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**USES AND ABUSES OF ECONOMIC ANALYSIS  
IN SETTING STORMWATER REGULATIONS**

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## Uses and Abuses of Economic Analysis in Setting Stormwater Regulations

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It is appropriate for economic analysis to play a significant role in setting environmental regulations. However, economic considerations are not the only factor relevant to environmental policy. Cost-benefit analysis and other economic tests should not replace statutory requirements, environmental science, and common sense. Unfortunately, EPA's current proposal for effluent guidelines and standards for the construction and development industry rests on a simplistic economic analysis that ignores or dismisses many of the factors that should be of primary importance in regulating stormwater runoff.

The effect of the abuse of economic analysis in this case is to suggest, quite incorrectly, that there is something unaffordable or economically unsound about EPA's earlier preferred and more ambitious proposal, presented in the April 5, 2002 version of the preamble and rule language as Option 2/2—Erosion and Sediment Control Option 2/Stormwater Management Option 2, as described on pages 84-88. On a more balanced interpretation of the available evidence and economic arguments, EPA's earlier proposal appears entirely reasonable, and is clearly beneficial to society as a whole. The rejection of this proposal does not increase, but rather decreases, net social benefits – contrary to the central objective of cost-benefit analysis.

Moreover, Option 2/2 survives the other two economic tests that have been discussed in this case: it causes only a very small net loss of employment; and, even under worst-case assumptions, it would drive only a small number of construction firms out of business. (Under more realistic assumptions, there would be even fewer, if any, businesses forced to close.) In short, there is no persuasive economic argument against Option 2/2; there is no economic test that it fails. The closest to a damaging finding is the change in employment: under Option 2/2, including credit for the resulting infrastructure savings, EPA has estimated that about 37,000 construction jobs would be created, while 46,000 jobs would be lost throughout the economy due to the small reduction in consumer spending. This implies a net loss of only 9,000 jobs – well under one-hundredth of one percent of employment nationwide.<sup>1</sup> Changes of this magnitude occur from month to month due to a wide variety of causes; the job loss from Option 2/2 would be lost in the monthly fluctuations in the labor market. There is no economic argument for rejecting a measure, like Option 2/2, with a favorable balance of costs and benefits, simply in order to avoid such tiny changes in employment.

In these comments I will first discuss the relationship between economic standards and the technology-based standards set forth by the Clean Water Act; next review the evidence that EPA's earlier proposal would, in fact, meet all relevant economic tests, such as a cost-benefit test as well as the (legally more appropriate) economic achievability standard; and finally respond to

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<sup>1</sup> See EPA's February 2002 Economic Analysis, p.5-71.

the specific points raised in the May 2002 memorandum from the Office of Management and Budget (OMB) explaining that agency's rejection of EPA's earlier proposal.

## **1. Technology standards vs. economic analysis**

The Clean Water Act sets forth technology-based standards for regulating point sources, including contaminated stormwater discharges, including New Source Performance Standards (NSPS) for new point source discharges. For existing sources, the Act includes the requirement to use the best available technology economically achievable (BAT) for toxic and non-conventional pollutants; stormwater, a point source, would qualify under this regulatory category. For conventional pollutants from existing sources, the best conventional pollutant control technology (BCT) is required. Technology-based standards, embodied in many environmental laws, represent a fundamentally different approach from cost-benefit analysis; the two approaches will frequently lead to different decisions.

Technology-based standards are often qualified by economic threshold requirements, such as the BAT requirement that technologies must be "economically achievable", or the standard that costs must not be "wholly disproportionate" to benefits. But once the economic threshold has been reached, the standard calls for choosing on the basis of technological performance, not economic benefits (e.g., BAT requires application of the "best available technology" that is economically achievable). If, as is often the case, more than one control technology passes the threshold, it is not relevant, under the language of the law, to debate differences between the technologies on grounds of their relative economic merits. A cost-benefit criterion would decide between regulatory options on the basis of net social benefits, expressed in monetary terms; a technology-based standard would decide, among those passing the threshold, on the basis of technical performance, typically expressed in terms of pollution reduction. Under many circumstances, these two approaches will select different alternatives as the "best" option.

Moreover, the economic thresholds are quite low, ensuring that many regulatory options will meet them – and hence leaving a wide scope for decision on grounds of technological performance. For instance, courts have ruled that a regulation can be considered "economically achievable" even if it is likely to bankrupt 1% to 3% of the affected firms. The projected impacts of Option 2/2, EPA's original proposal for stormwater regulation, are much smaller than this.

EPA estimated expected firm closures under a worst-case scenario, assuming that construction firms have no ability to pass on costs to their customers. With this assumption, the expected number of firm closures is reported as 814 at one point, and 874 at another, in the EPA analysis. Both of these numbers are described as 0.9% of the affected firms. However, EPA has also estimated that there are more than 148,000 firms potentially affected by Option 2/2. These numbers appear inconsistent with each other: the 814, or 874, projected closures due to Option 2/2 actually represent 0.5% - 0.6% of the total of 148,000 firms.<sup>2</sup> On any version of these numbers, the percentages are small.

