

APPENDIX III

POTENTIAL BILLING OPTIONS

A. INTRODUCTION

In order to assess the best method to allocate the costs for a stormwater program to potential payers within a user-fee system, a number of issues must be evaluated in detail. The task of creating a stormwater fee and distributing that fee to all customers in the service area is a two-part effort. First, an account database must be created that contains all potential customers and their associated calculated fees. Secondly, the fees must be billed to the customers through a new or existing billing system formatted specifically for the stormwater fee. This report will focus on both the creation of the account database and the billing mechanism used to implement the fee.

1. CREATING THE INITIAL MASTER ACCOUNT FILE (MAF)

a. ESSENTIAL DATA ELEMENTS

At a minimum, the initial MAF is a database of customer accounts containing associated stormwater fees for each account. Generally, stormwater user fees are parcel-based calculations involving the amount of impervious area (IA) on the parcel, or a combination of IA and another quantifiable measure, such as gross area (GA) of the parcel. The IA of the parcel is often made up of existing data layers maintained by the City or County and often augmented by the use of current aerial imagery.

Because of the parcel-based nature of the fee, additional information describing parcels must also be obtained. The Tax Assessor database is often used to identify property land use, owner name, and tax-exempt status. These property characteristics help steer how various stormwater fees are calculated and potentially how the fees are actually billed. In some instances, a land records database or other property-related database may be more appropriate than the assessor information.

There are four basic data elements: 1) parcels, 2) impervious features, 3) aerial imagery, and 4) the tax assessor database, that comprise the fundamental pieces needed to construct an account file. Other data may be used to augment the calculation of bills or differentiation of property types, but these four elements typically provide the basis for the stormwater MAF.

I. PARCEL DATA LAYER

The parcel data layer represents the foundation for billing stormwater fees in a typical methodology designed to estimate the amount of impervious surface per individual parcel. The spatial integrity and horizontal accuracy of the parcel layer is essential to the accuracy of the calculated fee. Only that area within the boundaries of a parcel will be considered for IA calculations. Parcel boundaries that actually encroach upon adjacent properties create slivers of area that are potential areas of billing dispute.



However, stormwater fees are not based on measurements of impervious surface accurate to the square foot.

Fairfax County GIS maintains a parcel data layer containing over 342,000 parcels, including parcels for the cities of Clifton, Herndon, and Vienna. The County does not maintain parcels for the cities of Alexandria, Fairfax, and Falls Church. The GIS group processes about 4,200 parcel updates per year. Most parcel updates are processed and completed in the parcel data layer within two weeks of official recording with the Register of Deeds.

In Fairfax County, the Parcel Identification Number (PIN) associated with each parcel is a character field based on map, quad, and lot number. This is a unique identifier for parcels and is generally a 13-character item such as:

0022_01_0003A

Duplicate testing of the PIN field revealed no duplicates in the entire group of 342,462 parcels.

Common areas associated with condos and other attached properties contain a partial PIN. Partial PINs contain a map, quad, and subdivision number such as:

0481__07__B1

The map and quad numbers correlate to the map and quad numbers of the lots within the subdivision or common area.

Overall, the parcel data layer is aggressively maintained and would serve as an adequate basis for billing for stormwater in the County.

II. PLANIMETRIC DATA LAYERS ASSOCIATED WITH IMPERVIOUS FEATURES

Fairfax County acquired aerial imagery and planimetric data in 1997. Planimetric layers contributing to a potential impervious layer include both major and minor transportation layers and the building layer. These layers contain impervious features such as building footprints, roads, commercial driveways, and parking lots. The layers do not contain other impervious features such as large sidewalks, patios, hardened plaza areas between buildings, athletic courts, or other miscellaneous impervious features. Of course, there was no intention on the part of the County to acquire a complete impervious data layer for stormwater purposes back in 1997.

