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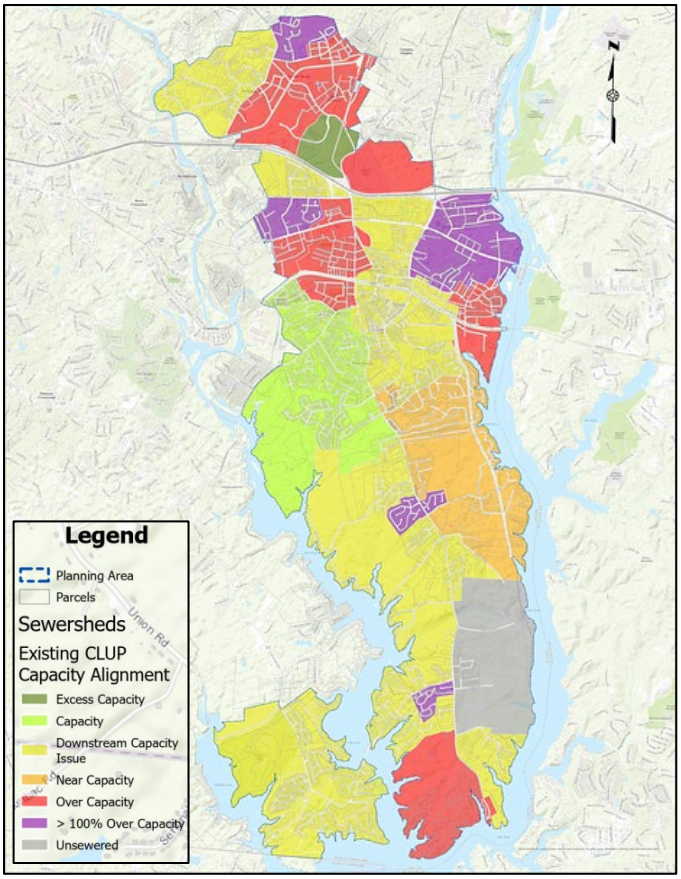
Land Use-Based Comprehensive Infrastructure Decision Model (LUCID)

Executive Summary

Belmont planning and engineering staff now have a living, real-time digital twin that is a single source of truth to make informed decisions about growth impacts. LUCID[tm] allows for "what if" scenarios of density changes at the parcel or development level with a single click of the mouse. This will ensure staff and stakeholders are aware of the sewer infrastructure impacts from the proposed development and all downstream assets. This includes expected sewer demands and cost sharing recommendations based on prorated downstream impacts.

Project Background – Informing the Comprehensive Land Use Plan (CLUP) Update

As part of the City of Belmont Comprehensive Land Use Plan (CLUP) Update, city staff recognized the importance of aligning community vision and infrastructure demands to create sustainable growth opportunities.

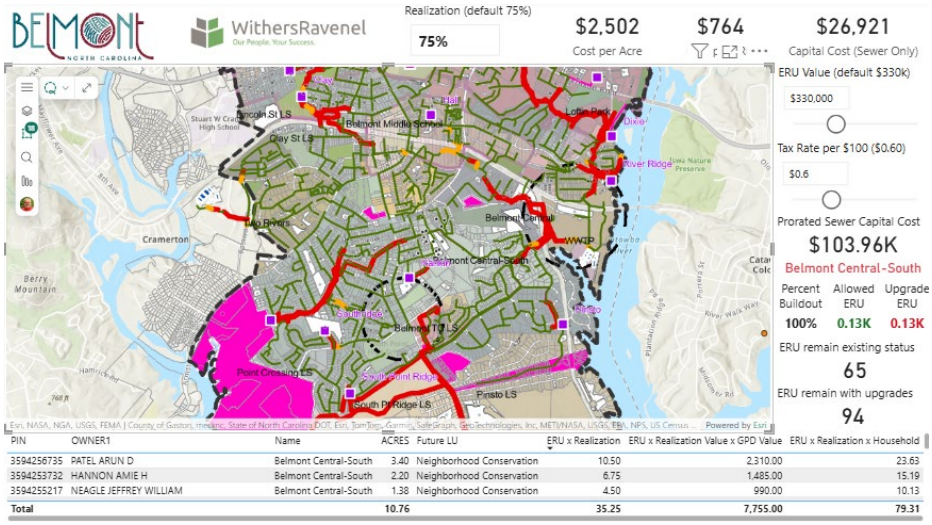


One of the greatest limiting factors to growth in Belmont and other surrounding areas is sanitary sewer capacity. Belmont was well positioned to leverage information from recent sanitary sewer capacity studies (AIA grant project, small area capacity studies, and hydraulic modeling).