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<sup>2</sup> April 5, 2002 Version of Preamble and Rule Language, p. 97, 156, 136

Moreover, EPA does not expect the worst-case scenario of no cost pass-through to occur: “In reality, academic literature and EPA’s discussions with industry officials indicate that most, if not all costs, are passed through to the final consumer and are not absorbed by firms in the industry.”<sup>3</sup> With the more likely assumption that costs are passed through to customers, closures would be expected at a much lower number of firms, if any. But even the worst-case estimate is a tiny fraction of the normal rate of business closures in the construction industry. From 1990 to 1998, annual closures amounted to an average of 14% of all construction firms.<sup>4</sup> Thus the worst-case additional closures due to Option 2/2 would represent an increase of about 4% in the number of construction firms that close in an average year – much less than the normal year-to-year variation in rates of construction firm closure.

Cost-benefit analysis represents a different approach to decision-making. In theory, cost-benefit analysis weighs all the costs of regulation against all the benefits. If *all* of the benefits and *all* of the costs could be quantified and expressed in monetary terms, then the net benefits – the total benefits minus the total costs – would provide a numerical measure of the aggregate gain or loss to society from the regulation. The option with the greatest net benefits (assuming its net benefits are positive) would then maximize the gain to society.

Even an ideal, perfectly complete cost-benefit analysis would not contain all the information needed for good regulatory decisions: the aggregate benefit to society says nothing about the distribution of costs and benefits. Questions of equity and environmental justice disappear when costs and benefits are aggregated; it is difficult to express concerns for safe minimum standards, or for fairness between regions and communities, in cost-benefit terms.

In practice, cost-benefit analysis routinely falls far short of the theoretical ideal. Some benefits are intrinsically difficult or impossible to express in monetary terms; the most fundamental values can be the hardest to monetize. The protection of nature and the elimination of threats to human life and health are of immense importance to many people, but in a manner that defies the assignment of meaningful dollar prices. Yet any benefit that is not monetized is, in effect, treated as having zero monetary value.

For some benefits, monetization is possible, but time-consuming and expensive. Cost-benefit analyses frequently list numerous benefits that could not be measured or monetized due to time and budget constraints. EPA’s analysis of the costs and benefits of stormwater regulation is no exception, as demonstrated below. The calculation of existence value, an attempt by environmental economists to measure the intrinsic value people place on nature, is particularly difficult, and is frequently omitted. However, calculation of existence values was endorsed in 1993, for use in legal proceedings and cost-benefit analysis, by the panel of leading economists assembled by NOAA to set standards for environmental valuation in the wake of the Exxon Valdez disaster.<sup>5</sup>

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<sup>3</sup> Ibid, p. 153

<sup>4</sup>Carliner, Michael. *Housing Economics*, "Life and Death in the Construction Industry," August 2001

<sup>5</sup> Kenneth Arrow et al., *Report of the NOAA Panel on Contingent Valuation*, January 1993, available at <http://www.darp.noaa.gov/pdf/cvblue.pdf>.

When the valuation of benefits is noticeably incomplete, the resulting comparison of costs and benefits is of little significance. In such cases, the usefulness of the calculation is undercut by the asymmetry between the cost and benefit sides of the balance sheet. Costs of environmental protection are normally market prices, or engineering estimates of prices for marketed goods and services. Such prices are readily available; there is no reason for substantial incompleteness in cost calculations. If anything, cost calculations tend to overstate the costs of compliance with regulation. Several retrospective studies have found that costs are more often overestimated than underestimated, when proposed regulations are under consideration.<sup>6</sup>

Benefit estimates, on the other hand, are rarely complete. In the case of stormwater regulation, as in many cases, zero is not a reasonable estimate for the value of the unmonetized benefits. Yet zero is, by default, the value assigned to everything that does not have a price. The sum of the monetized benefits thus provides a measure of partial, not total, social benefits. A comparison of costs and benefits therefore amounts to comparing substantially complete costs with partial benefits. "Complete cost – partial benefit analysis" has no merit as a standard for decision-making – particularly if it indicates that costs exceed benefits. If all we know is that partial benefits are less than complete costs, there is no way to tell whether complete benefits would be greater or less than costs.

On the other hand, if partial benefits exceed complete costs, then it is clear that total benefits must be even greater. This turns out to be the case with EPA's original proposal, Option 2/2. As I will explain in the next section, EPA's original analysis mistakenly understated the benefits in the few categories that it was able to monetize. A correction of the benefits assessment shows that just six categories of benefits, only two of which turn out to be sizeable, have a total monetary value that is well above the costs imposed by the regulation. Many other benefit categories have been identified by EPA, but not assigned monetary values; if values were created for these additional categories, the net total would be even greater.