Although a great deal of impervious data exists in the existing geographic information captured in 1997, two challenges exist concerning using this data as the starting point for a comprehensive impervious layer. First, the data was captured in 1997 and has been updated (building footprints) somewhat by the GIS group for new development. However, because of the size and scope of the development in Fairfax County, many of

the changes occurring in the County over the last seven years have not been captured. Secondly, those “missing” impervious features mentioned in the previous paragraph represent a substantial amount of impervious surface (potential revenue) for many parcels. For example, the government center parcel contains over 45,000 sq. ft. of IA in sidewalks alone. Given a theoretical ERU of 2,500 sq. ft., the sidewalks represent 18 billing units. This “missing” data could potentially represent hundreds of dollars in lost annual stormwater revenue, depending on the rate.

Measurement of impervious surface and the horizontal accuracy of parcel boundaries need to be reliable, but not exact, as the size of the base billing unit will compensate for the inherent inaccuracy issues of parcels and impervious data. Impervious surface data is usually captured manually using photo-interpretation techniques. Parcel data is often “off” horizontally by 3’ – 10’ when merged with ortho-rectified aerial imagery. So, a property line that is “off” by 8’ and is 100’ in length might attribute 800’ of IA to the wrong parcel. Utilizing a billing unit will often compensate for these and others inaccuracy errors inherent in GIS data layers. In some areas, parcel boundaries in Fairfax County are “off” the horizontal position of the ortho-rectified imagery by 8’ to 10’. This horizontal accuracy level is at the upper end of the tolerable limit for use in generating a fee but should not affect a significant number of the fees calculated.

In order to understand the magnitude of incomplete impervious surface data, several examples are included:



Approximately 19,500 sq. ft. of IA not in current planimetric data



Approximately 35,000 sq. ft. of IA not in current planimetric data



Approximately 131,000 sq. ft. of IA not in current planimetric data

III. AERIAL IMAGERY

Initial aerial imagery acquired by the County in 1997 has been updated on an annual basis for ¼ of the County area over each of the past several years. This revolving update program is still in place, so that imagery for any portion of the County is never more than three years old. These imagery sets are flown at a scale of 1:1200 and contain a pixel resolution of 0.5’.

In addition, the County has access to Virginia Geographic Information Network (VGIN) imagery captured during 2002 at a scale of 1:1,200 and a pixel resolution of 1.0’. A small portion of this imagery near Mason’s Neck was captured at a scale of 1:2,400 and a pixel resolution of 2.0’. Although the VGIN imagery represents a contiguous set of imagery captured on the same date, this data will soon not be as current as imagery being acquired through the revolving program.

IV. DEPARTMENT OF TAX ADMINISTRATION

The assessor database has been reviewed and determined to be an acceptable means for classifying properties for stormwater billing purposes. Fields relating to zone class and building use have been identified as the keys in property classification. Information relating to vacant properties is also available, as this is crucial to identifying residential subdivision properties that have not yet been developed.

B. RATE METHODOLOGY ISSUES

Because the impervious data needed to generate stormwater fees is incomplete, a number of issues begin to surface when determining an appropriate rate methodology for a potential stormwater utility. Since the impervious data available does not include all impervious surfaces and since Fairfax County is a large, diverse and highly-developed county, other options will be considered.

The discussion of data needs to support the Master Account File is correlated to the Rate Structure Discussion Paper. Rate modifiers involve consideration of the ability to support the cost allocation to a single rate payer through the data available. It is critical that a rational relationship be supported by the data sets chosen for this analysis. Single family residential properties are one key rate base and modifiers in rate policy can be established to address this significant portion of the account file. As presented in the Rate Structure paper, two primary approaches to single family residential properties are being considered. One is to “flat rate” all properties creating an Equivalent Residential Unit (ERU) as the basis for analysis of all parcels. The other approach is to set a base billing unit, perhaps 2000 square feet of imperviousness, called an Equivalent Rate Unit, where each single family residential parcel is evaluated for the number of billing units found on the parcel, often with a cap on the number of billing units for this category of properties based on policy considerations identified during the analysis.

