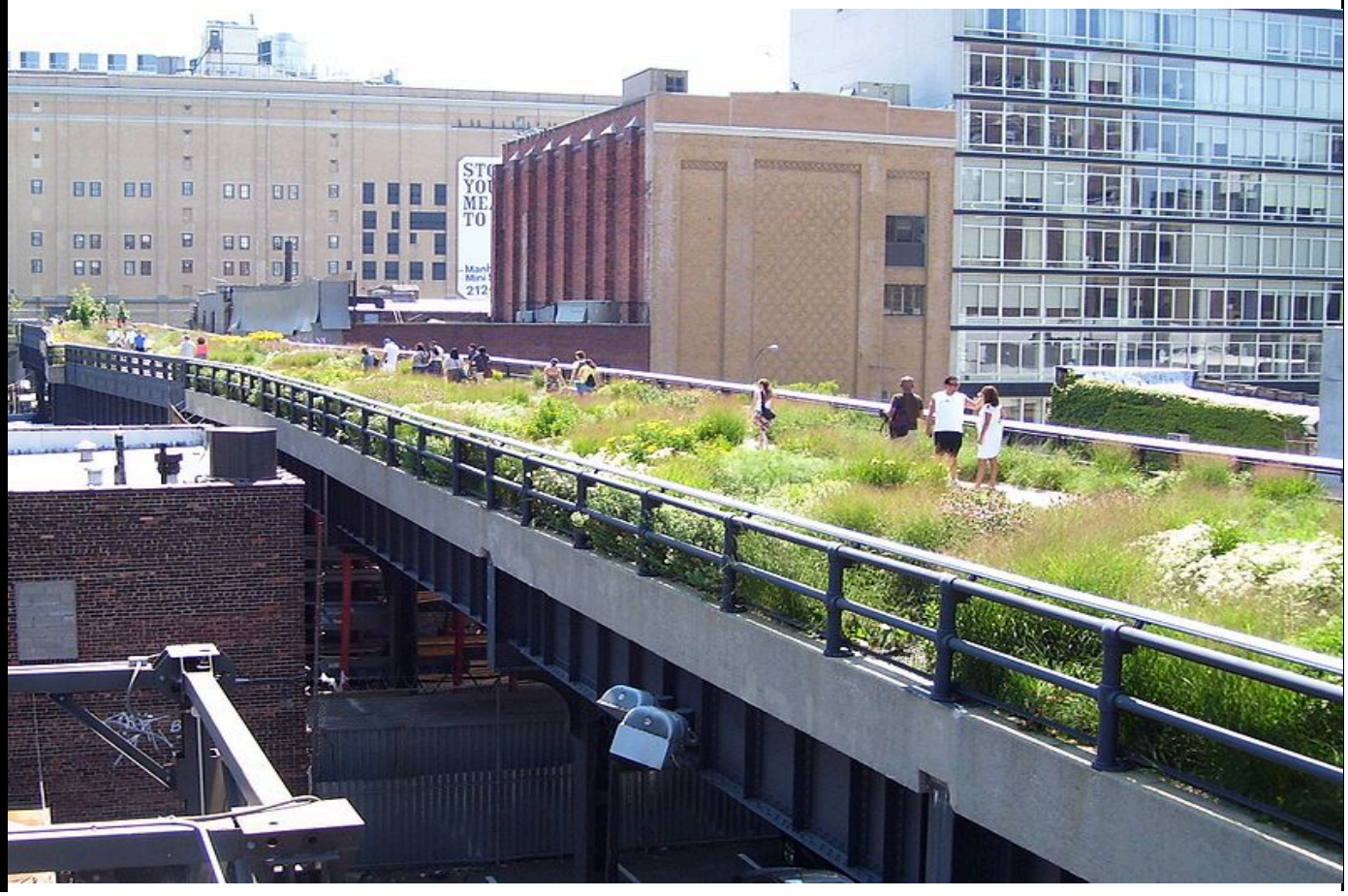
Crosswalking between Gray and Green Infrastructure for Budget Officers

As the green infrastructure (GI) approach to water management gains momentum, the local government budget process needs to adapt to some of the characteristics that make green distinct from the more traditional gray infrastructure approach. As communities launch GI projects, shortcomings in the budgeting process can falsely create a bad first impression. When an inaugural GI project is grossly over-budget for installation, or needs more frequent maintenance than planned, future GI projects may be blocked before the current project's vegetation can become established enough to produce the significant benefits for which it was designed.