In light of the numerous theoretical and practical limitations of cost-benefit analysis, there is no reason to think that it reliably produces better decisions than the technology-based standards, which are, in any case, the ones required by the Clean Water Act as a basis for decision-making. Part of the theoretical appeal of cost-benefit analysis is that hope that it will provide a transparent, objective standard for evaluation of policy proposals. However, in practice cost-benefit analysis gives rise to countless intricate debates over the details, with partisan conflict displaced into a technical realm that is inaccessible to all but a handful of experts. Months or even years of delay, and millions of dollars of expense in analysis and debate, may be required. In many cases a technology standard is far more transparent and easily explained, referring to existing technologies or simple standards for measurable reduction in emissions. That is, reliance on technology standards may lead to more efficient decision-making on public policy issues.

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<sup>6</sup> . Eban Goodstein, "Polluted Data," *American Prospect* 8, November-December 1997 (<http://www.prospect.org>); Hart Hodges, "Falling Prices: Cost of Complying With Environmental Regulations Almost Always Less Than Advertised," Economic Policy Institute, 1997 (<http://epinet.org>); Winston Harrington, Richard D. Morgenstern, and Peter Nelson, "On the Accuracy of Regulatory Cost Estimates," 19 *Journal of Policy Analysis and Management* 297-322 (Spring 2000).

Despite these reasons to de-emphasize cost-benefit analysis, Section 2 of my comments demonstrates that Option 2/2 does, in fact, pass a cost-benefit test, while Section 3 demonstrates the lack of merit in OMB's criticisms of that option. If cost-benefit analysis were the standard that applied, a reasonable version of that analysis would find that Option 2/2 would increase net benefits to society; OMB's version of cost-benefit analysis repeatedly errs in the direction of understating benefits and overstating costs.

## **2. Costs and benefits of EPA's original proposal.**

Although cost-benefit analysis is not required by the Clean Water Act, EPA assessed the costs and benefits of its original proposal, and submitted the results to OMB in early 2002. EPA's best estimate was that its proposal had benefits of about \$1.13 billion (in 1997 dollars) for each year of affected development activity.<sup>7</sup> OMB's critique, based on this estimate, argued for lower valuation of benefits in many respects. However, subsequent analysis by EPA and Eastern Research Group (ERG), a consultant to EPA, revealed a number of errors in the earlier assessment by EPA.

A memorandum from ERG to EPA, dated May 2, 2002, corrects these errors, and also responds to some suggestions from OMB and other reviewers of the original documents. The revised best estimate of the present value of benefits (ERG memo, Table 4) is \$3.2 - \$5.0 billion per year of development, with a low estimate of \$610 - \$960 million, and a high estimate of \$19.4 - \$30.6 billion. In each case the lower figure is based on a discount rate of 7%, and the higher figure on a discount rate of 3%.

Two principal types of errors were addressed in the ERG memo. First, and most important, was an error in the interpretation of the value of stream restoration, taken from a published study of restoration projects. Reduced storm water flows, resulting from EPA's proposed regulation, would reduce damage to streams, increasing their quality and amenity value in much the same way as restoration projects. The research EPA relied on in this area showed that stream restoration projects increased the value of nearby properties; hence EPA assumed that reduced storm water flows would cause similar increases in property values.

EPA had originally interpreted the published value of restoration projects as a community-wide measure; however, a closer reading revealed that the value was actually a measure per affected household. The benefit ranged as high as \$21,000 per house, for houses close to areas that enjoyed improved fish habitats. (High and low case estimates reflect differing assumptions about the number of houses that would experience this benefit.) Naturally, recognition of this error led to a substantial upward correction in the estimates of stream restoration-related benefits.

The second type of error is a more technical problem, involving occasional confusions between one-time and annual values. All of the summary cost and benefit estimates are present values of the stream of impacts over 30 years following development. The ERG memo corrected several cases in which the original EPA analysis classified some costs and benefits

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<sup>7</sup>April 5, 2002 Version of Preamble and Rule Language, p. 97

inappropriately, clarifying the reasons why some value categories recur annually, while others are single events, or already represent the capitalized value of a stream of future changes.

Correction of these errors, along with some minor data problems, led to the revised benefit estimates summarized above. Six categories of benefits were estimated; of these the benefits of stream and habitat preservation (based largely on the increase in nearby property values) account for almost 89% of the “best estimate” total, while benefits of reduced flooding account for almost 11%. The other benefit categories – involving water treatment, water storage, navigational dredging, and cold water fishing – are smaller by orders of magnitude, with the four categories together accounting for less than \$20 million of benefits.

The ERG memo provides a thorough, rigorous explanation of its corrections, and its approach to the valuation of benefits. I am not aware of any response to its arguments from OMB or other critics of EPA’s proposal. Thus I conclude that its estimates are the most reliable figures available on the monetized benefits of the proposal. Since the best estimate of benefits is \$3.2 - \$5.0 billion, while the costs of the Option 2/2 proposal are \$2.46 billion, it is clear that net benefits are positive – even though only a short list of benefit categories was included. In the terms introduced above, a partial calculation of benefits exceeds the estimate of total costs. If values were available for a more extensive list of benefits, the proposal would look even more socially desirable.