Data Analysis Using an Equivalent Residential Unit: The ERU is the amount of impervious area on an average or typical single-family residential (SFR) parcel. The ERU is usually based on a sample of various SFR properties, resulting in a median value of IA for the sample, which then becomes the ERU for the utility service area. The ERU can be a combination of IA and GA where the IA is often a percentage of the GA



based on a sample of SFR properties. In both cases, the ERU is based on a median value of impervious area for either a sample of SFR properties or the total population of SFR properties. When non single-family residential (NSFR) properties are billed, the total amount of IA per parcel is divided by the ERU, resulting in a number of billing units that are multiplied by the rate to obtain a monthly fee. So, if an NSFR property contains 20,000 sq. ft. of IA and the ERU is 2,500 sq. ft., the property is billed for 8 ERUs (or billing units) per month.

1. SFR PROPERTIES

Since significant gaps are present in the impervious data for the County, the first issue that should be addressed is that of using a flat rate or base billing rate for SFR properties. A flat rate is the concept of charging each SFR property with a single, flat billing unit as discussed above. In the flat rate scheme, SFR properties are not reviewed individually and do not require impervious data to support the calculation of a fee. When using a base billing unit in terms of imperviousness, SFR properties are “tiered” by assigning each parcel a number of billing units (or tiers, such as one billing unit equals “tier one”).

If tiers are to be implemented, then data must be available to fit all SFR properties into their appropriate tier. In the absence of impervious data, there is usually no accurate method for directly assigning individual properties to tiers. However, there are less conservative methods involving sampling and interpolation that may allow SFR properties to be assigned. For example, AMEC has used fields in the assessor database to mimic impervious features on the ground. This is not as precise and could result in too large a variance to actual field measurements. This option was evaluated for another client and we discovered:

- For 50% of the sampled parcels, the tax-derived impervious values differed from the GIS-derived values by 50%.
- For only 13% of the sampled parcels, the tax-derived impervious values were within $\pm 10\%$ of the GIS-derived values.

Options for data to support single family residential account analysis:

1. Since driveways and other features (patios, large utility buildings, tennis courts, etc.) are the missing elements for impervious data on the SFR property side, an option exists for sampling driveways and other features and assigning an average driveway and “other feature” IA to the total IA for each SFR property. Using this impervious estimate option, the house footprint becomes the only variable in the total IA per parcel. The driveway and “other features” impervious components are constant values or percentages for all SFR properties. It should be noted that studies by AMEC have shown that driveways alone represent 30% to 40% of the total impervious area on an SFR property. This option could potentially oversimplify the impervious area for SFR properties, but could be accomplished without developing a complete impervious coverage and can be substantiated as a reasonable and rational method for cost allocation.

2. To fill the gaps in the impervious coverage and to most accurately place SFR properties in tiers in Fairfax County, the county could develop a current, complete, and



comprehensive impervious data layer for all SFR properties. Though this is a costly option, it will provide the most reliable and defensible data.

3. A flat rate for all single family residential properties could be created through analysis of a sample of properties.

2. NSFR PROPERTIES

The issues for NSFR property fees are similar to those for SFR properties, but not identical. Because of the diversity of IA within NSFR properties (multi-residential, commercial, industrial, institutional, etc.), there is an even greater need for a current, complete, and comprehensive impervious data set.

The first option to consider would be to acquire an updated impervious data layer for NSFR properties only. A complete impervious data layer for NSFR billing would represent the most conservative method. This would also require the implementation of a methodology to capture new imperviousness created the day after the flight is flown for new photography if that is done OR a methodology must be put in place to capture new imperviousness built since the most recent capture of digital images.

The second option, with somewhat more risk, would be to obtain impervious data for adequate samples of different land use types. The median impervious percentage for each land use would then be applied to the GA of each parcel to estimate IA per NSFR parcel. This option is often less reliable because many property land use types vary greatly within a single land use in terms of percentage of impervious surface. For example, consider the following two NSFR properties classified with a land use of "Commercial and Office". Both properties are similar in GA, however, the first property contains about 40% of impervious surface while the second example clearly demonstrates a more urban example of the same land use with greater than 95% impervious surface area.





