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July 18, 2003

The Honorable Carol Schwartz, Chairman
Committee on Public Works and the Environment
1350 Pennsylvania Ave., NW, Suite 105
Council of the District of Columbia
Washington, D.C. 20004

Dear Councilmember Schwartz:

As required by the Storm Water Permit Compliance Amendment Act of 2000 (the "Act"), enclosed please find a report, prepared by the District of Columbia Water and Sewer Authority's independent rate consultants, on the feasibility of implementing an impervious surface-based rate for the District of Columbia's stormwater permit compliance costs.

The Act requires that the report include an estimate of the initial cost and time necessary to implement a new structure. As discussed in the report, the rate structure can be implemented within approximately nine months of notification to proceed; this assumes no significant changes to the structure that would require substantial modifications to the Authority's customer information and billing system and / or substantial fieldwork. The Authority is currently finalizing cost estimates for implementation, and this estimate will include the upfront costs associated with development of the structure and report preparation as well as other implementation costs, including billing system changes, etc. This cost estimate will be completed by the end of July and forwarded to you once complete.

The existing stormwater rate is structured to recover approximately $3.1 million in annual compliance costs, consistent with the initial cost estimates that were jointly developed by all participating agencies. I understand that the District will be receiving a new stormwater permit from EPA in the near future and that the costs of permit compliance may increase significantly. If the District chooses to recover these increased costs through the stormwater rate, we could adjust the rate accordingly.

Please contact me at (202) 787-2609 with any questions.

Sincerely,

Jerry N. Johnson
General Manager

c: Stormwater Advisory Panel

# Feasibility Analysis of a Rate for Cost Recovery for the Stormwater Management Program in the District of Columbia

June 27, 2003

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# 1. Summary and Recommendations

- This study evaluates the feasibility of developing rates that can be used to recover costs of the DC Stormwater Management program. The DC Storm Water Advisory Panel has proposed October 1, 2004 as the inaugural date for such a rate for the stormwater program.

- Across the country, the impervious area approach to cost recovery has been implemented for recovery of stormwater management costs. The method is straightforward and provides an equitable allocation of costs based on representative shares of impervious surface area. In advanced applications, such systems can be used to establish beneficial incentives for property owners, encouraging onsite control of runoff.

- Although the concepts are straightforward, implementation may be an involved undertaking. This is confirmed in the experiences of those who have been through the entire process in other jurisdictions. The challenges are generally: 1) developing the data to provide a defensible basis for computations; 2) assuring efficacy in revenue generation at levels that are fair and acceptable; and 3) assuring efficiency in billing and collections. The implementation challenges facing Washington DC include several additional dimensions that are unique to the Federal City.

- It is recommended that stormwater rates be developed by adopting an impervious area formula as a cost allocation mechanism within the WASA retail rate structure. Costs of the stormwater management program would be allocated to customer classes and sub-classes on the basis of their representative shares of the impervious surface area in DC, resulting in a fixed charge to be applied to each account. The existing stormwater fee would be discontinued.

- The proposed approach allows implementation of an equitable cost allocation that can be established by October 1, 2004 without major impediments and with modest implementation costs. This assumes that action is taken by the District of Columbia at least nine months prior to implementation and that there are no significant changes to the implementation strategy described in this report that require extensive billing system changes or field work.

- Looking to the longer-term, the database building blocks needed to support more advanced implementation are under development across several departments of the DC government. These systems might offer means of improving the assessment of impervious surface area used for cost allocation and the capability to incorporate incentives for onsite control measures. If the experience of other jurisdictions is any guide, it will still require considerable time and effort to bring those building blocks together once available.

- A first approximation cost allocation model has been developed in this study using the WASA Customer Information System, the DC property tax database and imperviousness estimates developed in the WASA CSO LTCP study. It must be stressed that all results presented in this report are preliminary. Results will be refined prior to implementation.

- Under the approach, the Federal cost share of stormwater management programs more than doubles compared to the status quo as a result of the large amount of land occupied by the Federal government. Cost shares to single-family residential, multi-family residential and commercial customer classes are reduced as a result.

# 2. Purpose and Need for A New Stormwater Rate in DC

The DC Storm Water Advisory Panel issued a report to the DC Council on September 9, 2002. The panel was charged with examining various aspects of the stormwater management program required under DC's MS4 NPDES permit that keeps the District in compliance with US EPA regulations governing stormwater management. This included assessing the equitability and sufficiency of the current cost recovery approach versus the alternative of rates based on impervious surface area.

Currently, the cost of the stormwater program is recovered through a separate line item in WASA's rate structure that applies a flat fee of $7 per year to single-family residential customers. Multi-family accounts are charged at a rate of 1.4% of the water and wastewater bill. A 2.0% charge is applied to the water and wastewater bills for commercial, Federal and municipal accounts. The panel concluded that while the current rate has been adequate for current revenue needs of around $3 million per year, it raises concerns when properties that consume little water produce significant amounts of stormwater runoff, or vice-versa. Looking to the future, it is likely that the magnitude of compliance costs entailed in renewing the MS4 permit will increase.

The advisory panel recommended a study be performed to evaluate the experiences of other jurisdictions and compare the current rate structure versus alternative rate structures based on impervious area with the intent of determining the best overall structure for DC. These study requirements have been incorporated into the present report.

The advisory panel recommended that, if feasible, an impervious area rate structure should be put into place to provide cost recovery for the DC stormwater management program starting in fiscal year 2005 (October 1, 2004). This objective has been adopted as a major criterion for assessing feasibility of an impervious area rate structure.

# 3. Experience Elsewhere With Stormwater Rates

**Prevalence and Scale.** The promulgation of stormwater management regulations by the US EPA stimulated widespread development of stormwater utilities supported by separate stormwater rate mechanisms for cost recovery. The trend is growing rapidly. Between 1995 and 2000, the number of stormwater utilities in the US doubled to a total of about 400. The median rate for a single-family detached residential property is about $3/month. The highest rates for such properties are in the $8/month range.