At the same time, the local government budget officer has not been the target audience for the tools and resources being developed in the GI field. This publication aims to provide a budget officer, or watershed proponent who seeks to influence a budget officer, some tools for planning for certain key attributes of GI in the budget process.



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UNC ENVIRONMENTAL FINANCE CENTER

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The Environmental Finance Center at the University of North Carolina, Chapel Hill is part of a network of university-based centers that work on environmental issues, including water resources, solid waste management, energy, and land conservation. The EFC at UNC partners with organizations across the United States to assist communities, provide training and policy analysis services, and disseminate tools and research on a variety of environmental finance and policy topics.

The Environmental Finance Center at the University of North Carolina, Chapel Hill is dedicated to enhancing the ability of governments to provide environmental programs and services in fair, effective, and financially sustainable ways.

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Introduction - Making the Case for Working with Budgeting and Accounting for GI

Much attention is being given to comparing the cost of GI to traditional gray infrastructure approaches. GI proponents are trying to establish the business case for GI. No other local government issue presents a more compelling economic case for GI than the Combined Sewer Overflow issue. For local governments, such as the City of Atlanta, faced with separating their stormwater and wastewater sewers, this can be one of the single largest municipal expenses. By, causing stormwater to slow down, infiltrate the soil, and not enter the sewer system, GI serves to reduce Combined Sewer Overflow events. The municipality is spared the water quality problems and fines that accompany such overflows. Armed with just this one point, a GI proponent should be able to get the attention of local government officials, including budget officers.

Yet, even when the business case for GI is clear, financial policies may prevent a local government from supporting the project. A recent World Resources Institute (2013) publication points out that "*Even where the case has been made, public utilities work with financial accounting standards that do not enable operations and maintenance spending on natural infrastructure as part of normal business practices, despite the clear benefit.* That document goes further to state that there is a need to "*Improve accounting standards to enable operations and maintenance spending on natural infrastructure by public entities as part of normal business practices."* Such significant changes to accounting standards may be an extensive process. As a stepping stone, this publication attempts to move local government budgeting and accounting along this path by suggesting ways to adapt budgets to GI. The case studies mentioned below are from a project called "Innovative Financing Approaches for Stormwater and Green Infrastructure." The research was funded by the Environmental Protection Agency.

Capital vs. Operation & Maintenance Budget

GI projects tend not to fall as neatly under the two established types of "capital" versus "operation and maintenance" (O&M) budgets. Creating a new concrete structure usually falls under the capital budget until it is completed. After completion, its upkeep falls under the O&M budget for subsequent years (apart from major renovation or replacement costs). While planting has traditionally been included in O&M budgets, with GI, the planting has become the initial "installation" of the new project. Hence, a common basic approach has been to include the initial planting in the capital budget, but the ongoing pruning and mowing etc. as part of the O&M budget.

There is no "one way" to do this though. Each local government should start with what seems to make the most sense in its own situation, and then adapt as needed. For example, the Milwaukee Metropolitan Sewerage District has been doing GI projects for several years, but recently decided to shift GI costs largely to the O&M budget (Figure 1):

> *Total expenditures are increasing 1.9 percent, or $1.6 million, compared to the 2013 Operations & Maintenance Budget. Contributing to the overall increase is a change how the District funds green infrastructure, in that much of the work will now be funded through the O&M budget. As green infrastructure is a component of the District's new 2013 WPDES permit, it is a significant increase to the budget at $1.4 million.*