“Commercial and Office” land use – approximately 40% impervious surface



“Commercial and Office” land use – greater than 95% impervious surface

The examples above demonstrate common challenges in finding adequate indicators (such as land use) for consolidating properties based on impervious development.

C. RATE STRATEGIES

Based upon a preliminary review of existing data, the options presented below represent rate alternatives available based on the practical application of the data available to support the cost allocation. Issues and key factors for each option is described under the option. The following assumptions have been made in describing the rate options:

- Land use data found in the County assessor database is reasonably accurate for general land use classifications.
- Land use categories in the County assessor database can be aggregated into approximately 8 to 10 major categories if NSFR sampling is used.
- Vacant SFR lots can be easily identified in the assessor database.
- No field(s) exists in the County's assessor database that can be used to mimic a complete representation (buildings, driveways, parking lots, patios, plazas, and other hardened surfaces) of IA on a parcel.
- AMEC estimates that of the 342,000 parcels maintained by the County GIS group, there are 280,000 parcels associated with unincorporated Fairfax County.
- AMEC estimates that 15% (42,000) of the parcels in unincorporated Fairfax County are NSFR properties.
- The County GIS group has updated building footprint data for new development and re-development.

1. SFR OPTIONS

A1) Flat Rate – requires very limited impervious data development

- Process - approximately 1,000 SFR properties would be sampled to determine the ERU for the stormwater utility. All SFR properties would be billed 1 ERU.

A2) Partial Estimate / Tiers – impervious data development needed for approximately 1,000 SFR properties to obtain driveway and “other feature” average values

- Process – the average values for driveway and other features would be added to building footprint surface area to obtain a total IA per SFR property.
- Using average values for driveways and other impervious features introduces significant generalization to the impervious estimate but can be supported as a rational approach to the allocation of cost.
- Building footprint areas would have to be updated and entered into County GIS (see assumption above).
- The ERU would be based on the median value of IA for all SFR properties.
- SFR properties would be placed in tiers based on distribution of the IA for the total population of SFR properties.

A3) Tiers with a cap on billing units– requires complete impervious data for all SFR properties



- The billing unit would be based either on the measured median value of IA for all residential properties or on a fixed value (e.g., 1000 square feet of imperviousness).
- It would require new imagery be captured to produce complete and current data to eliminate inefficient effort to “backfill” missing impervious data for approx. 238,000 SFR parcels across quarter sections of the County where aerial imagery was captured during different years (current revolving imagery update).
- New imagery could not be captured until late 2005 and complete impervious data and imagery probably would not be available until 3rd quarter of 2006.

2. NSFR OPTIONS

B1) Combination of GA and Estimate of IA – requires sampling of approx. 4,200 properties within different land use categories

- IA would be estimated by multiplying average impervious percentage of land use by (GA) of each NSFR property.
- Significant variation will exist within land use categories impacting impervious percentage.
- The impervious data development for the approx. 4,200 properties would have to consider date of aerial imagery (current revolving imagery update) in guaranteeing that current impervious development is captured.

B2) Existing Imagery / Complete IA – requires current, complete, and comprehensive IA data for all NSFR properties

- The impervious area data development for the approx. 42,000 properties would have to consider date of aerial imagery (current revolving imagery update) in guaranteeing that current impervious development is captured.

B3) New Imagery / Complete IA – requires new imagery to produce current, complete, and comprehensive IA data for all NSFR properties

- New imagery would allow for a more efficient process to develop complete IA data set
- New imagery could not be captured until late 2005 and resulting imagery and IA data not available until fall or winter of 2006

3. RATE STRATEGY TIME AND COSTS

The following are broad estimates of the time and costs for the development of IA and the ERU only. These estimates do not include other Data Track tasks commonly associated with stormwater utility development. Options listed as A1 through A3 represent SFR labor and cost estimates while options B1 through B3 represent NSFR labor and cost estimates. An option for both SFR and NSFR development must be chosen. (Note that the expense costs for A3 are those costs associated with another vendor developing complete IA data for all properties from new imagery. The imagery costs (\$50,000) are not included in A3 but listed in B3 because this option would automatically result in B3 being chosen also.)