### **3. Response to the OMB memo on EPA’s original proposal.**

OMB has released a very brief memo explaining the rejection of EPA’s March 1 draft NPRM, which supported Option 2/2. In that memo, OMB makes eight bulleted points (in two separate, unnumbered lists; they are numbered below for convenience). The points are accompanied by little or no explanatory text. The eight points, with my comments on them, are as follows:

1. *"The potential for encroachment on traditional State and local authority in zoning and land use planning."*<sup>8</sup>

The nature of the problem itself requires federal regulation, for two reasons. First, sediment deposition and stormwater runoff do not stop at state borders; pollution that affects one state may originate in another state. Therefore one state’s regulations, designed to protect public health and the local environment within the state, can be undermined by actions in other states. Despite incurring the costs associated with regulation, states or local communities may not realize the economic benefits. Research conducted by Thomas P. Holmes, an economist at the U.S. Department of Agriculture, indicates that “[t]he recursive relation between sediment loading and economic cost was used to estimate incremental benefits of reduction in sediment loadings on a watershed basis. The results support a growing body of literature which contends that onsite and offsite benefits of soil erosion control do not necessarily coincide geographically.”<sup>9</sup>

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<sup>8</sup> OMB Memo, May 22, 2002 EO 12866 Review of Proposed Construction and Development Effluent Guidelines.

<sup>9</sup> Holmes, Thomas P. Land Economics, "The Offsite Impact of Soil Erosion on Water Quality" Nov. 1998. p.356

The Dead Zone in the Gulf of Mexico is an extreme but important example of the interstate nature of the problems of runoff, sedimentation, and pollution of major water bodies. The Dead Zone appears annually, covering thousands of square miles off the coast of Louisiana. The combination of elevated sediment deposits and high levels of dissolved nitrogen flowing down the Mississippi River create severely anoxic conditions in a region of the Gulf of Mexico; consequently all oxygen-dependent life ceases to exist. The effects have ravaged aquatic plants and animals in the Gulf as well as harming people and industries that depend on their existence. Although the problem is felt most severely in Louisiana and other coastal states, it cannot be solved there, because so much of it originates with fertilizer runoff from farms far upstream. The former chair of the National Research Council of the National Academies, Robert W. Howarth sums up the primary source of this degradation, "We know as a community that the farm practices of the upper Midwest--Iowa, Illinois, and Indiana--are severely degrading the Gulf of Mexico, [...W]e really need the federal government to step up to that challenge."<sup>10</sup>

Second, federal regulation is required because development in the coastal zone of one state may be in competition with the coastal zone of nearby states, more than with the interior of either state. In the absence of federal regulation, states and local communities could attempt to attract economic development by lowering regulatory standards below those of their neighbors. By backing away from national regulations for long-term stormwater management and control of active construction sites, EPA's latest proposal allows the emergence of an uneven playing field, and a potential "race to the bottom" in which states could compete for development by lowering their standards.

2. *"The apparent mismatch of costs and benefits."*<sup>11</sup> – OMB claims costs are 4 times benefits in EPA's draft NPRM.

OMB's claim rests on the original EPA assessment of benefits, not on the corrections explained in the ERG memo. With those corrections, as explained above, the estimated benefits exceed the costs for Option 2/2. Benefits appear to be \$0.7 billion - \$2.5 billion greater than costs, according to the ERG calculations.

I say that net benefits "appear" to be of that magnitude, because the only available calculation rests on a very partial list of benefits. There is indeed a mismatch of costs and benefits, but it is of the variety I have described above: relatively complete costs are being compared to partial benefits. A complete calculation of benefits would be even greater, rendering it even clearer that there are net benefits to society from active federal regulation of stormwater runoff.

On the cost side of the ledger, EPA carefully assesses the costs potentially incurred through implementation of various sediment and stormwater regulations by the construction and demolition industry, by permitting authorities and by society as a whole. As in most cases, the costs of environmental protection consist largely of well-documented, market prices of pollution

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10 Rayl, A.J.S., *The Scientist* "Coastal 'Dead Zones' Get Attention: Strategy sought for combating nitrogen, phosphorus pollution" 14[13]:12, Jun. 26, 2000.

<sup>11</sup> OMB Memo, May 22, 2002 EO 12866 Review of Proposed Construction and Development Effluent Guidelines.

control hardware, infrastructure investment, and the administrative costs associated with implementation. For stormwater control technologies, the capital costs were derived from figures based on standard industry practices as well as references commonly used by the industry to estimate construction costs.<sup>12</sup> Much of this information is readily available; arriving at a realistic cost estimate does not involve complex, expensive surveys or other economic research, precisely because the market economy so efficiently provides price information for marketed goods and services.

In contrast, there is no market for many of the benefits derived from the protection of public health and the environment. Substantial research effort, involving noticeable time and expense, is required to assign dollar values to many categories of benefits. As a result, many benefits are mentioned but not quantified – and most important, not assigned a dollar value. The qualifying text mentioning these unpriced externalities is easily forgotten, while the slanted “bottom line” comparison of complete costs and partial benefits is quoted as definitive.

