best).

We use the change in REAC scores for the same properties as measured in the period 2000 to 2003 to measurements from the period from 2006 to 2009 to evaluate the effects of changes in REAC scores on median neighborhood home values at the block group level. Median home prices are based on the 2000 Census and the 2005-2009 combined American Community Survey. Together with other controls, we construct an econometric model relating public housing authority condition changes and median home value changes in neighborhoods (see Table E.1).

Table E.1 – Means and Standard Deviations of Key Data

Variable	Mean	Standard Deviation
First REAC Score	79.13	15.45
Final REAC Score	82.42	14.50
REAC Score % Change	0.08	0.31
Median Home % Change	0.96	1.25

Source: Econsult Corporation (2012)

We have 12,152 observed changes in REAC scores (one change per property). Within a ½-mile of the public housing sites, there are 23,546 block groups with observed changes in median home prices; within 1.5 miles of the PHA sites there are 70,185 block groups. [72] We have also collected data of median home values in both periods for every county in our sample. This data is used to control for changes in regional market conditions during the period.

[71] Based on YouTube video posted by HUD: http://www.youtube.com/watch?v=DJf5M9JtbaE.

[72] The dataset was compiled using GIS software to find the closest public housing properties (at most 15) that are within 1.5 miles of each block group.

In addition, we assembled data on capital expenditures at the PHA level from 2000 to 2010. We use these data to estimate a relationship between capital expenditures and building condition so that we can simulate the effects of capital budget reductions on neighborhood property values.

E.4 Measuring Building Condition Spillovers

The econometric models relate changes in house prices in the neighborhood near public housing sites to changes in the physical condition of the public housing property as reflected in changes in REAC scores. We hypothesize that:

- Neighborhood appreciation should be positively correlated with changes in REAC scores; and

- Change in REAC scores should have larger impacts closer to the public housing site.

We propose a rigorous test for the relationship between median home value changes and REAC score changes through the inclusion of county-wide median home value changes to control for overall market factors affecting local market appreciation. We estimate two models to evaluate the impact of REAC scores on appreciation. The simplest framework shown in equation 0.1 is estimated only in census blocks whose centroids lie within a ½-mile of the public housing property, and constrains the impact to be the same across census tracts.

(0.1) $$\frac{V_{j,k,t-}V_{j,k,t-s}}{V_{j,k,t-s}} = \alpha_0 + \alpha_1 \frac{C_{i,k,t} - C_{i,k,t-s}}{C_{i,k,t-s}} + \alpha_2 \frac{I_{k,t} - I_{k,t-s}}{I_{k,t-s}} + \varepsilon_{j,k}$$

Where: $V_{j,k,t-s}$ is the median value of houses in neighborhood j in region k at time period t-s;
$C_{i,k,t-s}$ is the REAC score of the public housing property i;
$I_{k,t-s}$ is the change median house price in region k at time t-s.

We generalize model 1 to allow the impacts of changes in REAC scores to vary with distance from the public housing site by interacting the REAC score with the distance of the centroid of each block group. We expect the magnitude of the impact to fall within distance from the public housing property and therefore we expect the coefficient on the interaction term to be negative.

(0.2) $$\frac{V_{j,k,t-}V_{j,k,t-s}}{V_{j,k,t-s}} = \beta_0 + \beta_1 \frac{C_{i,k,t} - C_{i,k,t-s}}{C_{i,k,t-s}} + \beta_2 \frac{C_{i,k,t} - C_{i,k,t-s}}{C_{i,k,t-s}} * d_{i,j} + \beta_3 d_{i,j} + \beta_4 \frac{I_{k,t} - I_{k,t-s}}{I_{k,t-s}} + \upsilon_{j,k}$$

Where: $d_{i,j}$ is the distance from housing property I to the centroid of neighborhood j.