Resources - Option	Labor (hrs)	Expense Cost
A1 - Flat Rate SFR	100	\$0.00
A2 - Partial Estimate / Tiers	120	\$0.00
A3 - Tiers / Complete IA / New Imagery	80	\$1,400,000.00
B1 - GA and Estimate of IA	645	\$0.00
B2 - Existing Imagery / Complete IA	5370	\$0.00
B3 - New Imagery / Complete IA	4320	\$50,000.00

Time Requirements - Option	IA Development Complete
A1 - Flat Rate SFR	3 weeks after start
A2 - Partial Estimate / Tiers	3 weeks after start
A3 - Tiers / Complete IA / New Imagery	3rd quarter of 2006
B1 - GA and Estimate of IA	12 weeks after start
B2 - Existing Imagery / Complete IA	10 months after start
B3 - New Imagery / Complete IA	3rd quarter of 2006

C. BILLING OPTIONS

There are essentially three options for billing stormwater fees: billing through a local water or wastewater utility or authority, billing through the real estate tax bill, or billing through a separate 3rd party billing system. This section will discuss details about the utility authority, a third party billing process and tax bill options specific to the situation in Fairfax County. Each option has advantages and disadvantages:

1. FAIRFAX COUNTY WATER AUTHORITY (FCWA)

Using the FCWA billing system has several advantages; the use of the FCWA billing system supports the concept of a utility service for the stormwater fee; the FCWA bills quarterly which would provide a steady revenue flow for a stormwater utility; and using the established FCWA billing system could allow regular opportunities to provide stormwater information to the public.

Challenges:

The use of FCWA represents a significant challenge in merging parcel-based accounts with meter-based accounts. The labor potentially needed to successfully merge the two billing systems should not be underestimated. The fundamental issue of linking the two systems will most likely require using physical addresses as the link between both the FCWA and the parcel-based stormwater fees. Much more will be known about the details of this process when the County GIS group completes the Master Address



Repository, a standardized address system that will associate physical addresses with both parcels and point locations within parcels. This addressing system should greatly benefit a linking with the FCWA billing system. Current plans forecast a completion of the addressing system by December, 2004. At this time, there are too many unknowns to estimate the amount of effort needed to merge a stormwater master account file with the FCWA billing database, but it is expected to be significant.

Another challenge using the FCWA as a billing mechanism is the issue of service area. The FCWA currently maintains about 235,000 accounts within Fairfax County. AMEC is estimating that there are approximately 280,000 parcels in unincorporated Fairfax County that will be within the stormwater service area. The difference between these two numbers might represent undeveloped properties and properties that are developed but do not receive water or sewer (parking lots). At this time, AMEC cannot estimate the number of properties that will be assessed stormwater fees that are not part of the FCWA billing system.

Finally, the FCWA board is currently hesitant to add an additional fee to customer bills. The Board has strived to keep residential bills under \$100 per quarter, and many residential customers are close to this threshold now.

2. SEPARATE “STORMWATER ONLY” BILLING SYSTEM

Establishment of a separate billing system for stormwater only, or that may include solid waste fees or other County fees as well, is a viable but more costly system. The advantages include total control over the design of a database and delivery system, along with a customer service system, that supports the administrative accounting and management processes for the County. Its biggest disadvantage is the cost of initial setup. This cost can be built into the rate model to recover the implementation resources utilized by the County to establish the initial billing system. It provides the greatest flexibility in communication with the public and meeting unique conditions for each account, such as management of a credit program and other adjustments that may be needed on any account. This process can provide a more consistent cash flow based on the frequency of the billing cycle. More frequent billing cycles will potentially increase the administrative cost of operation.