The following is a sampling of instances where substantial benefits were discussed in qualitative terms, but not quantified, by EPA.

The 1998 National Water Quality Inventory identifies siltation as one of the leading pollutants contributing to impairments in assessed stream miles and lists urban runoff and hydrologic modification as two of the leading sources of impairments. As a result, EPA expects that the potential for considerable benefits from today’s proposal do exist in these water bodies. However, EPA did not inventory the number of order 5 and greater streams that would potentially be impacted by these sources due to time and technical constraints.<sup>13</sup>

EPA acknowledges that evaluating additional pollutants would likely increase the estimates of environmental and economic benefits of today’s proposed rule.<sup>14</sup>

EPA has identified, quantified and monetized certain benefits attributable to today’s proposed rule. For other benefit categories, EPA has identified benefits, but has chosen not to quantify and monetize them at this time.<sup>15</sup>

The three primary benefit categories are: 1) physical habitat destruction, 2) damage to stream banks due to high frequency of high flow rates, and 3) thermal impacts on cold water habitat. {...} In particular, the Agency is not analyzing construction impacts in the following areas: 1) habitat/biology, 2) stream temperatures, 3) flow and velocity, 4) conventional pollutants and pollutant loadings, 5) human health, and 6) groundwater. EPA believes that these benefit categories may have substantial benefits. However, the Agency has chosen not to analyze them at this time.<sup>16</sup>

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<sup>12</sup> April 5, 2002 Version of Preamble and Rule Language, p. 127: cost information taken from R.S. Means Co., Construction Cost Manual 2000

<sup>13</sup> April 5, 2002 Version of Preamble and Rule Language, p. 177

<sup>14</sup> April 5, 2002 Version of Preamble and Rule Language, p. 178

<sup>15</sup> April 5, 2002 Version of Preamble and Rule Language, p. 185

<sup>16</sup> April 5, 2002 Version of Preamble and Rule Language, p. 185

To highlight just one of the aforementioned omitted benefit categories, consider the question of groundwater recharge. Reduction of stormwater runoff increases recharge rates, a benefit that will be of growing importance in the future. Many communities are of course dependent on groundwater to provide public drinking water supplies. Agriculture in some areas is dependent on groundwater for irrigation – and one-fifth of irrigation is pumping groundwater faster than the rate of recharge.<sup>17</sup> These problems will only worsen as population and economic activity grow, while water supplies remain fixed. In the next 30 years, the period used for assessment of costs and benefits in this case, medium-range population projections for the United States indicate a 13% increase in population. By 2030, a projected 366 million people will be competing for use of the same water resources that are available today.

The benefits of increased groundwater recharge resulting from Option 2/2, and even greater benefits from Low Impact Development infiltration techniques, could be estimated on the basis of the incremental costs of increased drinking water and irrigation withdrawals. As demand grows but supply remains constant in the future, the price – the value of increased recharge – will naturally increase. Thus the true benefits of regulation will increase as well. This benefit is not included in the estimates developed by EPA or ERG, let alone OMB.

Furthermore, EPA's economic analysis failed to account for benefits generated from various stormwater technologies. Low Impact Development (LID) techniques preserve or recreate natural landscape features and wildlife habitat; these are aesthetic and 'quality of life' values, which commonly translate into increased home values as documented by the National Association of Home Builders and other analysts.<sup>18</sup> LID can also reduce flood damages, pollutant loading and thermal pollution. A study done for EPA, "Economic Benefits of Urban Runoff Controls" also documents various case studies throughout the country where the benefits resulting from stormwater control technology have been valued by consumers and quantified through increased premiums on housing values.<sup>19</sup>

3. *"The potential for adverse impacts on the affordability of low-income housing."<sup>20</sup> OMB cites the increased cost to an average home, amounting to a present value of \$3500.*

The calculation of a \$3500 cost for an average home does not directly apply to affordable housing initiatives, which presumably involve houses of lower than average size and cost. As OMB notes, the estimate of \$3500 present value includes \$858 of construction costs, plus \$16 per month in post-construction operating costs, or \$192 per year, continuing indefinitely.<sup>21</sup>

Both aspects of this calculation appear to be exaggerated. Estimates of cost increases to new housing construction should be offset by the fact that runoff controls may lead to infrastructure savings. That is, the reduced volume of stormwater may allow use of smaller or no sewer pipes in construction, and reduction in post-construction operating costs of storm sewer

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<sup>17</sup> Barlow, Maude and Clark, Tony, Blue Gold, The New Press, New York 2002

<sup>18</sup> National Association of Home Builders, Smart Growth Case Studies. See also Natural Resources Defense Council, Stormwater Strategies.

<sup>19</sup> Economic Benefits of Urban Runoff Controls, Frederick et al.

<sup>20</sup> OMB Memo, May 22, 2002 EO 12866 Review of Proposed Construction and Development Effluent Guidelines.