Model 2 is estimated using all census block groups containing the public housing property or within 1.5 miles of the public housing property.[73]

E.5 Findings: Building Condition Spillovers

Our empirical analysis revealed a non-linear relationship between median house price changes and changes in REAC scores. Specifically, we found a significant, positive relationship between public housing condition and neighborhood property value that declined with distance for all public housing properties except properties whose REAC score changes were in the worst 10 percent of the distribution. For these properties in the bottom 10 percent of the distribution of the change in REAC scores, REAC scores were negatively related to house price changes over the sample period, and the negative relationship diminished with distance, which is the opposite of what we had hypothesized. For reasons discussed below, the positive relationship evident in 90 percent of the data is the best estimate (see Table E.2).

[73] Block groups with median house price falling more than 50% or increasing more than 500% were excluded as outliers.

Table E.2 – Change in Median House Value for the Top 90 Percent of REAC Score Changes

	Model 1			Model 2		
	Coef	t-stat		Coef	t-stat	
Intercept	-0.0019	-0.23		0.065	13.7	*
REAC Change	0.041	4.14	*	0.068	7.13	*
REAC Change * Distance				-0.026	-2.74	*
Distance (Miles)				-0.042	-10.63	*
County House Price Change	1.14	126.52	*	1.07	320.83	*
Adjusted R^2	0.314			0.328		
Number of Observations	35,678			215,513		
*Denotes Significance at the 1% level						

Source: Econsult Corporation (2012)

Both models show a significant, positive impact of REAC score changes on median house value changes in neighboring communities. The coefficient on REAC score is economically significant. It implies that a 10 percentage point increase in REAC score would result in a 0.4% increase in median house prices. Model 2 shows that the positive impacts decline with distance. Not surprisingly, most of the change in neighborhood house prices is explained by regional market conditions as measured by the median county house price change. Interestingly, the coefficient on county house price change is greater than 1, suggesting that a) the neighborhoods near public housing are more volatile and b) since 2000-2007 was a period of general house price growth, home prices in neighborhoods near public housing grew more rapidly than did other housing. These findings are strong evidence that improvements in the physical condition of public housing have spillover effects on neighboring communities.

The finding that the improved physical condition of public housing is not universal in our sample. As mentioned above, neighborhoods near public housing with properties that had the worst declines in condition (the bottom 10 percent which had declines in REAC scores of more than 25 percent) were found to have a negative correlation between house price appreciation and REAC scores. That is, worsening measured condition of the public housing properties was associated with higher neighborhood appreciation. We do not believe, however, that the negative estimated relationship between median house value appreciation and REAC scores for the 10 percent of properties experiencing the largest drops is a good measure of the typical impact of building depreciation for several reasons:

- Building depreciation is a gradual process; large declines in REAC scores over a relatively short period of time (roughly 6 years) suggest that either the initial score was too high or the second score too harsh. Thus the validity of large REAC score declines is in question. In contrast, note that the renovation process should be expected to result in large increases in REAC scores so that there is no analogous reason to question large increases in REAC scores.

- Properties that have very large drops in REAC scores also have very low REAC scores (the 10 percent of properties with the largest decline in REAC scores have an average recent REAC score of 47.7 compared with the average of 77 for the entire sample. Very low REAC scores may be either a predictor of future investment of the public housing project which would lead to future improvement.

- Low and declining REAC scores may be the result of phasing out of properties which could pave the way for neighborhood improvement by the removal of obsolete public housing properties. There is some anecdotal evidence that this does occur. For instance, a random sample of 27 developments in the lowest 10 percent of REAC drops was investigated further. Seventeen of these developments were still existent and family based complexes, while five were demolished or revitalized, and five were senior living facilities. As one example, **Chester Towers** development was demolished and then revitalized after the last REAC score in 2006. In 2004, Chester Housing Authority received a Hope VI, and proceeded with the revitalization of Chester Towers. All of the residents of Chester Towers were successfully relocated in 2007. By March 2011 five out of six of the project phases had been completed. In another example, **Dove Court** development was demolished in 2008 shortly after its last REAC score. The revitalization plan of Dove Court, which sits on 14 acres, is the largest ever taken by the Richmond Redevelopment and Housing Authority. The proposed plan is for the sale of both market rate and low income housing.