The County can outsource the billing system and customer service program, using a 3rd party billing agent or by utilization of the billing agent handling the real estate property tax.

3. DEPARTMENT OF TAX ADMINISTRATION (DTA)

From a technical integration of the data for the Master Account File, the DTA real estate bill represents the least challenging option for billing stormwater fees through an existing system. Parcel-based fees can be translated to this bill much easier than using a meter-based account system. Similar efforts for other Counties have generally involved 4 to 6 weeks of effort. In Fairfax County, the tax bill is billed twice per year which is more beneficial for stormwater revenue flow than a typical once-per-year tax cycle. The DTA tax billing system is currently being upgraded, and the new system will allow for billing of flat fees.





It is estimated that there are approximately 5,500 (< 2% of the total parcels in the County) tax-exempt properties in the County. Many of these parcels currently receive solid waste fees through the DTA billing system, with perhaps as few as 200 parcels that would require the establishment of a stormwater only bill.

The only parcels that would be problematic for billing from the DTA system would be the properties assessed by the State Corporation Commission; however, there are less than 200 of these parcels currently in the system.

The current real estate tax bill contains a line-item fee for solid waste. Sources within DTA/RED say that additional line item fees would probably require a re-design of the bill format.

BILLING OPTION SUMMARY

Fairfax County Water Authority or Wastewater Bill

Pros:	Cons:
Supports the concept of a “utility” service for a stormwater fee.	Difficult to merge property-based MAF with meter-based billing system.
Provides consistent cash flow.	Properties that don’t have water/sewer service (i.e. parking lots) will need to be added to system.
Billing and accounting system in place that would require minimal adjustment to add additional fee.	Unoccupied properties require billing of stormwater fee though other fees may be suspended.
Can be used as a methodology for direct communication to the public.	Properties with multiple meters may require splitting stormwater fee.
Address standardization in progress will help with merging files.	Consensus needed at executive level to allow use of the Authority billing system.

Fairfax County Real Estate Bill

Pros:	Cons:
Stormwater fee is property-based making link between MAF and tax database relatively easy.	Requires high level of customer support and education to support tax office.
Bill is delivered to property owner, regardless of land use or occupancy.	Revenue is received twice a year, requiring cash flow planning.
Master account file updated annually.	May require redesign of bill format.
Billing and accounting system in place.	



Separate Billing System

Pros:	Cons:
Supports the concept of a “utility” service for a fee.	Expense of creating a new billing and accounting system (staff, hardware, software, office space, etc.)
Cash flow can be continuous throughout the year – very flexible.	Collection of delinquent accounts may be more challenging.
Can be used as a means of direct communication to the public.	Must set up new fiscal controls for receipt of payments.

POTENTIAL BILLING OPTIONS

AMEC recommends that the DTA real estate tax billing process be used to facilitate the billing of stormwater fees. This could include the creation of a separate bill for stormwater fees, managed by the DTA or the direct billing of the fees on the real estate tax bill itself. This recommendation is based on a number of factors including:

1. The FCWA board does not wish to add further fees to their bills as this might result in most quarterly residential bills to exceed the \$100 threshold that the board is trying to maintain.
2. The FCWA service area as well as the waste water service area does not cover the entire service area for stormwater management.
3. Some of the service area for stormwater management provided by the County receives water services from another jurisdiction, requiring the creation of a separate billing process to address these accounts as well as those identified under Item 2 today.
4. Until the Master Address Repository is complete, the potential success of linking stormwater accounts to FCWA accounts is unknown. Even if the new addressing system is successful, a great deal of effort will still be needed to allocate fees to parcels with multiple FCWA service locations or aggregate fees for service locations covering multiple parcels.
5. The DTA real estate tax bill provides the best coverage for billing parcels within a potential Fairfax County stormwater utility.
6. A separate third party billing system is more costly to establish and administer.