**Cost Recovery Rationale.** An impervious area rate structure is justified as a means of cost recovery for stormwater management programs based on a *cost-causer / cost-payer rationale.* This is the *user fee principle* wherein an individual is charged a share of costs that reflects as closely as possible their contribution to the costs of the program. Costs are related to the amount of stormwater runoff that is produced by each property in the service area. A rate structure therefore requires a means of allocating costs to each property on this basis.

**Basic Framework.** While it is not practical to continually measure runoff from every property, the amount of *impervious surface area* (rooftops and paved surfaces) existing on a property can be used as a proxy for the amount of runoff generated by the property. For example, if a 2,500 square foot property is 40-percent covered by impervious surfaces, it would be responsible for 1,000 square feet of impervious area. Accordingly, if there were 500 million square feet of impervious area in the total city, the example property would be charged .0002% (1000/500 million) or one five-hundred thousandth of the total cost.

It is equally impractical, however, to continually monitor impervious surface areas on every parcel of property within a city. Most cities that have developed stormwater rate structures have followed a simplified approach. This has been accomplished through the computation of an equivalent billing unit to represent all or most of the residential sector that represents the vast majority of properties (e.g., 84% of WASA customers). The typical residential property is defined as possessing the median lot size with the average percent of impervious cover. Using figures from the above example, if the median lot size was 2,500 square feet and the average percentage of impervious cover was 40-percent, then every residential property would receive an equivalent bill representing the share of total costs attributable to 1000 square feet of impervious area.

The computation of an equivalent residential billing unit is an effective means of making a reasonable assignment of cost responsibility between major classes of land use (residential, commercial, etc) while keeping the amount of tracking and parcel-specific land use analysis required within manageable

limits. Across the country, the level of sophistication applied to the procedure varies considerably from place to place.

Assignment of cost responsibility to commercial properties is accomplished by first computing the total amount of impervious area attributable to each property. Commercial properties are commonly assumed to have about twice as much impervious cover as residential properties. The impervious area computed for each commercial property is divided by the number of square feet that have been defined as an equivalent residential billing unit in order to compute the number of billing units attributable to a commercial property. Hence, in the context of our same example, a 25,000 square foot commercial property assumed to have 80% impervious cover would have 20,000 square feet of impervious area and would therefore be billed the same as 20 equivalent residential units (20,000/1,000).

Some localities have sub-divided their residential and non-residential categories to refine the allocation, while many others have kept the process as simple as the above example. Most localities have relied upon their real property tax database to provide information about the area of individual parcels as well as the owner's name and address necessary for billing. In many communities, the property tax billing system has been used directly by adding the stormwater fee as an additional item on the property tax bill.

Many cities launched stormwater fees on the basis of simple assumptions regarding the relative differences in imperviousness between land use types. Where the city geographic information system (GIS) is linked with the property tax database, it can provide a means of assessing the amount of impervious surface area that exists on individual parcels as well as generally within residential, commercial and other categories.

Roadways are typically omitted from this type of stormwater cost allocation. Although roads constitute a sizeable proportion of the total impervious surface area within a city, their contribution is allocated proportionately across the other land uses. A few cities have managed to obtain token contributions to stormwater management programs for state roads from their state highway departments.

**Enhancements.** The environmental benefits of an impervious area approach to stormwater cost recovery can be enhanced with the addition of incentive formulas to provide discounts and/or rebates to property owners who deploy onsite runoff control measures or reduce the amount of impervious surface. Only some cities with impervious area based stormwater rates have added incentive mechanisms to their rate formulas. Some have added incentive mechanisms as a second phase after the initial rate has been instituted. As with the rate structure itself, some cities have taken very simplistic approaches and others have adopted more sophisticated programs, reflecting varying capabilities and motivations. The design and administration of incentives poses a number of additional challenges.

First, it is necessary to consider the cost-effectiveness of onsite control measures. If the onsite measures deployed do not reduce the cost of the stormwater management program by an amount equal to the amount of the incentive, then the result of granting the incentive will be to produce a deficiency in revenue generation that will need to be recovered from other customers. Presently, the science does not support estimation of the cost-effectiveness of onsite control measures at a level of precision sufficient to confidently assess whether the incentive offered will or will not be offset by cost reductions elsewhere in the control program. This is one reason that the Environmental Protection Agency does not give full credit to such measures in approving compliance plans. Another reason that EPA considers the effectiveness questionable is uncertainty as to the degree that onsite measures will be adopted in response to the incentives offered.

From a revenue standpoint, implementation of incentives must be accompanied by an extra margin of safety in revenue targets to assure that cash flows are adequate to support the program even if the most unfavorable combinations of cost effectiveness and market penetration should materialize.

A second priority for implementation of incentives is anticipating and providing for additional administrative needs. The basic needs include:

- A marketing process to make the public aware of the program;
- Appropriate modifications to the billing process to reflect the incentives;
- A customer service process to respond to inquiries; process applications for discounts or rebates, and resolve complaints or disputes;
- A field verification process to confirm that the onsite measures have in fact been put in place;
- An inspection program to confirm that the measures are still in place and functioning during ensuing billing cycles; and
- An underlying database that is developed and maintained to support retention of individual property data on imperviousness, on runoff control measures, and on the application, verification, and inspection history of each individual property for which incentives are being offered.

The data management and customer support costs entailed in these implementation tasks are significant and have to be added to the total revenue target of the control program in order to assure full cost recovery.

**Implementation.** As suggested by the DC Storm Water Advisory Panel, representatives of Montgomery County, MD, Takoma Park, MD, and Baltimore, MD were interviewed regarding their experiences in implementation of impervious area stormwater rates.

The situation in Montgomery County prior to issuance of their 1996 MS4 permit was one in which home owners associations were bearing a

disproportionate share of the stormwater burden. Primarily responsible for required maintenance and inspection of smaller residential stormwater structures, they were also taxed to generate revenue for similar management of larger structures. During this permitting, the County was required to do a systematic assessment of the 3,000 structures in their system, which revealed such inequities that could be corrected with an impervious area rate.

