



# Town of Chapel Hill

*Pro Forma Business Plan –*

*Utility-Based Stormwater Management Program*

## **I-3 Basic Database Feasibility**

### **Introduction**

At the most basic level, the rate structure for a stormwater utility can be built upon assigning rates based on contribution of stormwater runoff for a given property. Stormwater runoff can be related directly to the amount of impervious area that is built upon a property. This is a brief assessment of the data needed to support the creation of a user-fee-based stormwater management program for the Town of Chapel Hill.

In assessing GIS data for a potential stormwater utility, there are four key data components that are used to develop a stormwater utility billing database: tax parcels, the attributes describing these parcels, planimetric data, and aerial orthophotography. These form the basis for developing a stormwater management service charge rate methodology that can be applied to individual properties. The rate methodology is then applied to individual properties and bills are generated and delivered to each customer.

A key step in setting up a utility is development of a Master Account File. The Master Account file will include information on the customer, the property type, the amount of impervious area, and the rate to be billed. This account file is then integrated into the utility billing system to generate actual bills. Existing databases, such as property tax rolls and water/wastewater account files, are typically used as the foundation for building the Master Account File. Customer data contained in the Master Account File will depend on the source data used to create the file. For example, if tax rolls are used in developing the Master Account File, then the file will likely be based on parcel ownership rather than on water or wastewater customer.

### **Basic Database Feasibility**

For stormwater service charges to be implemented, a means of billing, collecting, and accounting for the service charge revenues must be identified and instituted. Experience has been that the requirements of a stormwater management service charge billing often challenge the capacity of existing systems and can pose a potential major obstacle to timely implementation. In order to implement and properly bill, collect, and account for stormwater service charges, two main systems are required. These are:

- 1. A system to generate and manage a list of charges and related data for each stormwater customer.**

Assuming the basis for charges is impervious area, this method will require that parcel lines and impervious features be established for some ratepayers. Parcel-based charges can be developed using this method. Typically, single family residences (SFR) are billed one or a series of flat rates, such that actual computed impervious areas are only required for non-residential customers. We estimate that there will be fewer than 3,000 non-residential

customers (NSFR) in Chapel Hill. From the data we've evaluated to date, our experience tells us the tax-billing database will need to be expanded to include classification fields to support the additional data needs.

## **2. A method to deliver bills to customers and account for payments, credits, etc.**

The easiest way to satisfy this requirement is to add stormwater service charges (as a separate item) to an existing service billing system, such as a water and sewer billing system. Since the relationship between Chapel Hill and Orange Water & Sewer Authority (OWASA) is supportive and since water and sewer bills for Chapel Hill are already initiated at OWASA, the most effective and efficient way to provide stormwater user fee billing will likely be through OWASA. In this scenario, parcel-based charges must be converted to account-based bills before billing can be accomplished. Another method that might be used is to add stormwater service charges to the annual tax bill. This however will blur the line in perception between this being a user fee and being a tax.

### **Existing Data**

The Town of Chapel Hill has access to or possesses several systems and data sets that can be used in implementing stormwater service charges. The latest aerial photographs were taken of the Town in 1998. The photographs are black & white orthophotography developed with a resolution of 0.5' pixels. The photography that was reviewed appears to be somewhat grainy, but the high resolution allows for an adequate source for generating the impervious features coverage.

However, to ensure that the billing file is as accurate as possible and to establish the Master Account File from the same source data, it is recommended that the Town be re-photographed in late fall 2002 or early winter 2003 when the trees have lost their leaves. It will then be possible to manually digitize impervious surfaces in a drafting or GIS program. It will not be possible to use the power of a GIS software package to perform the calculations by parcel until the planimetric and cadastral mapping is completed.

GIS Planimetric Layers - The Town has limited GIS data relating to impervious features, as this is information that has not been previously needed for Town purposes. There is a background coverage containing building footprints. It appears that some of these features appear sporadically and are often not as spatially accurate as the utility would demand. Figures 1 and 2 on the next page show some of the difficulty that will be encountered if the Town chooses to use only existing data.



FIGURE 1 - Limited available building footprints.



FIGURE 2 - Many building footprints are not 100% accurate

## Evaluation Criteria

Imperviousness is the single greatest factor in estimating runoff volumes from individual land parcels. Although the final decision on a rate structure might require that other factors be considered in determining stormwater charges for each land parcel, for this analysis it is assumed that impervious area will be the major factor in computing rates. Given this assumption, parcel lines and impervious features are required inputs into database development. Given the available data and systems, a stepwise process and set of evaluation criteria for implementing stormwater service charges is provided below. If Orange County and/or Carrboro decide to join the Town of Chapel Hill in improving the stormwater management program in the near future or at a delayed date, the following process can be modified to accommodate the change. **Based on existing data tools, the process for development of the Master Account File is:**

1. Acquire a digital copy of the Orange County tax database and GIS parcels coverage (coverage is a data model form shown within ARC/Info), identify parcels inside the Town limits of Chapel Hill, and identify which of these parcels are single-family residential. Set aside the single-family residential parcels to be billed by flat rate (if applicable). Set aside the non-single family parcel list for other uses. This data set must have accurate identifiers, such as parcel numbers, physical parcel addresses, and owner names. Using the non-single-family parcel list, find each of these parcels in the GIS parcels coverage. The GIS parcels coverage must have current parcels, accurate parcel numbers, and be on a coordinate grid system that is positionally accurate to within 10-15 feet.