<sup>21</sup> April 5, 2002 Version of Preamble and Rule Language p. 164

systems. This would result in savings, in the form of reduced municipal sewer construction and operating costs presently not reflected in the \$858 average price increase per house estimate. An earlier EPA analysis implies that these savings average \$390 per household, leaving a net cost of only \$468.<sup>22</sup> Since sewer costs are ultimately paid by households, the savings from reduced costs would be passed on to households in the form of lower municipal costs and taxes. Furthermore, by employing Low Impact Development (LID) techniques that harness rainwater, house owners can reduce their water bills by decreasing their demand for treated drinking water, which is used for lawn care.

The post-construction operating costs, which account for most of the \$3500 present value, are substantially higher than the costs actually reported in some communities that have adopted the LID approach. For example, the Pierce County LID Study by CH2MHill found that LID maintenance costs were \$50 per household per year in one case (Kensington) and \$70 per household per year in the other (Garden Valley). In comparison, costs for conventional design were \$35 per household per year (Kensington) and \$50 per household per year (Garden Valley). Actual annual maintenance costs are likely to be a far cry from the \$192 assumed in this rulemaking.<sup>23</sup>

Even assuming the full \$3500 figure, cost increases of this magnitude should not have a crippling effect on real estate markets. EPA's calculation of the effect on homebuyers was based on the price of an average home (not an "affordable," presumably lower-priced home), and was set up in a manner that is biased toward finding a large impact:

"The Agency then used income distribution data to estimate the change in the number of households that would qualify to purchase the median-priced new home under each of the regulatory options. In this way, EPA was able to determine the number of households that may be priced out of the new housing market, *assuming that all prospective buyers were targeting the average-priced new home.*"<sup>24</sup> [emphasis added]

This procedure assumes that the only choices are to buy the average house, or nothing. However, housing is available in many gradations of size, location, and price; a more likely response to a slight increase in costs is that buyers with limited incomes will buy slightly smaller houses, or ones in slightly less desirable locations. It is simply implausible that any significant number of people will abandon their plans to buy homes because some (not all) houses on the market increase in price by \$3500.

Moreover, several studies have found that stormwater management techniques may be effectively used to increase the value of a house both through their pollution mitigating functionality and their physical appearance. The National Association of Home Builders conducted a study that concluded the value of a house near clean water body may increase the house value by up to 28%.<sup>25</sup> And the study of the valuation of stream restoration, cited in the ERG memo, found a substantial increase in property values close to streams where there are

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<sup>22</sup> Feb 28 analysis, p.5-48

<sup>23</sup> CH2MHill, Pierce County LID Study (April 11, 2001), p. 38.

<sup>24</sup> April 5, 2002 Version of Preamble and Rule Language, p. 146

<sup>25</sup> National Association of Home Builders. Housing Economics. NAHB, Washington, DC 1993

improvements in fish habitats and other aspects of water quality. It should come as no surprise that many people value living near clean bodies of water.

4. *"The potential for significant cost increases for road and highway construction."*<sup>26</sup>

OMB notes that these increases were not accounted for in EPA's cost analysis. What OMB's brief memo does not mention was the reason for this omission: "Because new road and highway construction is such a small percentage of annual development acreage [nationally], EPA did not conduct a separate analysis of the costs associated with the proposed rule for highway, street, bridge and tunnel construction."<sup>27</sup> EPA refrains from monetization not because it is unable to quantify the costs, but rather because it deems these costs insignificant to the assessment at hand. As EPA has noted, a number of states have adopted water quality controls; I am not aware of any reports of adverse impacts of these regulations on road and highway construction.<sup>28</sup>

In its three-page memo, OMB presents no information that indicates what the significant cost increases for road and highway construction would be. EPA's judgment appears reasonable, in the absence of any evidence supporting OMB's objection.

5. *"The potential for adverse impact on small businesses"<sup>29</sup> - small construction firms will experience cost increases.*

Many construction firms currently operating in coastal zones are already subject to similar stormwater and sediment controls; compliance with such regulations has not caused a wave of bankruptcy or economic hardship.

As suggested above, EPA does not expect the costs of regulation to be borne by the industry; nor do I. Any customer would naturally expect the construction firm to pass on the full costs imposed by regulatory requirements. Like most homeowners, I am unfortunately quite familiar with the idea that a contractor working for me will expect me to pay when the costs of the job increase. Thus there is no damage to the industry from a small increase in regulatory costs, except for the small reduction in demand for construction that would result from passing on the small cost increase to customers. As indicated above, EPA's estimates show only minor impacts on the industry even under the unrealistic assumption that costs are not passed through to customers.

Moreover, it should be recalled that Option 2/2 was projected to cause an increase in construction employment, offset by losses in employment elsewhere in the economy. These figures suggest that workers and firms will be drawn into construction, not driven out of it.

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<sup>26</sup> OMB Memo, May 22, 2002 EO 12866 Review of Proposed Construction and Development Effluent Guidelines.

<sup>27</sup> April 5, 2002 Version of Preamble and Rule Language, p. 126

<sup>28</sup> Development Document for Proposed Effluent Guidelines and Standards for the Construction and Development Category, June 2002, p.3-3.