Some of the questions they faced included the granting of agricultural exemptions, whether to have a credit/incentives program, and how to treat government facilities, schools, and libraries. Federal facilities are not a substantial presence in the County, but they are responsible for maintenance on their facilities and are therefore not required to pay the stormwater rate.

Data was developed using the county GIS system, which included an impervious layer with building and parking attribution. A statistical sample of 700 houses was conducted and the median impervious area used for the equivalent residential billing unit was estimated to be 2406 square feet. It was estimated to possess approximately 25% error "to the ratepayers good", but was deemed suitable to begin the process. New aerial photos are flown every two years to continually update the impervious information. The GIS was used to identify structures within drainages served by stormwater facilities. Four stormwater rate classes were identified; single-family detached, single family attached, multi-family, and associated non-residential (indicating a commercial parcel with an associated structure. Commercial customers do not pay if they are not served by an identified structure).

The costs associated with development and implementation included approximately $500,000 for GIS work and rate structure and billing system development as well an additional $700,000 for facility inspections. These efforts extended over a year-and-a-half. The tax office does the billing and collection of funds, although it is technically considered a fee for service although it appears on tax bills. The equivalent annual bill is $12.75 per single-family detached residence. There is no credit system in place at the current time.

Takoma Park, MD implemented a stormwater rate in 1995 to support the ten to thirteen thousand linear feet of catch basins, manholes, and other assets that must be cleaned annually to maintain proper operation (the maintenance program itself costs $50,000 - $80,000 per year, with the current five-year capital plan ranging from $120,000 - $180,000 dollars).

The City hired a consultant to develop the system over six months, relying on the local tax database. Takoma Park was fortunate enough to possess a tax database already attributed with imperviousness information prior to this work. The County was also in possession of a GIS database, used for display and mapping purposes and spatial orientation of problem areas. The process lasted a year and a half before the initial bills were distributed.

The city maintains the stormwater fee as a "fee system" -- not a tax -- and can therefore collect from tax-exempt entities (although they do not bill the Federal government). The City generates $233,000 in revenue from the stormwater rate, with each single-family residential owner currently billed an equivalent $28.68 per year.

The City of Baltimore, MD investigated the potential for development of a stormwater rate. A consultant was hired and completed a nine-month, $380,000 first phase effort. It was determined the equivalent residential billing unit methodology of property assessment could be utilized to cover costs associated with storm drain maintenance, permitting fees, etc. The city was in possession of a recently upgraded geographic information system (GIS), which, with substantial additional work, would have been deemed suitable for supporting such a methodology. The process was on the verge of entering a second phase of implementing a rate when the City was reorganized and momentum was compromised. Additionally, the Department of Justice had recently issued a consent decree ordering a $900 Million solution to Baltimore's sewer overflow problem. In combination with new disinfection rules it was estimated wastewater rates were slated to rise approximately thirty percent. This combination of circumstances generated enough outcries from the citizenry to force the City to shy away from introducing a new revenue mechanism and precluded further development of a stormwater rate.

# 4. Review of Available Data and Information Systems

Our review of databases to support a rate for DC is summarized below.

**WASA Customer Information System**
The WASA Customer Information System (CIS) tracks water consumption and computes and produces the WASA bills that incorporate consumption charges for water and wastewater service, the metering fee, the right of way rate, and the current stormwater fee. Significantly, the WASA CIS contains fields containing the square and lot numbers that are used as unique identifiers of parcels in the DC property tax database. This linkage is used by WASA when it is necessary to post liens against properties that have defaulted on paying their WASA bills.

**DC Office of Tax and Revenue – Property Tax Data Base**
Many cities have relied upon their property tax database to support development and maintenance of rates based on impervious area. A copy of the DC property tax database was obtained and used as part of this study. It contains data on the area of individual properties and a detailed categorization of the type of land use to which each property is devoted. The land use detail exists because it is the basis for assigning real property tax rates. These data elements are fundamentally important to development of an impervious area rate structure.

An especially beneficial feature of the property tax database is that the Office of Tax and Revenue (OTR) has a need to keep the information for these key data elements up-to-date for their own purposes. Despite the fact that the many governmental and tax-exempt organizations in DC do not receive a property tax bill, information on these entities exists within the tax database nonetheless because property ownership must be reliably established in order to determine who gets a tax bill.

**WASA CSO Long-Term Control Plan -- Impervious Data**
To support hydrologic modeling of control scenarios for the Combined Sewer Overflow (CSO) Long-Term Control Plan (LTCP), a comprehensive assessment of the extent of impervious surface that exists for different land uses within the CSO drainage area was developed. This database represents, in effect, a very large sample of land use in DC and provides an ample basis for making imperviousness assumptions about different land uses to support development of an impervious area rate. In addition, the manner in which the CSO LTCP study was performed incorporated the imperviousness of roadways into the imperviousness assigned to different land use types, providing an automatic way to incorporate roadways.

**DC Office of the Chief Technology Officer – GIS Data Base**
The DC Geographic Information System (GIS) is currently undergoing an upgrade that will support computation of the total area and impervious area of each property within DC. The project involves converting aerial photo data into digital form and correctly aligning the perimeters of individual parcels. This enhancement of the GIS is a $2 million project that began in October of 2002 and is scheduled to be completed by October of 2004.

The DC property tax database exists as a "layer" within the DC GIS. Upon completion of the GIS upgrade project, estimates of the total area and total impervious area of each parcel can be obtained from the GIS in a manner that can be linked to the property tax database.

**National Capital Planning Commission – GIS Data Base**
The NCPC has responsibility for all Federal parks and open space in the District of Columbia. Their responsibilities extend to other aspects of the Federal presence in the national capital. To support these efforts, they maintain a geographic information system that can provide definitive assessments of the amount of area occupied by the Federal government and additional information regarding its imperviousness. This database can be very useful in validating the understanding of the Federal presence in DC.