For the calculation of the impact of changing REAC scores on neighboring aggregate residential value, we rely only on the estimates of Model 1 and calculate the impacts within a ½-mile of the public housing property. The estimates from this model are much lower than those from Model 2, for which average impacts are higher and the area of impact is much larger.

E.6 Estimated Results

In order to investigate the relationship between REAC scores and HUD capital grants, average REAC scores were estimated for individual PHA developments for two periods: 2000-2003 and 2006-2009. Only those with observations in both periods were used for this analysis. The

percent change in average REAC score between these two periods was used as the dependent variable, and change in average HUD funding for the corresponding PHA in that period was used as the independent variable. The final sample was 12,163 observations.[74] The regression results report that a decline in HUD capital funds of 20 percent would lead to a decline in REAC scores of 1.19 percent.[75]

Based on the model of neighborhood property value impacts, we can link this decline in REAC scores to changes in property values. There are 12,152 public housing properties for which we have REAC change data and there are over 44.3 million houses within a ½-mile of these properties. The aggregate value of these properties is $2.9 trillion. Based on the coefficients in the model and data on the median house value in each tract, the projected impact of a 1.19 percent drop in REAC scores on nearby property value were estimated. Aggregating these across block groups the total impact is estimated at $2.8 billion in decreased property values.

That $2.8 billion property decline represents a conservative estimate of the effect of a permanent 20 percent decrease in HUD funding. As noted above, what is being considered in this report is a temporary 20 percent decrease, which can be construed as having 1/40th of the impact, assuming a 40-year depreciation cycle for PHA units. Thus, the equivalent one-time property decline, for the purposes of this report, is 1/40th of $2.8 billion, or about $70 million (see Table E.3).

Table E.3 – Conservative Estimate of Net Impacts Resulting from Blighting Effect on Neighboring Properties Due to Reductions in Capital Funding Resulting from a Temporary One-Time Cut ($470 Million) in Capital Funding

Estimated Capital Expenditure Reduction	Estimated Decline in REAC Scores	Estimated Property Value Effect of Permanent Decrease in HUD Funding	Estimated Property Value Effect of Temporary Decrease in HUD Funding
$469M	1.19%	$2.8B	$70M

Source: Econsult Corporation (2012)

[74] Only those PHAs with a decline in HUD grants were included, since the effect of a decline in grants is not likely symmetric with an increase in grants. This eliminated 5 percent of the sample.

[75] Including state level controls variables resulted in a 1.04 percent impact.

APPENDIX F – MID-RANGE ASSUMPTIONS USED IN MAKING MIDDLE ESTIMATES

Utilizing mid-range assumptions instead of low-end estimates, and recalculating impact estimates, provides some insight as to a more reasonable magnitude of impacts. This appendix articulates the low-end and mid-range assumptions used to calculate estimates of negative impacts, and the sources and reasoning behind those assumptions (see Table F.1).

Table F.1 – Assumptions Used in Estimating Negative Impacts of Capital Funding Cuts

Impact Category	Difference(s) in Assumptions Made Between Low-End Estimate and Middle Estimate (Low-End in Parentheses)
Cost of Housing / Quality of Housing (see Figure F.1 and Figure F.2)	• 20% of households will become homeless (vs. 10%) • Disinvestment commensurate with total capital funding cut proportion (vs. just the "Build New Units" and "Modernizeportion)
Increased Homelessness (Figure F.3 and Figure F.4)	• 20% of households will become homeless (vs. 10%) • Average cost to provide shelter of $13,148 (vs. $6,574)[76]
Exclusion from Information Technology Resources (Figure F.5 and Figure F.6)	• Five-year depreciation of workstations (vs. three-year)[77] • Two households served per workstation (vs. one) • Five years before digital exclusion is completely eradicated on its own (vs. three years)[78]
Blighting Effect on Neighboring Properties (Figure F.7 and Figure F.8)	• Adjustment in house prices over a one-year period (vs. five-year period)[79]
Energy/Green Improvements (Figure F.9 and Figure F.10)	• Seven-year life cycle of energy/green improvements (vs. three-year)[80]
Deferred Maintenance (Figure F.11 and Figure F.12)	• Seven-year life cycle of deferred maintenance projects (vs. three-year)[81]