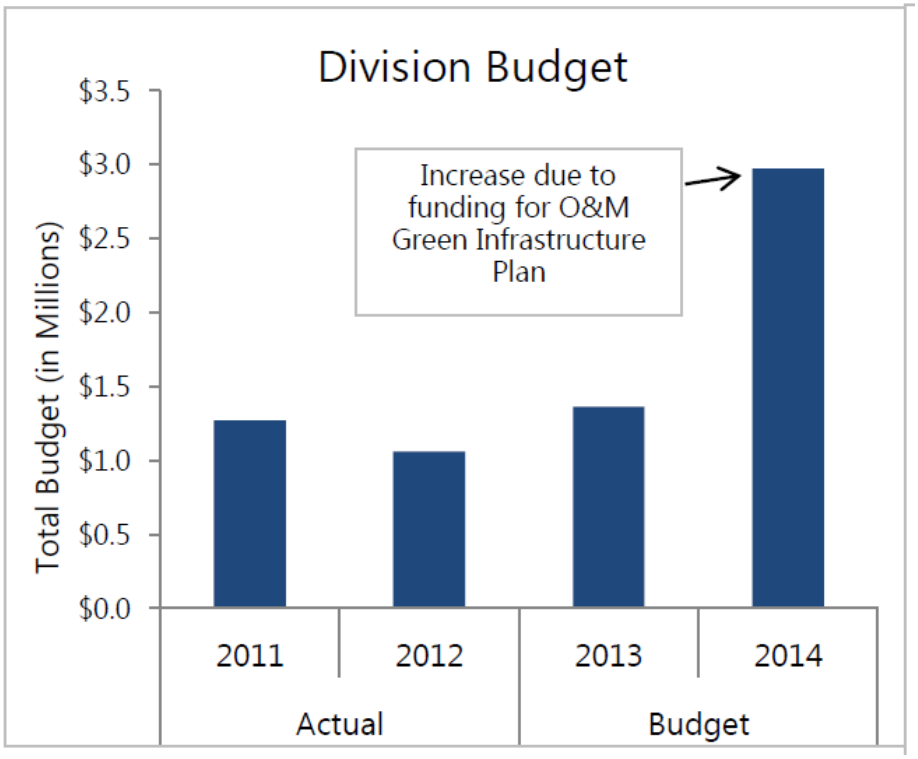

Figure 1: Planning, Research, & Sustainability Division Budget. Source: Milwaukee Metropolitan Sewerage District - 2014 Budget 2014 Operations & Maintenance and Capital Budgets http://www.mmsd.com/-/media/MMSD/Documents/Financial/budgets/2014BudgetFINAL.pdf; 2014

It is important to note that Milwaukee has a well-established funding source for its GI project **installations**. Other jurisdictions need to be vigilant that having the GI program shift too much of its costs to the O&M

budget does not lead to GI being outcompeted by other types of O&M expenses within the local government. Perhaps more important to guard against is that without proper representation in the capital budget, GI projects may not benefit from debt financing options, which could limit the scale of installations. In other words, access to revenue bond funding may make the case for including GI in the capital budget. In the case where a stormwater utility exists, or a drinking water plant is budgeting for source water protection, the fees charged to utility customers can represent a significant and reliable source of funds to repay revenue bonds. Revenue bonds can be used for GI, provided that the utility can include GI projects as capital assets. This process of issuing revenue bonds backed by the utility's ability to charge user fees aligns with how major capital projects at utilities have traditionally been financed. Not including GI projects in the capital budget can essentially exclude these types of projects from the municipal bond market.

The issue of capital versus O&M budgets for GI also hinges on the ownership of the property where the GI is installed. In some cases, a local government has GI on both private and public property. Milwaukee also handles these two ownership situations differently in its budgets. When the District will not own the property on which the project is installed, GI is included in the O&M budget. However, if the GI installation is to occur on District-owned property, then it is included in the capital budget. It is highly recommended that consideration is given to this topic of property ownership. Many of the country's more advanced GI programs are recognizing the need to encourage more GI projects on private property. Hence, having a clear policy on responsible entities related to installation, ownership and maintenance of GI is becoming more relevant.