**DC Department of Consumer and Regulatory Affairs**
The Building and Land Regulation Administration (BLRA) regulates all building and land use within the District of Columbia to ensure safety and conformity to local and federal laws and regulations. BLRA manages permit processing, building inspection, and zoning programs covering new construction, alterations, repairs and use.

The BLRA is initiating a project to build an information system that will add new data fields to the framework of the DC property tax database to assist in its mission of monitoring and inspecting compliance with building and land regulations. This project potentially lays the groundwork to support incentives for onsite runoff controls. Moreover, the BLRA might be a logical implementation partner since its mission involves putting inspectors in the field to document compliance.

# 5. Strategy for Implementation

The DC Storm Water Advisory Panel urged implementation of a new stormwater rate based on an impervious area approach by October 1, 2004 in light of the prospect of increasing costs of the stormwater management program over the near and medium term. Development and implementation of a rate within this timeframe is feasible assuming Council approval at least nine months before commencement and that there are no significant changes to the methodology described in this section that would require substantial billing system changes or extensive field work. The data have in fact been obtained and a mock up of the proposed approach has been developed, as described in the remainder of this section. (It must be stressed that results presented in this section must be regarded as preliminary at this stage. Additional refinements will produce marginal adjustments in the course of implementation.)

Most often, stormwater rates have been developed and implemented through reliance on a combination of the city's property tax database (for billing) and the city's geographic information system (for computations of impervious areas). Frequently, a stormwater "fee" has been simply appended to property tax bills as a separate line item. In DC, we are confronted with circumstances in which the requisite GIS capability is currently in development and is not scheduled for delivery until October 1, 2004. The experience of other jurisdictions suggests that it may then require an additional 2 years and as much as $1 million in further development work to integrate the GIS and property tax databases to support an impervious area fee.

A further complication arises uniquely in the case of DC where the property tax database is probably not the preferred billing system since 39 percent of the non-roadways land area belongs to the Federal government. Still more land belongs to foreign governments and tax-exempt organizations. In contrast, the WASA customer information system (CIS) recovers costs from all water and wastewater customers. The proposed approach involves use of the WASA Customer Information System in combination with the DC property tax database and the imperviousness database developed by WASA in the course of preparing a long-term control plan for combined sewer overflows.

| | **Typical Approach** | **Proposed Approach** |
|---|---|---|
| Property Tax Database | Billing by property | Area by property & type of land use |
| Geographic Info System | Impervious Area by Property | |
| WASA CIS | | Billing WASA customers |
| WASA CSO LTCP | | Imperviousness by type of land use |

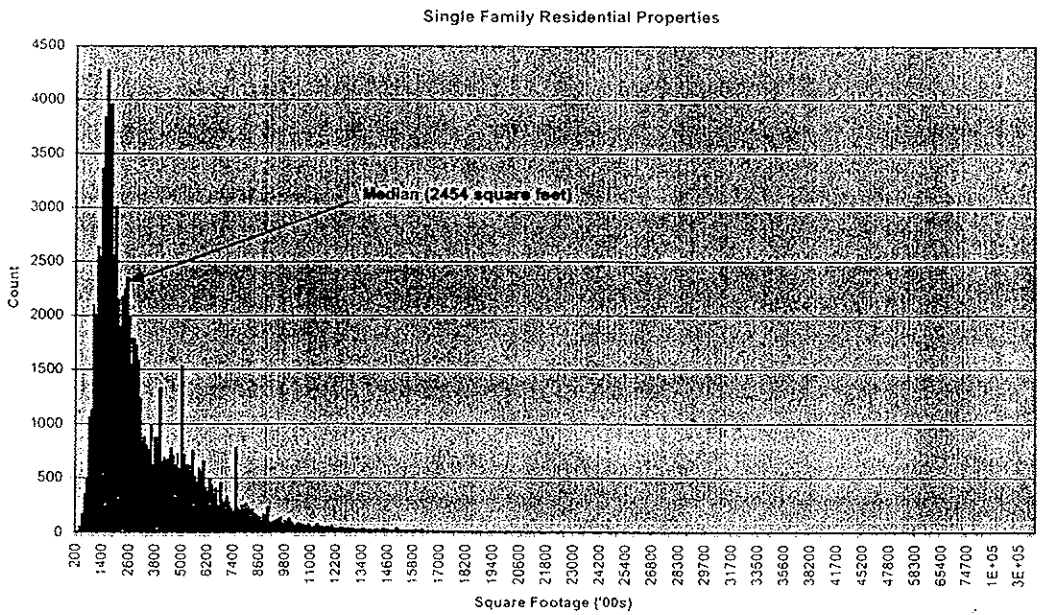
The proposed approach is to compute an equivalent residential billing unit (EBU) and use it to allocate costs across customer classes within the WASA CIS. Costs will then be charged and recovered as a separate line item for stormwater management on the WASA bill at different rates for each class. This approach has the benefit of being implementable in the short-term while also lending itself to refinement and enhancement when the GIS capability becomes available later.

There are three overall steps in the procedure:

- Computation of An Equivalent Residential Billing Unit (EBU)
- Allocation of Costs Across Customer Classes
- Development of Rates for Cost Recovery Within Non-Residential Customer Classes

**Computation of An Equivalent Residential Billing Unit (EBU)**

An Equivalent Billing Unit (EBU) allocates an equal share of costs to all single-family residential customers based on the characteristics of a "typical" residential property. This allows a simplification in the residential category that includes 84% of all WASA customers. The starting point is defining a "typical" residential property. The distribution of the land area of single-family residential properties in the DC property tax database is illustrated below.




Step 1 in the EBU computation selects the median lot size – 2454 square feet -- to represent the "typical" single-family residential property. Because of the extremely long "tail" of the distribution representing the very large residential lots, the median is much more typical of most properties than the average. By definition, half the distribution is larger than the median and half is smaller.

