Stormwater ERU Analysis: Raftelis Memos

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Project Funding and Timeline

- 2023: TOBM received **$5.4 million** in grants through North Carolina's **Local Assistance for Stormwater Infrastructure Investments (LASII)** program
- **$5 million** – for the **Swannanoa Floodplain Project**
- **$400,000** – planning grant for **asset mapping and capital planning** of the town's stormwater system
  - WK Dickson, an Ardurra Company, subcontracted ERU Analysis and Rate Modeling to Raftelis
- Raftelis analysis included determining an Equivalent Residential Unit (ERU), development of units of service based on measured impervious area, and calculation of rate ranges under a new rate structure alternative.

Objective

Determine an Equivalent Residential Unit (ERU) for the Town of Black Mountain and calculate rate ranges under new rate structure

- Change stormwater rate structure to one based on impervious area to utilize a rate structure that more accurately and equitably charges properties based on the demand they place on the stormwater system
- TOBM currently has a tiered rate structure based on property land use characteristics
- I am discussing the proposal of the ERU structure today
- Rate changes will be discussed later, after rate models have been updated to include corrected Stormwater Fund budget information

Current Stormwater Utility Rates

Tier	Tier Description	Monthly Fee
1	Minimal Impact (e.g., SFR)	$6
2	Moderate Impact (e.g., retail, professional services)	$20
3	Undeveloped	$0
4	Exempt (e.g., government-owned)	$0
5	Significant Impact (e.g., strip retail, grocery store, industrial facility)	$100

Why use ERUs?

- Impervious area-based rate structures are the industry standard for stormwater fees.
- They are considered a good measure of a ratepayer's demand for stormwater service. In general, properties with more impervious area place greater demand on a utility for stormwater management services because runoff rates and volumes are higher than from pervious surfaces.
- Under the Town's current rate structure, properties that have the same land use classification, but significantly different amounts of impervious area are charged the same amount for stormwater management.
- The shift to an impervious area-based rate structure would enhance equity in the stormwater rate structure by ensuring that customers that place a similar demand for stormwater service, as determined by impervious area, pay similar stormwater fees.

Why use ERUs?

- Many stormwater utilities with an impervious area-based rate structure use ERUs as the billing unit for the stormwater fee.
- **The ERU is a community specific unit that reflects the amount of impervious area found on a typical single-family residential (SFR) parcel within a specific jurisdiction.**
- The use of an ERU as the unit of charge for stormwater fees facilitates the consideration of stormwater fee rate structures that include simplified billing for the largest customer group – single-family properties.

Finding the ERU

- Imagery: 2023 aerial imagery publicly available from NC OneMap and geographic tax parcels found in the Buncombe County Open Data Explorer
- Random sample of 400 SFR parcels
- The sample size of 400 parcels was selected to provide 95% statistical confidence that the ERU value is within 5% of true value (margin of error) and is statistically representative of the Town's SFR properties.
- Using ArcGIS and overlaying parcels on top of 2023 aerial imagery, new spatial features were created to represent the impervious area on each property based on visual assessment of the property features.