Most GI projects have long-term benefits. As explained in more detail below, a tree planted today will actually provide more benefit in the next fifteen (15) years, depending on the species, than the tree will provide in the first year. This long-term benefit adds to the case for financing this type of GI through debt, so that future generations, who will benefit more from the infrastructure, pay some of the costs in installation. For the sake of administrative efficiency, it obviously makes sense to finance projects like tree planting across a whole municipality, as opposed to a few trees at an individual site. Such a large scale approach fits well with capital improvement projects for budgeting purposes.

GI May Affect More Line Items in the Budget Than First Meets the Eye

One major hurdle to the GI approach is the misconception that it only increases the overall cost of a project. However, the budget officer needs to consider that while certain line items increase, others may decrease on account of the GI approach. As an example, let us consider permeable pavement. It may be more expensive for a municipality to install permeable pavement compared to traditional roads, but less de-icing salt is needed on this type of GI compared to traditional roads. Less de-icing salt means lower O&M costs to the government, and less chlorides in stormwater. Although the cost savings from reduced de-icing salt may currently be less relevant in areas with milder climates, it is a significant problem in places like Minnesota where the Ramsey Washington Metro Watershed District is anticipating that, due to chlorides from road salt:

- *4 lakes and 1 stream are going to be listed as impaired*
- *Significant lake impacts are imminent unless action is taken*
- There will *"likely be a Metro-wide TMDL for chlorides – with a uniform implementation approach* (Aichinger, 2013)

In other examples, according to a 2013 report by the University of New Hampshire's Stormwater Center, GI eliminates the need for "*conventional stormwater infrastructure such as curbing, catch-basins, piping,*

ponds, and other hydraulic controls. So the **net** effect to the project budget is what becomes more important than individual line items.

Estimating Costs for Green Infrastructure

For those seeking to anticipate and understand the costs of GI, there is a growing body of literature and data on general GI cost guidance. The reader does need to keep in mind that costs and performance of GI are somewhat more dependent on local conditions than gray infrastructure. However, the Environmental Finance Center at The University of North Carolina at Chapel Hill has assembled a catalog of publications and pointed out where several of these documents offer cost estimates (EFC at UNC, 2014). One noteworthy document included in this catalog is from the Stormwater Center at the University of New Hampshire, which provides general information on GI including:

> *"surface systems are easier to inspect than subsurface systems; larger systems with higher storage capacities require less frequent inspection than smaller systems with lower capacities; and more effective systems require more frequent inspections than lower efficiency or less effective systems. … most vegetated-media filtration systems require maintenance activities more in line with routine landscaping approaches. These may be less familiar to many Department of Public Works (DPW) personnel but may be affordably subcontracted…"*

Such "rules of thumb" for GI costs are becoming more dependable as more projects are installed and more time elapses since their installation. However, budgets should include a "buffer." In part, the buffer would protect against GI underperforming based on local conditions. Also, as with most new endeavors, there is a learning curve involved. For example, one official involved in Seattle's "Street Edge Alternative" (SEA) pilot project estimates that the project could be done for about 25% less going forward (American Rivers, 2012). Therefore being conservative with, especially earlier, GI budgets is important.

Beyond the upfront cost of installation, operation and maintenance costs related to GI tend to differ from traditional infrastructure projects. Gray infrastructure usually needs **more** O&M as age increases. Conversely, as the vegetation involved with GI matures, there tends to be increased resilience and function. According to American Rivers, (2012) O&M for gray infrastructure frequently lags behind actual needs. The authors suggest that in order to keep green infrastructure working properly, there is a need to shift to a new maintenance paradigm by planning for "*regular, low capital rather than episodic, high-capital approaches.*"

The cost to install GI also depends on whether one is looking to retrofit existing development as opposed to new development. Generally, in new developments, GI costs are less than retrofitting already developed urban areas. This is especially true for individual, small-scale retrofit projects (ECONorthwest, 2007). GI costs can be reduced when they are incorporated into larger-scale redevelopment projects.

Differences Between Gray and Green Infrastructure for Budgeting Considerations

For the budget officer who is embarking on her first GI budget, there are certain key factors that warrant consideration. Table 1 captures some of the main considerations for budgeting for green infrastructure projects compared to gray ones.