Source: Econsult Corporation (2012)

[76] This amount, while double the assumption used in the low-end estimate, is still on the low end of the range of values quoted, of $6,574 to $38,742.

[77] According to Generally Accepted Accounting Principles, five years is more appropriate. Three years means a higher annual cost per workstation, and therefore a higher cost per household served and thus a lower number of households served.

[78] The National Broadband Plan, produced by the Federal Communications Commission in 2010, establishes a federal goal of providing universal broadband Internet access within the US by 2020.

[79] The results from the econometric work performed in this report are best understood as estimating the immediate adjustment in house prices from disinvestment in PHAs.

[80] Many energy/green improvements have life cycles of 10 or more years.

[81] Many deferred maintenance projects have life cycles of 10 or more years.

Table F.2 – Estimated Negative Impacts Associated with Increased Cost of Housing and Decreased Quality of Housing Due to Reduced Total Units from a Temporary One-Time 20 Percent Cut ($470 Million) in Capital Funding

	Low-End Estimate	Middle Estimate	Source
Cut Amount for "Build New Units"	$29M	$29M	Survey of PHAs
Construction Cost per Unit	$318	$318	RS Means
New Units Not Built	91	91	Calculated
Cut Amount for "Modernize "	$256M	$256M	Survey of PHAs
Cut Amount as % of Total HUD Budget	11%	20%	HUD
Temporary Amount Converted into Permanent Amount	0.27%	0.50%	Calculated
Current Inventory of PHA Units	1,155,455	1,155,455	HUD
Existing Units Lost through Disinvestment	3,152	5,777	Calculated
New Units Not Built + Existing Units Lost	3,243	5,868	Calculated
% Affected Households That Do Not Become Homeless	90%	80%	Assumption
Rent Subsidy Value to Household	$7,391	$7,391	HUD
Aggregate Loss to Households	$21.6M	$34.7M	Calculated
Operating Subsidy Amount for HUD	$4,211	$4,211	HUD
Aggregate Savings to HUD	$12.3M	$19.8M	Calculated
Annual Net Loss	$9.3M	$14.9M	Calculated
Life Cycle of PHA Unit	40	40	Assumption
Discount Rate	7%	7%	US Government
Present Value of Annual Negative Impact	$124M	$199M	Calculated

Source: Econsult Corporation (2012)

Table F.3 – Estimated Negative Impacts Associated with Increased Cost of Housing and Decreased Quality of Housing Due to Reduced Total Units from a Permanent 20 Percent Cut (Present Value of $6.7 Billion) in Capital Funding

	Low-End Estimate	Middle Estimate	Source
Current Inventory of PHA Units	1,155,455	1,155,455	Calculated
Cut Amount	20%	20%	Assumption
% Units Eventually Lost	11%	20%	Assumption
# Units Eventually Lost	126,076	231,091	Calculated
% Affected Households That Do Not Become Homeless	90%	80%	Assumption
Rent Subsidy Value to Household	$7,391	$7,391	HUD
Aggregate Loss to Households	$839M	$1,366M	Calculated
Operating Subsidy Amount for HUD	$4,211	$4,211	HUD
Aggregate Savings to HUD	$478M	$778M	Calculated
Annual Net Loss	$361M	$588M	Calculated
Life Cycle of PHA Unit	40	40	Assumption
Discount Rate	7%	7%	US Government
Present Value of Annual Negative Impact[82]	$1,961M	$3,194M	Calculated

Source: Econsult Corporation (2012)

[82] This estimate of the present value of negative impacts resulting from permanent funding cuts takes into account the fact that negative impacts take time to reach the estimated figure. This is because units lost through disinvestment are lost over time and not all at once.