Step 2 develops an average "imperviousness percentage" from the database compiled in the CSO LTCP study to represent single-family residential land uses. This is computed as a weighted average of all the single-family residential land area in the city. In this weighting procedure, the imperviousness estimates for each type of single-family residential land use are weighted by the number of square feet of each use appearing in the DC property tax database. The resulting weighted average – 34% -- represents the average degree of imperviousness of single-family residential properties.

| | $Ft^2$ | Imperviousness |
|---|---|---|
| **Residential-Detached-Single-Family** | 205,907,241 | 25% |
| **Residential-Semi-Detached-Single-Family** | 60,421,539 | 45% |
| **Residential-Row-Single-Family** | 62,820,783 | 55% |
| ***Weighted Average*** | | 34% |

Step 3 multiplies the median single-family lot size estimate by the average imperviousness percentage to yield an estimate of the number of square feet of impervious surface per single-family residential property (2454 x 34% = 834 square feet = 1 EBU).

Step 4 assumes all single-family residential properties are equal to 1 EBU for billing purposes. Based on the DC property tax database, there are 93,529 EBUs in the single-family residential category. Each of them will be assigned a share of the total cost attributable to 834 square feet of impervious surface area.

### Allocation of Costs Across Customer Classes

The next step computes the number of EBUs attributable to each of the other property types and customer classes. This is accomplished by first multiplying the total square feet in each land use category appearing in the property tax database by the imperviousness estimates developed for corresponding land use categories in the CSO LTCP. The weighted average imperviousness of properties comprising each customer class is developed in a manner similar to that described above for the residential category. The total impervious area thus determined in each customer class is then divided by the 834 square foot figure in order to compute the number of EBUs in each customer class.

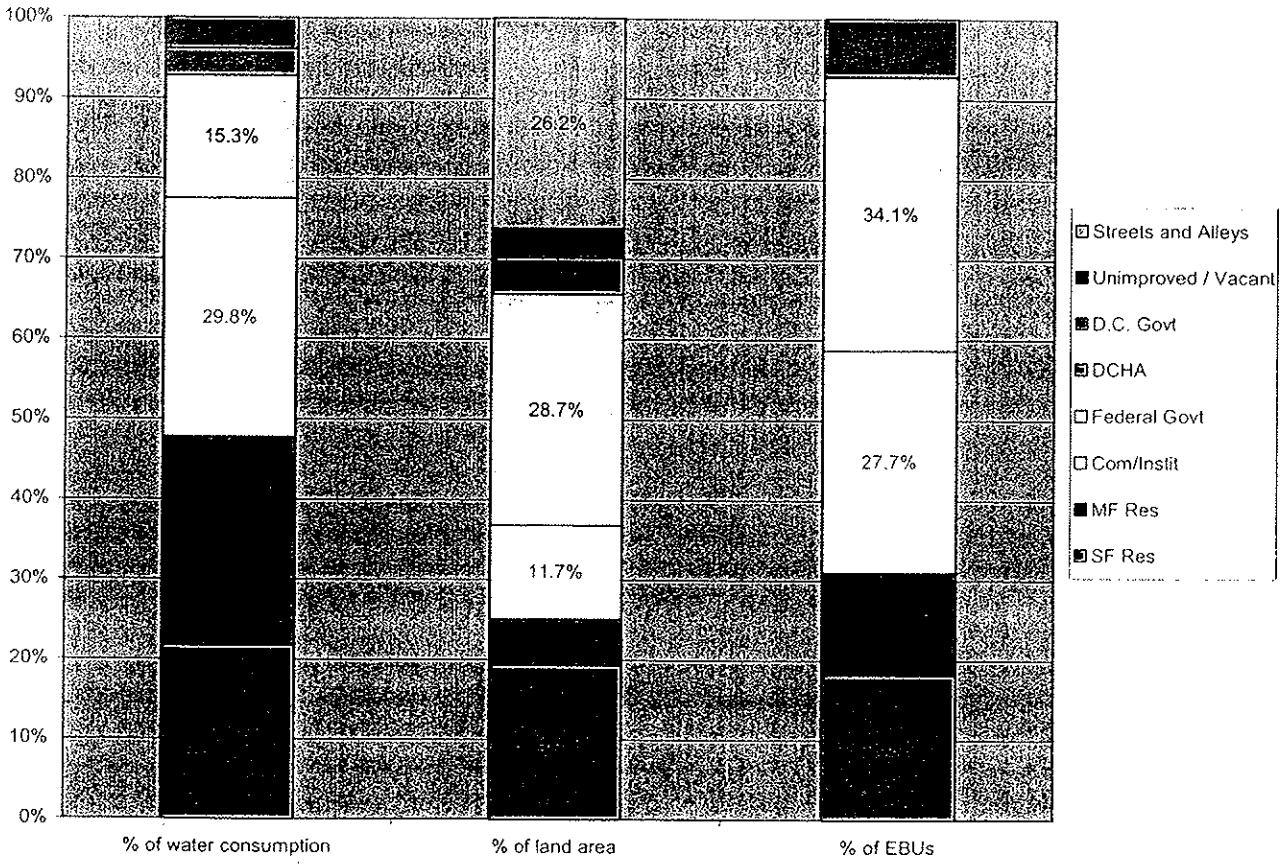
Properties belonging to the Federal government, the DC government, and the DC Housing Authority are evaluated in the same manner as those in private ownership. The following table summarizes the overall procedure.