<sup>29</sup> OMB Memo, May 22, 2002 EO 12866 Review of Proposed Construction and Development Effluent Guidelines.

6. "The infrastructure savings calculation did not account for lost consumer surplus from the reduced infrastructure."<sup>30</sup> -Lost consumer surplus from wide streets, sidewalks and big sewers is not counted.

Here OMB appears to assume that people have expressed a preference, not just for built infrastructure, but for the specific forms and sizes of it that exist today. Yet there are limits to the amount of information that can sensibly be inferred from municipal spending on infrastructure: how many local governments have surveyed consumer preferences about exactly what sizes of streets, sidewalks, and sewers to build? How many people have actually had a choice about these matters? Municipal infrastructure meets a need, and is accepted on that basis; but a slightly different form might meet the same needs equally well, or better. The issue recalls a joke that used to circulate among graduate students in economics: it was said that poor people must like substandard slum housing, since they pay such high rents to live in it. High rents for slum housing prove that poor people need housing, but not that they prefer substandard conditions. Likewise, widespread construction of streets and sidewalks proves that people need some paved infrastructure, but not that they have made a careful choice about the precise widths that maximize their satisfaction.

Moreover, there are offsetting benefits to paving and building less, rather than more. A narrower street means more undisturbed surroundings; there are losses when more of the landscape is paved to construct wider streets. It is not obvious that there is a greater social benefit from wider asphalt areas versus wider areas of natural surrounding. Recent results of local elections indicate just how much people value natural surroundings. In the words of a November 16, 2002 op-ed in the *New York Times*,

"In [New Jersey] elections this month, the movement to trade higher taxes for more open space spread to a total of 185 towns and 19 of New Jersey's 21 counties. The state of New Jersey has the highest property taxes in the nation and yet voters are willing to increase their tax burden because of their high valuation of natural surroundings. This isn't simply a New Jersey phenomenon. In the last four years, voters in local and state ballots across the nation have allotted more than \$20 billion for the purchase of open spaces — \$2.6 billion of that total coming in the measures passed this election."<sup>31</sup>

In many instances, a reduction in street and sidewalk width would provide additional lawn frontage. The enormous value that many Americans place on their lawns is well known, and is confirmed by the size of the lawn-care industry. An industry survey estimated that there were about 70,000 lawn care firms, with revenues of \$61 billion, as of 1998.<sup>32</sup> Between 1993 and 1997, 22% of U.S. households hired professional landscape, lawn care and tree care services. For these services, they spent an average of \$663 per year from 1993 to 1997.<sup>33</sup>

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<sup>30</sup> OMB Memo, May 22, 2002

<sup>31</sup> Anonymous, *New York Times*, "Greening the Garden State" op-ed. Nov. 16, 2002.

<sup>32</sup> Research USA, November 1997 *Lawn & Landscape Reader Survey*, August 1998.  
<http://asbdc.ualr.edu/fod/8002.htm>.

<sup>33</sup> Industry information at <http://www.anla.org/industryinfo/information.html>.

Beyond aesthetics there may be a real public health benefit to narrower streets. One study found that narrower streets are safer than wider streets. In 1997 the City of Longmont Colorado and Swift Associates published their study, "Residential Street Typology and Injury Accident Frequency," which found a strong correlation between wider streets, higher speeds and increases in accidents. The study found that "as street width widens, accidents per mile per year increase exponentially." The safest streets were 24 feet wide and had an accident injury rate per mile about one-fourth the injury rate of the more common 36-foot-wide streets. Variations in the average level of daily traffic did not turn out to be a major factor explaining the differences in accident rates.<sup>34</sup>

In contrast to this bleak image, many stormwater control strategies turn out to be capital assets because they improve the overall aesthetics of the property. Several techniques associated with Low Impact Development are invisible to the untrained eye, fairly inexpensive to create and maintain, employ fewer infrastructure requirements and do not hold standing water after storms. Bioretention areas and "rain gardens" appear to be landscaped areas, but are engineering techniques that facilitate the depression, storage, infiltration and biological removal of pollutants and sediments.<sup>35</sup> Vegetated filter strips and buffers can often be constructed from the natural vegetation already existing on the lot. They are inexpensive to construct and typically do not create stagnant water.

As LID techniques are employed more frequently, there is a growing body of research that indicates houses that constructed with LID sell more quickly and at higher prices than houses constructed without such techniques.<sup>36</sup>

7. *"The majority of benefits were accounted for by avoided stream restorations costs."<sup>37</sup> EPA did not demonstrate that most streams would be restored. An analysis based on changes in property values near restored streams suggested lower monetized benefits.*

This objection appears to be answered by the ERG memo correcting EPA's earlier benefits assessment. As the ERG memo makes clear, the most important error in the earlier assessment was the misreading of the published economics literature on the value of stream restoration. Research has, in fact, found substantial increases in property values near restored streams; this is the basis for most of the benefits in ERG's corrected calculation. The benefits do not rest on avoided expenditures for stream restoration, which as OMB notes, might not have occurred. Rather, reduced stormwater runoff will improve water quality, and increase the amenity value of living near improved water bodies, in a manner comparable to the effects of stream restoration.