Figure 1. Town of Black Mountain Sample Distribution

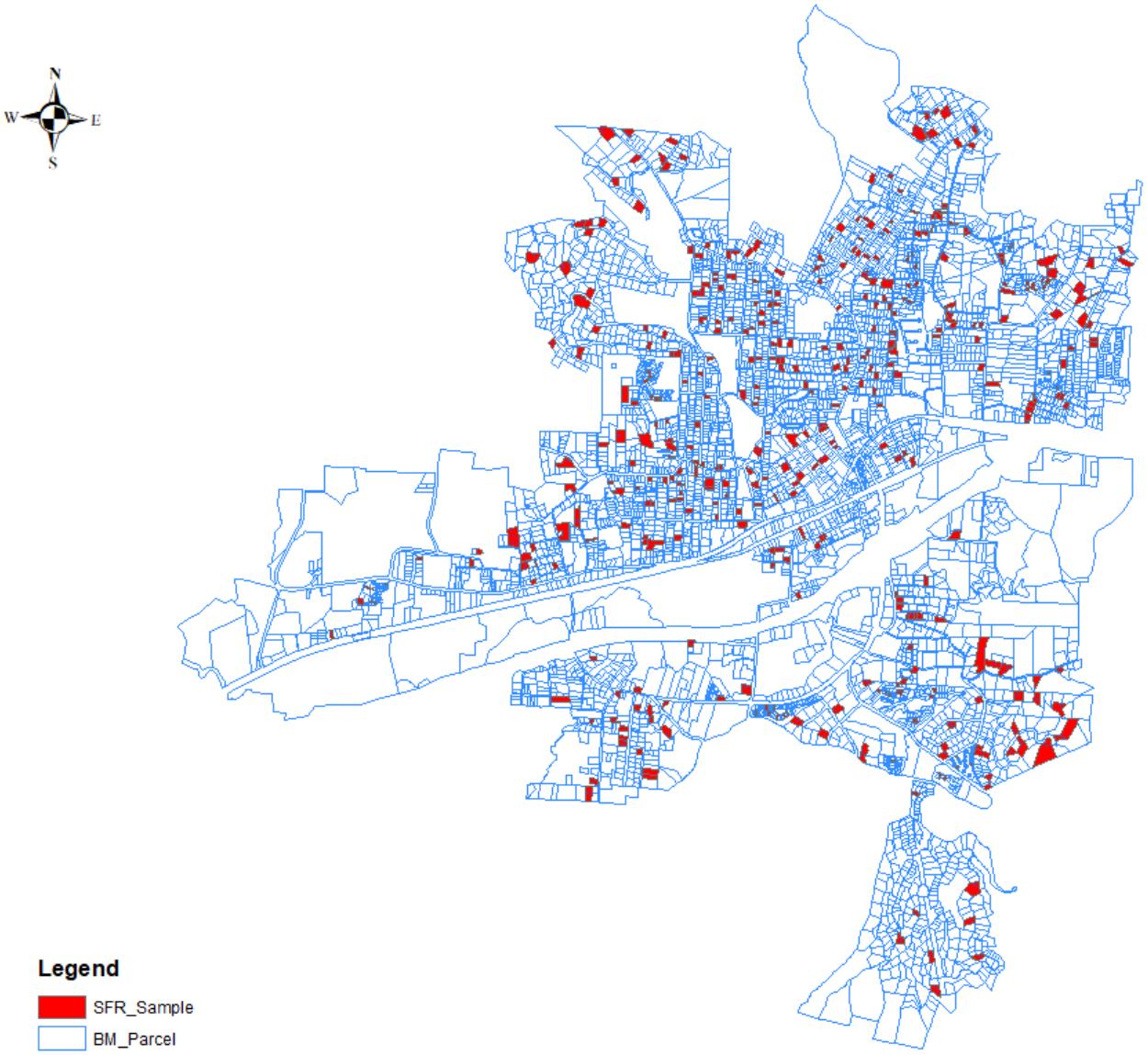




Figure 2. Example of SFR Properties' Impervious Area Digitization (photos not at the same scale)

ERU results

- The 400 sampled parcels had a wide range of impervious area amounts
- Typically, the median value of impervious area for the SFR sample is identified as the ERU. Compared with the mean (average) impervious area, the median is more statistically robust, and less sensitive to outliers, and is therefore considered an accurate representation of the impervious area associated with a typical SFR property within the Town.
- Median- a value in an ordered set of values below and above which there is an equal number of values or which is the arithmetic mean of the two middle values if there is no one middle number (MEDIAN Definition & Meaning - Merriam-Webster)

Based on the median value, the ERU value for Black Mountain is 3,161 square feet of impervious area. The distribution of sampled impervious area, with the median demarcated, is shown in Figure 3 below