| | # of Properties | Area | Imperviousness | Impervious Area | EBUs | EBUs per Property | % Allocated |
|---|---|---|---|---|---|---|---|
| **Private** | | | | | | | |
| Single-Family Residential | 93,529 | 333,133,229 | 0.34 | 113,265,298 | 93,529 | 1.0 | 17.8% |
| Multi-family | 14,748 | 100,021,901 | 0.55 | 55,012,046 | 65,933 | 4.5 | 12.6% |
| Condos | 36,886 | 18,807,160 | 0.70 | 13,165,012 | 15,779 | 0.4 | 3.0% |
| Commercial | 8,836 | 88,672,018 | 0.65 | 57,636,812 | 69,079 | 7.8 | 13.1% |
| Institutional | 1,575 | 94,702,209 | 0.51 | 48,258,827 | 57,839 | 36.7 | 11.0% |
| Unimproved / Park / Vacant | 9,845 | 62,980,060 | 0.08 | 5,038,405 | 6,039 | 0.6 | 1.1% |
| Unknown | 1,403 | 37,722 | 0.44 | 16,598 | 20 | 0.0 | 0.0% |
| | | | | | | | 100% |
| **Federal** | | | | | | | |
| Single-Family Residential | 47 | 237,833 | 0.34 | 80,863 | 97 | 2 | 0.0% |
| Multi-family | 775 | 14,145,242 | 0.55 | 7,779,883 | 9,324 | 12 | 1.8% |
| Condos | - | - | 0.70 | - | - | | 0.0% |
| Commercial | 210 | 31,098,456 | 0.65 | 20,213,996 | 24,227 | 115 | 4.6% |
| Institutional | 198 | 198,421,882 | 0.51 | 101,112,818 | 121,186 | 612 | 23.1% |
| Unimproved / Park / Vacant | 2,554 | 252,115,914 | 0.08 | 20,169,273 | 24,173 | 9 | 4.6% |
| Unknown | 27 | - | 0.44 | - | - | | 0.0% |
| **DC** | | | | | | | |
| Single-Family Residential | 68 | 174,174 | 0.34 | 59,219 | 71 | 1 | 0.0% |
| Multi-family | 55 | 1,443,492 | 0.55 | 793,921 | 952 | 17 | 0.2% |
| Condos | 44 | 71,945 | 0.70 | 50,362 | 60 | 1 | 0.0% |
| Commercial | 209 | 4,862,206 | 0.65 | 3,160,434 | 3,788 | 18 | 0.7% |
| Institutional | 320 | 50,061,976 | 0.51 | 25,510,833 | 30,575 | 96 | 5.8% |
| Unimproved / Park / Vacant | 831 | 21,200,705 | 0.08 | 1,696,056 | 2,033 | 2 | 0.4% |
| Unknown | 4 | 57,506 | 0.44 | 25,303 | 30 | 8 | 0.0% |
| **DCHA** | | | | | | | |
| Single-Family Residential | 64 | 136,715 | 0.34 | 46,483 | 56 | 1 | 0.0% |
| Multi-family | 25 | 688,604 | 0.55 | 378,732 | 454 | 18 | 0.1% |
| Condos | 1 | 394 | 0.70 | 276 | 0 | 0 | 0.0% |
| Commercial | 1 | 1,794 | 0.65 | 1,166 | 1 | 1 | 0.0% |
| Institutional | 1 | 35,253 | 0.51 | 17,964 | 22 | 22 | 0.0% |
| Unimproved / Park / Vacant | 188 | 1,001,236 | 0.08 | 80,099 | 96 | 1 | 0.0% |
| Unknown | - | - | 0.44 | - | - | | 0.0% |

The final step divides the number of EBUs for a customer class by the total number of EBUs in the city as a whole to produce an estimate of the percentage share of costs to be allocated to each customer class. But before that computation can be made an adjustment must be made for the Unimproved/Park/Vacant and Unknown properties within the private ownership category. Because there is no water customer associated with these accounts, their EBUs are re-allocated proportionately across the other private sector accounts. The resulting cost allocations are summarized in terms of WASA customer classes in the table and chart below. (Note: condos and institutional properties are included in WASA's commercial customer class.)

| | EBUs | % Cost Share |
|---|---|---|
| Single-Family Residential | 95,404 | 18.2% |
| Multi-family | 67,255 | 12.8% |
| Condos | 16,095 | 3.1% |
| Commercial | 70,464 | 13.4% |
| Institutional | 58,999 | 11.2% |
| Federal Gov't | 179,008 | 34.1% |
| DC Gov't | 37,509 | 7.1% |
| DC Housing Authority | 629 | 0.1% |
| | 525,363 | 100% |

The total annual cost of the program is divided by the total number of EBUs to compute the cost per EBU. So, for every $1 million in program costs, the cost per EBU is $1.90. In the residential customer class, this would imply an annual bill of $5.70 at the current level of program expenditures of $3 million per year. This compares to the current residential rate of $7/year.




The above chart provides a useful summary of the EBU approach in comparison to the alternative of cost recovery through the water consumption charges. It also shows the relationship of the EBU allocation to the shares of land use in DC. It is worth noting the substantial share of land area comprised by roadways. The nature of the imperviousness assumptions that are drawn from the CSO LTCP study is such that they include the effect of roadways in the estimates developed for each land use type. Hence roadways do not have to be separately addressed. The CSO study measured runoff and then attributed the results to land use types in each drainage area studied. The effect of roads is therefore embedded in this procedure.

**Development of Rates for Cost Recovery Within Non-Residential Customer Classes**

Once the appropriate share of costs has been allocated to the commercial and multi-family residential customer classes via the above-described procedures, it is next necessary to distribute the allocated shares across all the accounts comprising these classes. The approach adopted is based on the hypothesis that there is a correlation between meter size and land area.