The physical parcel addresses from the tax database will need to be verified if addresses are used. The residential addresses tend to be less accurate than the commercial addresses. Public Utilities' site address data should be a valuable resource in verifying and updating the tax data. Even then, it will be necessary to field check some streets. Finally, there will be the need to digitally overlay these non-single family parcels on the new ortho-rectified photographs, move the parcel lines as necessary to align them with visible cues from the photographs, digitize the visible impervious features on the photographs which fall under each non-single family parcel, and compute the impervious area of each of the non-single family parcels.

2. Create a GIS coverage (polygon-based) of impervious features based on the 1998 photography for NSFR parcels only. This coverage should include building footprints, parking lots, sidewalks, patios, miscellaneous concrete/hardened surfaces, etc. This initial impervious features coverage will represent the state of imperviousness through 1998.
3. Update the initial impervious features coverage using the ongoing work performed by Deborah Squires that utilizes building plans/permits. In addition, develop methods to incorporate other impervious features not captured by Deborah Squires. Additional actions might require field visits and GPS data collection on NSFR parcels containing new impervious features. Establish the “cut-off” date for the impervious features coverage.
4. Make a decision about how roads will be addressed in the utility. This decision will affect how roads will be dealt with when creating the impervious features coverage.
5. Create a separate impervious coverage (or an additional component of the main impervious features coverage) for SFR sample parcels.
6. Intersect NSFR parcels and impervious features to determine amount of impervious area (IA) per NSFR parcel. Develop strategies for managing complex many:1 tenant-to-parcel issues.
7. Establish the initial billing file.
8. Match each parcel in this initial billing file to the parcels, accounts and addresses found in the water and sewer billing system, creating “stormwater only” accounts where necessary.
9. Adjust the water and sewer billing system to handle the additional line item charge and associated accounting needs. The water and sewer billing system must be designed such that an additional service charge line item can be added.
10. Establish data management and maintenance procedures to allow for accurate accounting, collection, and continuous updating of stormwater data. These processes can be GIS-based or manual.

## Approach for Data Management and Development

Other existing data that needs to be closely examined includes:

1. The existing water and sewer billing system (OWASA), which may already have parcel numbers associated with the account number. Past experience has shown us that this is not always the case, as the billing system is account-based and not parcel-based.
2. The existing tax billing system. Orange County does all billing under contract to Chapel Hill, collects the taxes and forwards monies to the Town daily. The initial tax billing is in July, and the tax digest is set final in October of each year.

The impervious features information currently available to the City is limited. Much of the effort and cost of building the stormwater utility will go to building and refining this data component. Once complete and current, strategies will have to be developed and implemented to maintain the accuracy and completeness of this critical GIS layer.

The most important and the most difficult part of the process requires high-quality, current original data. The Town's current photography is almost five years old. This is of particular concern considering the growth and change in the area in recent years.

The decision about how to proceed is a balance between accuracy versus time and expense. Re-flying the area (a flight of approximately 20 square miles of digital imagery) could not be done effectively until late winter when all the trees are bare. We would suggest that the entire Town be flown at 1:1200 scale in order to get very high resolution photography. (Other sources of photography may be possible to find and should be considered as a first step). It is recommended that the Town team with Orange County and other incorporated jurisdictions for new photography. The flight to obtain the photography would probably cost between \$20-30,000. The greater costs involve processing the imagery and the ortho-rectification (processing image to match real-world terrain, etc.) process. The total cost of re-flying and processing the data is estimated at \$150,000. Digitizing the impervious coverage will cost an additional \$120,000 and \$175,000, to capture all features within the Town limits including residential units and public roads.

Before the aerial photography is undertaken, it is highly recommended that building the utility database be considered in determining the kind and form of data to be captured. Coordination with the consultant will considerably enhance the usability of the data. AMEC would work with the Town to determine the best alternatives for planning the mapping portion of the project, and as part of an agreement could be made responsible to oversee the work and the timeliness of the mapping company. This is the most efficient methodology for completing the work. The cost can be folded into the utility start-up costs.

Once the flight is complete, it takes approximately six months before data is available from the mapping company for use in building the Master Account File. This may impact the start-up date for the utility.

On the plus side, once new data is available, the Town would have more accurate information to start the utility and can then be more confident in initial billing accuracy and the ability to keep up with changes and additions.

## **Possible Problems and Data Gaps**

It may be difficult to match existing water and sewer account numbers with parcel numbers for some accounts. Once digital methods are exhausted, hand matching using addresses and names can be used to finish the task.

The tools used in the computation of impervious area for non-single family parcels are imperfect, due to parcel line and photograph inaccuracies. This is addressed by use of a standard billing unit, usually 1,000 square feet or greater.

For seamless operations in the future, a linkage will be required between the OWASA system and a system for computing impervious areas for non-single family residential parcels. The details of this linkage cannot be known at this time.

## Schedule

In order to perform the process detailed above, and to allow for some extra effort to overcome the possible problems and data gaps mentioned, a time period of eight to nine months should be allowed, *once all source data has been assembled*. To match the 20-24 month schedule for developing the utility, the Town must re-fly the area by February 2003; impervious coverage data would then be available in approximately October 2003. It frequently takes two months to acquire all digital source data in a useable format. If the Town plans to utilize a GIS for data management, appropriate coordination with Orange County should be undertaken immediately. This coordination will add some time to the schedule but likely result in a more integrated system.

Given all timing and schedule issues, 20 to 24 months should be allowed from notice to proceed on the Master Account File portion until an integrated system is completed. This would integrate with the Town's wish to have the utility in place in 2004, but might push the January 31, 2004 date back to second quarter 2004.