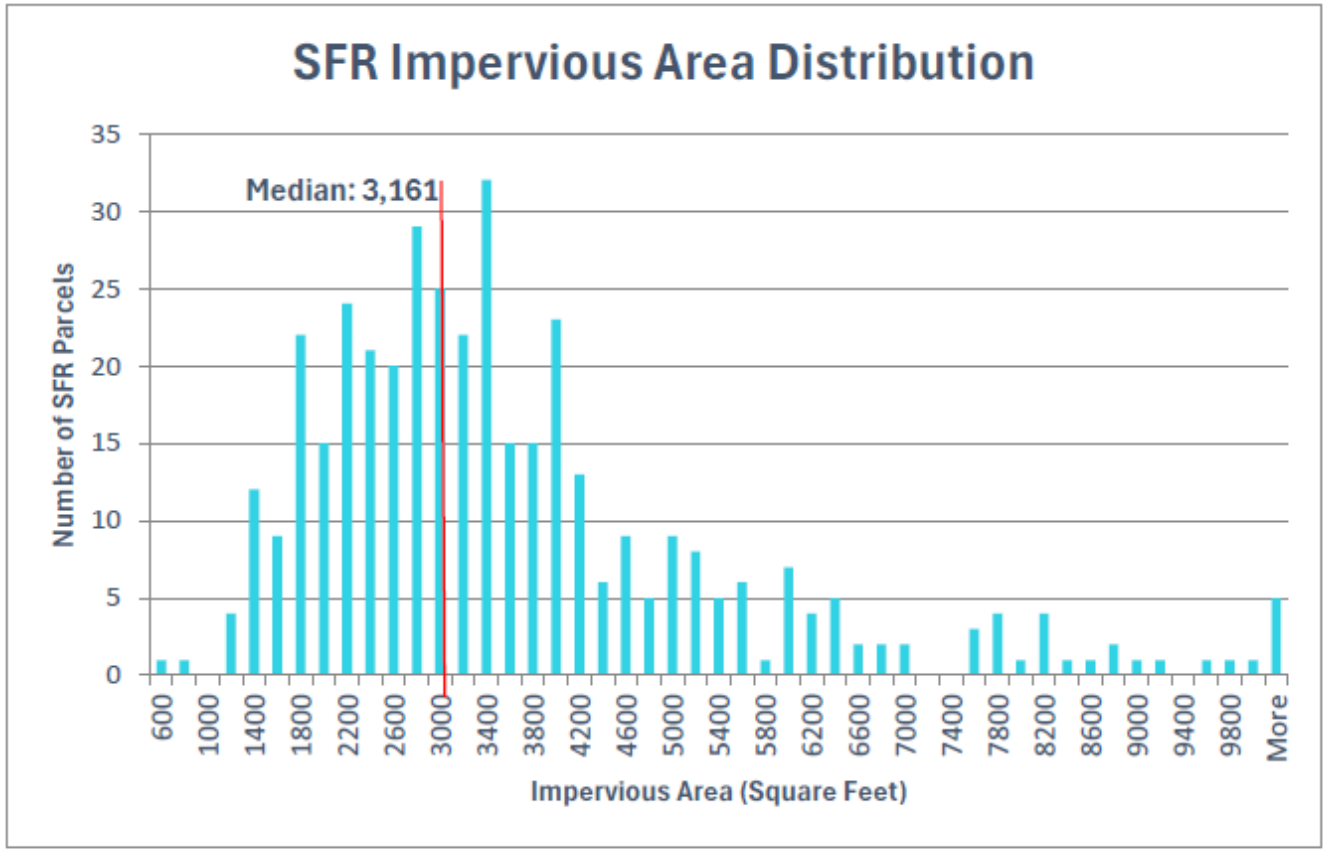


Figure 3. Impervious Area Distribution for SFR Properties in the Black Mountain ERU Sample

ERU Comparison to other Municipalities

- ERU values are community specific and depend on development patterns within the specific community.
- More densely developed communities typically have smaller ERU values while less densely developed communities have larger ERU values.
- To better understand how the Town's development patterns compared to other peer communities, Raftelis compared the Black Mountain ERU to the ERU values for other similarly sized stormwater utilities in the State of North Carolina.