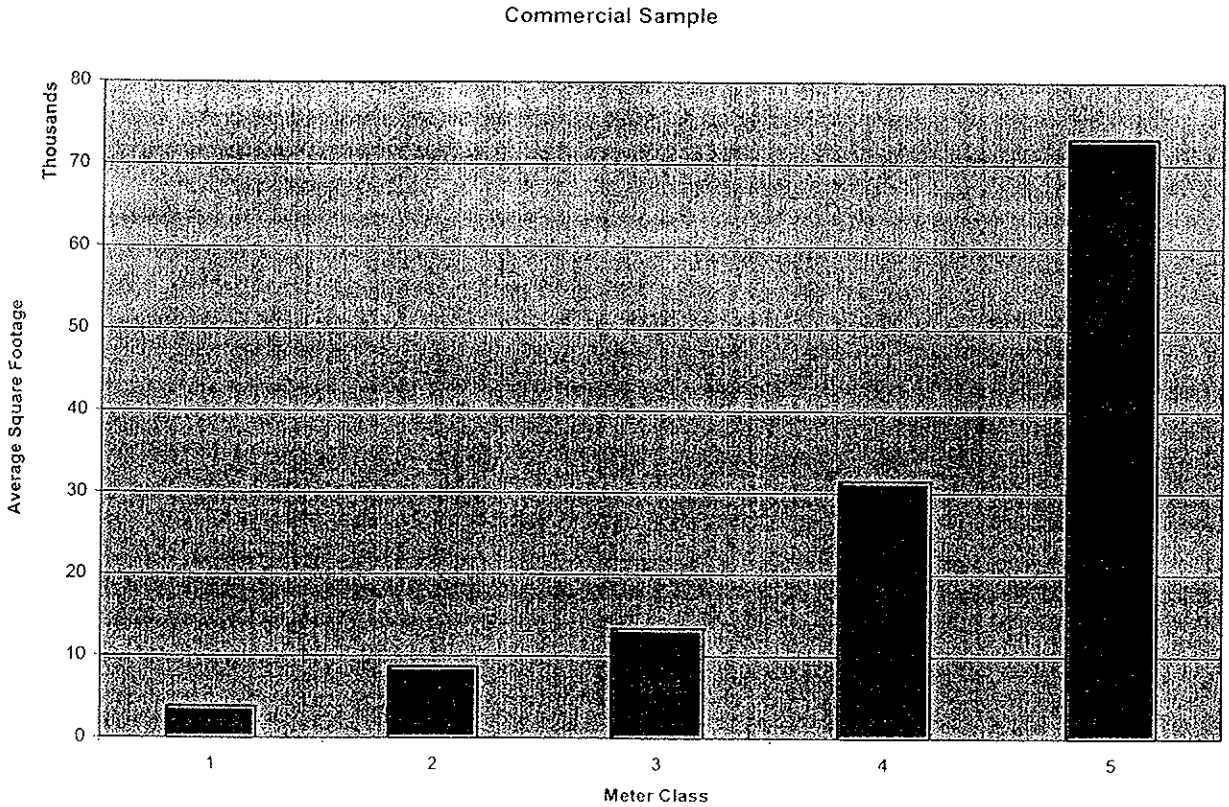
The WASA Customer Information System (CIS) contains information on the Square, Lot, and Suffix designation of land parcels associated with most accounts. Where complete and accurate, these values make it possible to obtain land area information by linking with the DC property tax database. The Square, Lot, Suffix information within the WASA CIS data does not match all records to the property tax database. However a fairly large sample of both commercial and multi-family classes had complete data.

It was determined that meter size does indeed provide a reliable indication of average parcel size, increasing as a function of increasing meter size. This holds true for both commercial and multi-family classes.

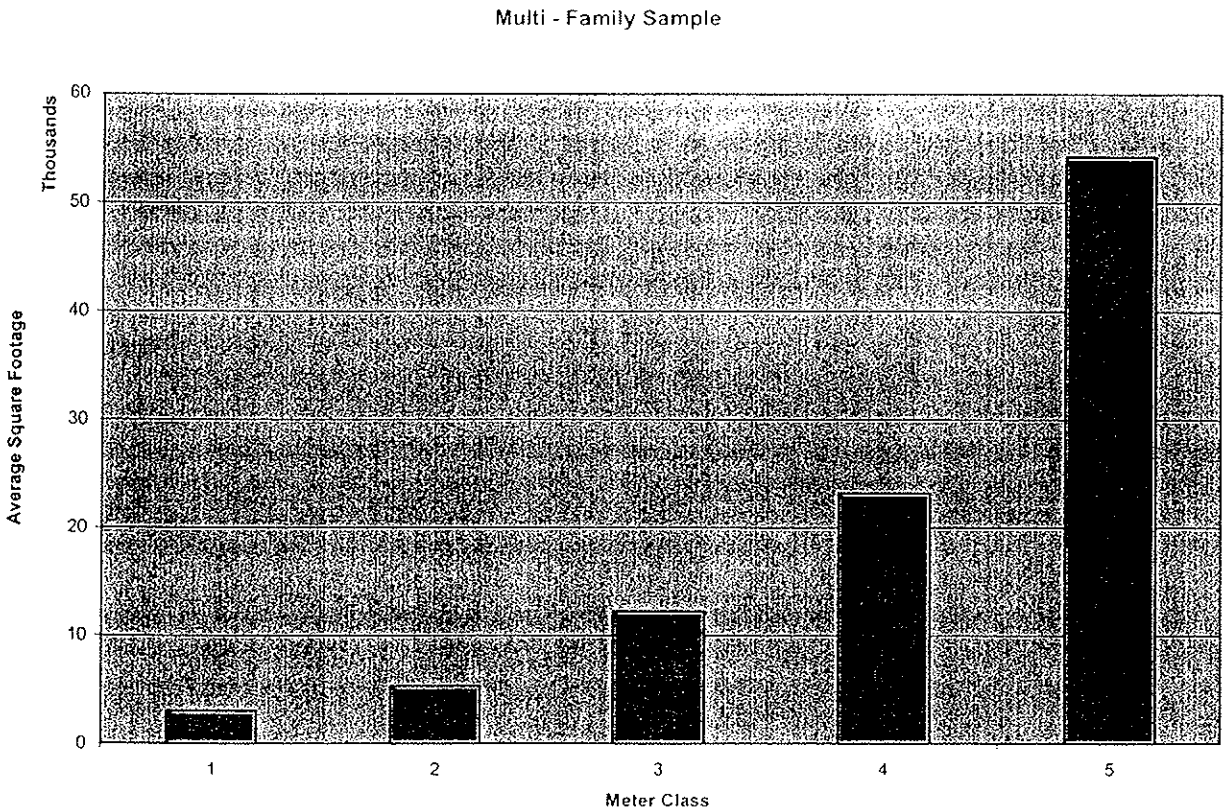
Five meter size categories were developed for cost allocation within these customer classes. Using the average parcel size for each category within the sample, in coordination with the number of WASA customers in each category makes it possible to estimate the percentage of land contained within each category in each class. Each meter size category is then assigned this share of the total cost (equal to its estimated share of the total land area occupied by the customer class). Results are presented in the following series of figures and tables.