The large effect of environmental improvement on property values is no surprise. Economic research has repeatedly found that improvements in the quality of the natural environment lead to measurable increases in nearby property values. For example, an extensive

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<sup>34</sup> "Study Concludes Narrow Streets are the Safest," *New Urban News* November-December 1997, available at <http://www.thevillagenotl.com/Article/pdf/narrowstreets.pdf>

<sup>35</sup> NRDC "Low Impact Development." Ch. 12.

<sup>36</sup> Aponte Clarke, George and Stoner, Nancy. "Stormwater Strategies, "The Economic Advantage,"

<sup>37</sup> OMB Memo, May 22, 2002 EO 12866 Review of Proposed Construction and Development Effluent Guidelines.

literature documents the value of living closer to parks and open spaces.<sup>38</sup> A study of property values in a neighborhood in Columbus, Ohio estimated that over 7 percent of the selling price of a house was related to its proximity to the park and river.<sup>39</sup> A study of four parks in Worcester, Massachusetts, showed that on average, a house located 20 feet from a park sold for \$2,675 more than a comparable house located 200 feet away.<sup>40</sup> One of my graduate students, Kayo Tajima, has researched the factors influencing property values in Boston, finding that the removal of an ugly elevated highway and construction of 30 acres of new parks to replace it, as part of a current redevelopment project, will add an estimated \$1 billion to the value of the real estate in nearby neighborhoods.<sup>41</sup>

It should be noted that such calculations of increases in property values represent only the value of an environmental improvement to nearby property owners. If the improvement is also valuable to people who do not own nearby properties, then the total social value must be even greater.

8. *"A number of potential benefits offsets were not valued"<sup>42</sup>--these included increased standing water following storms, causing concerns about mosquitoes, reduced access for emergency vehicles, and drowning hazards to children.*

EPA's original proposal, Option 2/2, called for performance-based stormwater regulations, providing flexibility for developers to select the technology and engineering devices needed to achieve the 80% reduction in TSS. OMB's objection refers primarily to one particular technology choice, involving large, centrally located collection ponds. While such ponds might create opportunities for increased mosquito breeding; risks of drowning, or reduced access in emergencies, they can be designed to minimize such impacts.

With the ability to choose among many technologies, it seems unlikely that the industry will opt for the most damaging alternative. Performance-based standards provide developers the leeway to respond to the geographic location of the site, its existing resources, and then to incorporate the most appropriate stormwater technologies that would reflect consumer preferences. It seems likely that developers will utilize a stormwater management technique such as LID, which has been shown to increase home value while costing less to install and maintain as compared to most conventional stormwater management systems.

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<sup>38</sup> See, for instance, "The Effects of Greenbelts on Residential Property Values: Some Findings on the Political Economy of Open Space." Mark R. Corell, Jane H. Lillydahly and Larry D. Singel, *Land Economics*, 54, May 1978.

<sup>39</sup> Weicher, J. and Zerbst, R., 1973. "The externalities of neighborhood parks: an empirical investigation." *Land Economics*. 49: 99-105

<sup>40</sup> More, T.A., Stevens, T. and Allen, P.G. 1988. "Valuation of Urban Parks." *Landscape and Urban Planning* 15:139-152

<sup>41</sup> Kayo Tajima, *On Top of the Big Dig: Economic Analysis of the Urban Parks Created by the Boston Central Artery/Tunnel Project*, Masters thesis, Department of Urban and Environmental Policy and Planning, Tufts University, May 2002; see also Kayo Tajima and Frank Ackerman, "The Billion-Dollar Bonus", *Boston Globe*, July 1, 2002, p.A11.

<sup>42</sup> OMB Memo, May 22, 2002

#### 4. Conclusion

Regulation of effluent runoff from construction and demolition should not, according to the language of the Clean Water Act, be based primarily on economic criteria. Nonetheless, I have demonstrated that EPA's original proposal, Option 2/2, would pass all relevant economic tests. It would create about as many jobs as it would destroy. Even under worst-case assumptions, it would drive very few construction firms out of business; under more realistic assumptions, its negative impact on business would be even smaller, if not vanishing entirely.

Most important in terms of economic theory is the finding that cost-benefit analysis supports Option 2/2: even a partial calculation of its monetizable benefits clearly exceeds its costs. It is particularly short-sighted for EPA's newer proposal to eliminate the post-construction phase of regulations, which accounted for the majority of the benefits. The result of this misguided cutback is to create a proposal with much more limited net benefits, with much more ambiguous support from economic theory.

A principal argument for cost-benefit analysis is that it might help us identify cases in which a more expensive proposal is actually preferable, because it creates greater net benefits for society as a whole. In this case, it has done exactly that: Option 2/2 costs more than the newer EPA proposals – AND Option 2/2 achieves greater net benefits. The clear implication is that, if the decision were to be based on economic criteria, Option 2/2 should be selected.