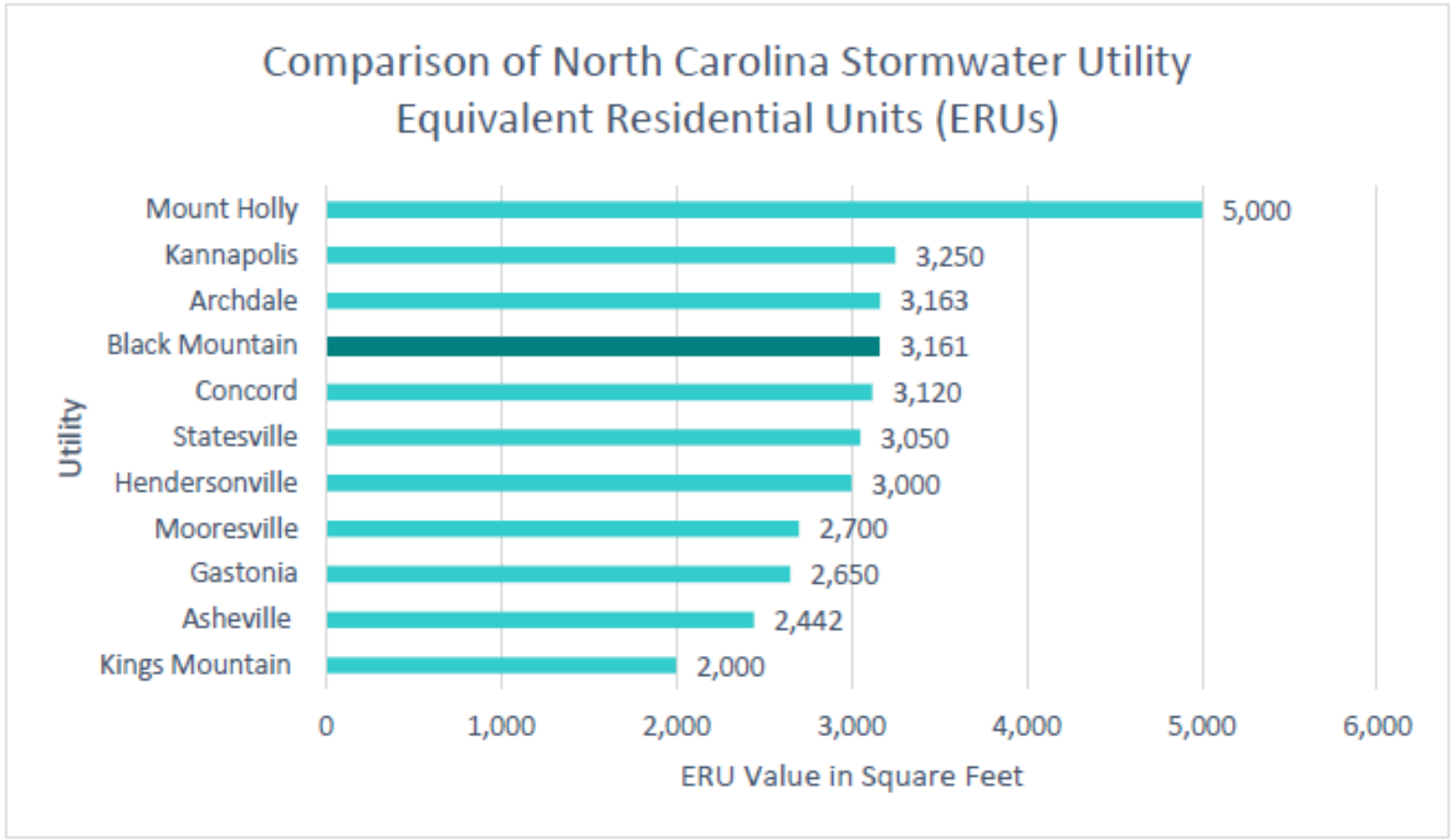


Figure 4. Comparison of ERU Values in North Carolina Stormwater Utilities

NSFR Impervious Area Delineation

- The next phase of rate structure analysis was to delineate impervious area for all NSFR properties in the Town and determine the number of billing units NSFR properties using the newly derived ERU value.
- Raftelis digitized the impervious area on every NSFR parcel in ArcMap, totaling 947 parcels that were not vacant or did not have an SFR parcel classification.

NSFR Impervious Area Delineation

- To compute the units of charge for each NSFR property, the impervious area measurement for each NSFR parcel was divided by the ERU value of 3,161 square feet to determine the number of billing units that a parcel would be charged.
- For example, a NSFR property with 9,000 square feet of impervious area would be charged for 3 ERUs (9,000/3,161 = 2.85 (rounded up to 3)).
- The NSFR impervious area delineation resulted in a wide range of impervious area amounts, from a minimum of 11 square feet to a maximum of 1,991,108 square feet.

Rate Structure Recommendation

- A simple and easy to maintain rate structure was a high priority for Town staff. As a result, a flat rate residential rate structure is recommended for the Town.
- The recommended rate structure will charge one ERU for each SFR property and all NSFR properties will be charged in increments of ERUs or part thereof based on measured impervious area.
- A flat rate residential rate structure will minimize data maintenance cost and effort since the largest customer class, residential, will all be charged the same amount.
- The use of integer values in the computation of ERUs for NSFR properties is considered fair, additionally minimizes data maintenance costs, and is common industry practice.

The estimated total number of billing units for both SFR and NSFR properties under the recommended rate structure are detailed in the table below.

Bill Class	# of Billing Units	# of ERUs
SFR	3,516	3,516
NSFR	5,811	6,081.5
Total	*9,327*	*9,597.5*

ERU Rate Structure Effects

- Revenue generated under this rate structure will depend on the rates eventually established by the Town.
- As with any rate structure change, some customers may experience an increase in their stormwater charge, while others may experience a decrease in their stormwater charge.
- Generally, under the recommended rate structure, a higher percentage of stormwater fee revenue will be generated from the NSFR properties than from the SFR properties compared to the current rate structure.
- Specific customer impacts will not be known until financial planning, rate setting, and development of any rate structure modifiers, like stormwater fee credits, are completed and finalized in the next phase of the project scope.