Table 1 – Differences in Gray and Green Infrastructure for Budgeting Considerations

Factor	Gray	Green
Initial capital costs	Variable	Variable - Depends on the type of GI (e.g. green roof installation tends to be much higher than traditional roof; while porous pavement can be more comparable to cost of traditional roads) (Adams, 2003)
Frequency of O&M	Usually Less	Usually More
Intensity of O&M	Usually More	Usually Less
How standard is O&M regime?	Generally more routine and based on manufacturer's guidelines; less variability	May need to adapt to growth rate; weather and soil conditions etc.
Precedence on O&M	Long history of O&M data to draw on	Limited long-term data on O&M costs
Level of skills involved in O&M	More specific skills may be necessary for maintenance	Usually more general skills, can even include community involvement in maintenance – See Portland Example
Lifecycle costs	Usually higher	Usually lower
Design contingency costs	Tend to be lower	Tend to be higher
Construction contingency costs	Tend to be higher	Tend to be lower
Community Willingness to Pay	Usually lower	Usually community more willing to pay for maintenance – See Portland Example
External costs to consider	More salting and plowing on traditional roads	Permeable pavements reduce public road maintenance expenses
Eliminates need for other infrastructure line items in budget?	Most often does not reduce need/cost for other types of gray infrastructure.	Often eliminates need for other "gray" costs such as curbs, drains and stormwater conveyance tanks, pipes etc.
Triple bottom line benefits – social and recreational?	Limited or no social and recreational benefits	While some costs can be quantified more easily: e.g. reduction in capital and O&M costs, or reduced fines for CSOs, but there are also social and recreational benefits that are less easy to quantify, but may be worth considering.
Triple bottom line benefits – environmental and long term financial benefits		Potential avoided capital costs for treatment processes like flocculation and sedimentation; membrane filtration etc. based on enhanced source water quality. *One study found that water treatment costs for utilities decrease by approximately 20 percent for every 10 percent increase in forest cover across a watershed* (Ernst, 2004).

Where to Start?

Some of the examples of GI programs date back many years. A local government looking to create a brand new GI program may be overwhelmed and perplexed about where to even begin.

If a water utility has budgeted for "source water protection" in the past, this can serve as a good launching pad to introduce GI into the budget process. Where there are insurmountable concerns for using direct rates revenue for GI, perhaps a surcharge on the water utility bill may be palatable. For example, in the City of Raleigh, NC, customers pay a surcharge of one penny per hundred gallons of water used. The surcharge raises $1.8 million annually for investments in the utility's source water. Such "watershed protection fees" have been increasing in occurrence.

Another obvious area of local government to interject green infrastructure projects is through a stormwater management program. Many local governments have created stormwater utilities to generate the funds needed for these types of projects.

Conferring with neighboring experienced communities may also be useful. However, since this area has been evolving so quickly, anyone preparing budgets for GI should be sure to get recent quotes. For example, simply talking to a nearby local government who put in their GI even a few years ago may indicate much different (most likely higher) costs than current market prices.

Which GI Projects to Fund First?

While budget officers are used to "CPI" referring to the "consumer price index" as it relates to inflation, this acronym has another meaning in the GI world. The "Conservation Priority Index" is a tool to prioritize *"watershed land parcels in terms of importance as natural infrastructure for watershed services. This prioritization enables the program administrator to direct capital (e.g., for conservation easements, riparian buffers, or other investments) most cost-effectively across the landscape* (Talberth, Gary, Yonavjak, Gartne, 2013)." This tool can help a local government determine which areas or projects can have the greatest impact on water resources. This "CPI" tool does relate more to conserving areas of forest as opposed to urban GI such as rain gardens though. Another potential tool for prioritizing GI projects is the "Forests to Faucets" project. This tool by the United States Department of Agriculture (USDA), allows the user to hone in on areas in a watershed that are most important to surface drinking water quality.

For the budget officer tackling the first GI budget, (or for the GI proponent who is instigating that first step), one thing to remember is that that implementation of GI can be incremental, even though the vision may be grand!

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