As an example, the commercial customer class was found to occupy 28% of the impervious land area in the district. Meter class 1 (consisting of 5/8" and 3/4" meters) occupies approximately 8% of the commercial land. Class 1 commercial customers will then pay 2.24% of the total revenue (28% x 8%), to be divided equally among the 3,887 accounts.

The Federal, DC government, and DCHA customer classes do not lend themselves to such easy treatment for sub-allocation. It has been WASA's practice to provide these customers with bills itemized by agency to facilitate budgeting. For the initial implementation strategy, the governmental shares of cost can be recovered from the agencies via the consumption charge. The current charge is 2% of consumption, resulting in an average charge of $.09/CCF. The proposed new charges would be $.16/CCF for Federal agencies, $.14/CCF for DC government agencies, and less than a penny per CCF for DCHA. In the longer term, the Federal and DC governments may wish to use their respective GIS capabilities to provide WASA with the data necessary to allocate their cost shares across agencies on the basis of impervious area.




| Class | Sample Count | CIS Count | Total Sample Footage | Avg. Sample Footage | % of CIS Count | % of Commercial Area |
|---|---|---|---|---|---|---|
| 1 | 2,604 | 3,887 | 9,960,196 | 3,825 | 40% | 8% |
| 2 | 1,291 | 2,301 | 11,175,430 | 8,656 | 24% | 11% |
| 3 | 461 | 1,016 | 6,156,241 | 13,354 | 10% | 7% |
| 4 | 477 | 1,207 | 15,003,993 | 31,455 | 12% | 20% |
| 5 | 478 | 1,374 | 34,944,754 | 73,106 | 14% | 54% |
| | 5,311 | 9,785 | 77,240,614 | | | |




| Class | Sample Count | CIS count | Total Sample Footage | Avg. Sample Footage | % of CIS Count | % of Multi-Family Area |
|---|---|---|---|---|---|---|
| 1 | 966 | 1,076 | 2,907,125 | 3,009 | 0.16 | 0.04 |
| 2 | 2,987 | 3,442 | 15,813,249 | 5,294 | 0.50 | 0.22 |
| 3 | 736 | 992 | 8,974,503 | 12,194 | 0.14 | 0.14 |
| 4 | 566 | 880 | 13,118,331 | 23,177 | 0.13 | 0.24 |
| 5 | 319 | 549 | 17,279,865 | 54,169 | 0.08 | 0.36 |
| | 5,574 | 6,939 | 58,093,073 | | | |

## Typical Bill Comparisons

Federal, DC and D.C. Housing Authority customers are each treated as a single customer class for purposes of cost allocation. All accounts in each of the commercial and multifamily classes are assessed a fixed rate by dividing the costs allocated to the class by the number of accounts in each class. Each single-family residential customer is charged the same amount, which is determined by dividing the costs allocated to the single-family class by the number of single-family accounts. The following tables compare the recommended schedule for the proposed new stormwater rate to the status quo.

Comparison of FY 2005 Annual Charges By Customer Class

| Class | Subclass | Units | Unit Type | Proposed | Status Quo (Mean) | Status Quo (Median) |
|---|---|---|---|---|---|---|
| Federal | | 1 | Single Annual | $1,022,193 | $538,293 | |
| Municipal | | 1 | Single Annual | $214,190 | $130,294 | |
| Housing Authority | | 1 | Single Annual | $3,591 | $113,311 | |
| Commercial | | | | | | |
| | Class C-1 | 3,887 | Accounts | $18 | $15 | $8 |
| | Class C-2 | 2,301 | Accounts | $40 | $25 | $12 |
| | Class C-3 | 1,016 | Accounts | $61 | $67 | $38 |
| | Class C-4 | 1,016 | Accounts | $145 | $94 | $51 |
| | Class C-5 | 1,374 | Accounts | $336 | $788 | $446 |
| Multi-family | | | | | | |
| | Class MF-1 | 1,076 | Accounts | $14 | $14 | $11 |
| | Class MF-2 | 3,442 | Accounts | $24 | $29 | $17 |
| | Class MF-3 | 992 | Accounts | $56 | $83 | $63 |
| | Class MF-4 | 880 | Accounts | $106 | $137 | $110 |
| | Class MF-5 | 549 | Accounts | $249 | $543 | $386 |
| Residential | | 98,492 | EBUs | $6 | $7 | |

Comparison of 2005 Revenue Projections ($3 Million in required revenue)

| | | Proposed | Status Quo | Change | |
|---|---|---|---|---|---|
| Federal | | $1,022,193 | $538,293 | $483,901 | 90% |
| Municipal | | $214,190 | $130,294 | $83,896 | 64% |
| Housing Authority | | $3,591 | $113,311 | -$109,719 | -97% |
| Commercial | | | | | |
| | Class C-1 | $68,366 | $53,077 | $15,289 | 29% |
| | Class C-2 | $91,591 | $52,842 | $38,749 | 73% |
| | Class C-3 | $62,388 | $47,144 | $15,245 | 32% |
| | Class C-4 | $146,953 | $88,059 | $58,894 | 67% |
| | Class C-5 | $461,888 | $786,754 | -$324,866 | -41% |
| Multi-family | | | | | |
| | Class MF-1 | $14,860 | $13,907 | $953 | 7% |
| | Class MF-2 | $83,619 | $92,666 | -$9,047 | -10% |
| | Class MF-3 | $55,508 | $75,163 | -$19,655 | -26% |
| | Class MF-4 | $93,595 | $113,479 | -$19,884 | -18% |
| | Class MF-5 | $136,468 | $276,276 | -$139,808 | -51% |
| Residential | | $544,790 | $689,444 | -$144,654 | -21% |