Specifically, the negative impact of permanent funding cuts on increased cost of housing and decreased quality of housing rises to $360 million over a 40-year period. So to calculate the present value of that magnitude of negative impacts, it was assumed that 1/40th of that amount took place in Year 1, 2/40th in Year 2, 3/40th in Year 3, and so on, and those negative impacts were discounted to the present at a discount rate of 7 percent.

Table F.4 – Estimated Negative Impacts Associated with Increased Homelessness Due to Reduced Total Units from a Temporary One-Time 20 Percent Cut ($470 Million) in Capital Funding

	Low-End Estimate	Middle Estimate	Source
New Units Not Built + Existing Units Lost	3,243	5,868	Calculated
% Affected Households That Do Not Become Homeless	10%	20%	Assumption
Per Household Cost to Provide Shelter	$6,574	$13,148	HUD
Aggregate Loss to Households	$2.1M	$15.4M	Calculated
Operating Subsidy Amount for HUD	$4,211	$4,211	HUD
Aggregate Savings to HUD	$1.4M	$4.9M	Calculated
Annual Net Loss	$0.8M	$10.5M	Calculated
Life Cycle of PHA Unit	40	40	Assumption
Discount Rate	7%	7%	US Government
Present Value of Annual Negative Impact	$10M	$140M	Calculated

Source: Econsult Corporation (2012)

Table F.5 – Estimated Negative Impacts Associated with Increased Homelessness Due to Reduced Total Units from a Permanent 20 Percent Cut (Present Value of $6.7 Billion) in Capital Funding

	Low-End Estimate	Middle Estimate	Source
Current Inventory of PHA Units	1,160,000	1,160,000	Calculated
Cut Amount	20%	20%	Assumption
% Units Eventually Lost	11%	20%	Assumption
# Units Eventually Lost	126,572	232,000	Calculated
% Affected Households That Do Not Become Homeless	10%	20%	Assumption
Per Household Cost to Provide Shelter	$6,574	$13,148	HUD
Aggregate Loss to Households	$83M	$610M	Calculated
Operating Subsidy Amount for HUD	$4,211	$4,211	HUD
Aggregate Savings to HUD	$53M	$195M	Calculated
Annual Net Loss	$30M	$415M	Calculated
Life Cycle of PHA Unit	40	40	Assumption
Discount Rate	7%	7%	US Government
Present Value of Annual Negative Impact[83]	$163M	$2,253M	Calculated

Source: Econsult Corporation (2012)

[83] This estimate of the present value of negative impacts resulting from permanent funding cuts takes into account the fact that negative impacts take time to reach the estimated figure. This is because units lost through disinvestment are lost over time and not all at once.

Specifically, the negative impact of permanent funding cuts on increased homelessness rises to $30 million over a 40-year period. So to calculate the present value of that magnitude of negative impacts, it was assumed that 1/40th of that amount took place in Year 1, 2/40th in Year 2, 3/40th in Year 3, and so on, and those negative impacts were discounted to the present at a discount rate of 7 percent.

Table F.6 – Estimated Negative Impacts Associated with Exclusion from Information Technology Resources Due to Disinvestment in Management Improvements Resulting from a Temporary One-Time 20 Percent Cut ($470 Million) in Capital Funding

	Low-End Estimate	Middle Estimate	Source
Cut Amount for "Management Improvements"	$17M	$17M	Calculated
% of Category that is IT Resources	20%	20%	Assumption
IT portion	$3.4M	$3.4M	Calculated
Cost per Workstation	$1,800	$1,200	Colorado, Philadelphia
Depreciation of Workstation (yrs)	3	5	GAAP
Households served per workstation	1	2	Assumption
Cost per Household Served	$600	$120	Calculated
# Households Affected	5,667	28,333	Calculated
Benefit per Household	$1,400	$1,400	Econsult
Present Value of Annual Negative Impact	$7.9M	$39.7M	Calculated

Source: Econsult Corporation (2012)

Table F.7 – Estimated Negative Impacts Associated with Exclusion from Information Technology Resources Due to Disinvestment in Management Improvements Resulting from a Permanent 20 Percent Cut (Present Value of $6.7 Billion) in Capital Funding

	Low-End Estimate	Middle Estimate	Source
Present Value of Annual Net Loss	$8M	$40M	Assumption
# Years before Broadband Internet Access is Universally Available	3	5	Assumption
Discount Rate	7%	7%	US Government
Present Value of Annual Negative Impact	$22M	$174M	Calculated

Source: Econsult Corporation (2012)

Table F.8 – Estimated Negative Impacts Associated with Blighting Effect on Neighboring Properties Resulting from a Temporary One-Time 20 Percent Cut ($470 Million) in Capital Funding

	Low-End Estimate	Middle Estimate
Years to Take Effect	5	1
1	$14.0M	$70.0M
2	$14.0M	
3	$14.0M	
4	$14.0M	
5	$14.0M	
Present Value of Annual Negative Impact[84]	$61.4M	$70.0M

Source: Econsult Corporation (2012)

Table F.9 – Estimated Negative Impacts Associated with Blighting Effect on Neighboring Properties Resulting from a Permanent 20 Percent Cut (Present Value of $6.7 Billion) in Capital Funding

	Low-End Estimate	Middle Estimate
Years to Take Effect	5	1
1	$560M	$2,800M
2	$560M	
3	$560M	
4	$560M	
5	$560M	
Present Value of Annual Negative Impact [85]	$2,456.8M	$2,800.0M

Source: Econsult Corporation (2012)

[84] For the low-end estimate, the property value decline is estimated to occur over a five-year period. Since its estimated magnitude is $70 million, $14 million is assigned for each year for five years, and that amount is discounted to the present. For the middle estimate, the property value decline is estimated to occur over a one-year period, so all of the $70 million in property value decline takes place in the first year.

[85] For the low-end estimate, the property value decline is estimated to occur over a five-year period. Since its estimated magnitude is $2.8 billion, $560 million is assigned for each year for five years, and that amount is discounted to the present. For the middle estimate, the property value decline is estimated to occur over a one-year period, so all of the $2.8 billion in property value decline takes place in the first year.

Table F.10 – Estimated Negative Impacts Associated with Buildings Being Less Energy/Cost Efficient Due to Disinvestment in Energy/Green Improvements Resulting from a Temporary One-Time 20 Percent Cut ($470 Million) in Capital Funding

	Low-End Estimate	Middle Estimate	Source
Cut Amount for "Energy/Green"	$33M	$33M	Calculated
Return on Investment	5%	5%	Various
Annual Net Loss	$1.7M	$1.7M	Calculated
Life Cycle of Energy/Green Project	3	7	Various
Discount Rate	7%	7%	US Government
Present Value of Annual Negative Impact	$4.6M	$9.5M	Calculated

Source: Econsult Corporation (2012)

Table F.11 – Estimated Negative Impacts Associated with Buildings Being Less Energy/Cost Efficient Due to Disinvestment in Energy/Green Improvements Resulting from a Permanent 20 Percent Cut (Present Value of $6.7 Billion) in Capital Funding

	Low-End Estimate	Middle Estimate	Source
Present Value of Annual Net Loss	$4.6M	$9.5M	Calculated
Discount Rate	7%	7%	US Government
Present Value of Annual Negative Impact	$66M	$136M	Calculated

Source: Econsult Corporation (2012)

Table F.12 – Estimated Negative Impacts Associated with Buildings Requiring Expensive Repairs Later Due to Disinvestment in Deferred Maintenance Resulting from a Temporary One-Time 20 Percent Cut ($470 Million) in Capital Funding

	Low-End Estimate	Middle Estimate	Source
Cut Amount for "Deferred Maintenance"	$75M	$75M	Calculated
Return on Investment	3%	3%	Various
Annual Net Loss	$2.3M	$2.3M	Calculated
Life Cycle of Deferred Maintenance Project	3	7	Various
Discount Rate	7%	7%	US Government
Present Value of Annual Negative Impact	$6.3M	$13.0M	Calculated

Source: Econsult Corporation (2012)

Table F.13 – Estimated Negative Impacts Associated with Buildings Requiring Expensive Repairs Later Due to Disinvestment in Deferred Maintenance from a Permanent 20 Percent Cut (Present Value of $6.7 Billion) in Capital Funding

	Low-End Estimate	Middle Estimate	Source
Present Value of Annual Net Loss	$6.3M	$13.0M	Calculated
Discount Rate	7%	7%	US Government
Present Value of Annual Negative Impact	$90M	$185M	Calculated

Source: Econsult Corporation (2012)

APPENDIX G – METHODOLOGY FOR DESIGNATING PUBLIC HOUSING AUTHORITIES AS URBAN, SUBURBAN, OR RURAL

Public housing properties were allocated into nine possible categories describing urban, suburban or rural status based heavily on the categorization scheme designed by the National Center for Education Statistics (see Table G.1).[86] Properties were geocoded and placed on a map of Census designated boundaries using ESRI mapping software. Boundaries for cities of various sizes were designated using Census 2010 population counts and designated geographic boundaries for places and urban clusters. Boundaries were created for very large cities if the designated place had a 2010 population greater than 500,000 people. Places were designated large cities if they had a population above 250,000, but below 500,001. Medium cities were defined as places with populations above 100,000, but less than 250,001. Small cities, or towns, were designated as such if they were within an urban cluster or urban area and had a population below 100,001.

Suburban boundaries were created based on place population counts and the distance away from the boundaries of very large, large, medium, or small cities. A large suburb was labeled such if a census designated place's 2010 population was above 250,000 and the place was within a thirty mile radius of the boundaries of a very large city. A medium suburb was so designated if a place's 2010 population was above 100,000, but below 250,001, and it was within a thirty mile radius of the boundaries of a very large or large city. A small suburb was labeled as such if a place's population count was below 100,001, it was in an urban area or urban cluster, and was within thirty miles of the boundary of a very large, large, or medium city.

Rural boundaries were so designated if the place was not in an urban area or urban cluster and not within thirty miles of a very large, large, or medium city and if the population of the place was less than 100,001. Non-places (can be combined with rural) were non-census designated places with populations less than 100,001, and not in any urban area, urban cluster, or thirty miles from a very large, large, or medium city.

[86] http://nces.ed.gov/ccd/rural_locales.asp.

Table G.1 – Place Size Categories, Based on US Office of Management and Budget and US Census Bureau Definitions and Using National Center for Education Statistics Specifications

Very Large City	Within boundary of place with population above 500,000
Large City	Within boundary of place with population above 250,000, less than 500,000
Large Suburb	Place boundary of place with population above 250,000, less than 500,000 within 30 mile radius of very large city (urban ring).
Medium City	Within boundary of place with population above 100,000, less than 250,000.
Medium Suburb	Within boundary of place with population above 100,000, less than 250,000 within 30 mile radius of large or very large city.
Small City/Town	Within boundary of place with population less than 100,000 and in urban area or urban cluster.
Small Suburb	Within boundary of place with population less than 100,000 and in urban area or urban cluster within 30 mile radius of medium, large, or very large city.
Rural	Within boundary of place with population less than 100,000 and NOT within an urban area or urban cluster or any urban ring.
No Place	Not within a census designated place, population less than 100,000 and NOT within an urban area or urban cluster and not w/in any urban ring.

Source: US Office of Management and Budget, U.S. Census Bureau, National Center for Education Statistics, PAHRC (2011)