This information was built upon and further enhanced to create a guidepost to inform density location for the CLUP update. The adjacent graphic was created and shared with Plusurbia, the consultant preparing the CLUP update, to show areas of opportunity and challenges concerning the sanitary sewer system and became one factor along with citizen feedback when finalizing the 2025 CLUP.

2025 Comprehensive Land Use Plan (CLUP) and LUCID[tm] Model

With the proposed 2025 CLUP complete, the new land use designations and proposed density were subsequently applied to undeveloped and underdeveloped property in a digital hydraulic model for the city. The future sewer demands were then loaded into the sanitary sewer hydraulic model to determine needed capacity investments to meet the demand at a 5 year storm level of service (LoS).



PIN	OWNER1	Name	ACRES	Future LU	ERU x Realization	ERU x Realization Value x GPD Value	ERU x Realization x Household
3594256735	PATEL ARUN D	Belmont Central-South	3.40	Neighborhood Conservation	10.50	2,310.00	23.63
3594253732	HANNON AMIE H	Belmont Central-South	2.20	Neighborhood Conservation	6.75	1,485.00	15.19
3594255217	NEAGLE JEFFREY WILLIAM	Belmont Central-South	1.38	Neighborhood Conservation	4.50	990.00	10.13
Total			10.76		35.25	7,755.00	79.31

The hydraulic model results were imported into the LUCID[tm] model to create a prorated downstream impact at the individual property level. In addition, cost opinions of investment need were developed to inform staff of the remaining sewer capacity and the opportunity for developer agreements to offset future investment for sewer capacity.

Step 1

- Identify remaining undeveloped and underdeveloped property with estimated sewer demands based on proposed land use designation.

Step 2

- Future sewer demands imput into the sewer hydraulic model. Model runs of build out and 50% build out in both dry weather and 5 year design storm. Hydraulic model results identify pipes and pump stations that are surcharged due to capacity limits based on service levels.

Step 3

- Pipes and pump stations identified as inadequate are upsized to meet future demands. Cost opions were created and loaded into LUCID[tm]. Prorated costs are associated on a parcel by parcel or development basis.

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The Value of the LUCID[tm] Model to Belmont Citizens, Staff, Council, and the Development Community

LUCID[tm] is a cloud-based asset management solution that provides robust land use data visualization, mapping, and what-if scenario modeling. It transforms static land use plans into dynamic land use models.

Deciding whether to recommend or reject an initial development proposal becomes an exercise in cross-referencing multiple maps or databases to answer questions like "does the historic district have enough sewer capacity to support a new microbrewery?" LUCID[tm] eliminates that headache by layering land use and utility asset data in a single interface.

LUCID[tm] leverages engineering and planning data to show how much new developments will increase demand for services. It also calculates the costs of infrastructure upgrades, making it easier to see whether existing enterprise utility fees, system development fees, or specific developer agreement will be sufficient to cover the costs.

The result is a dynamic land use model that helps staff and elected officials make informed decisions, understand the "when and how much" of capacity investments, and creates opportunities for cost sharing of infrastructure investment with the development community. This ensures that citizens have a vibrant and financially sustainable community that aligns with their future vision of Belmont.

Conclusion

The LUCID[tm] Model developed by WithersRavenel helped Plusurbia mesh citizen input and sanitary sewer areas of challenges and opportunity to create a Comprehensive Land Use Plan (CLUP) that aligns with citizen desires and the ability to meet the sewer demands of new development.

The outcome is a model that allows Belmont to maximize return on infrastructure investment and creates a framework for developers to partner with Belmont to meet infrastructure challenges. The LUCID[tm] model allows Belmont to better inform and capture System Development Fees (SDF) and create equitable developer agreements to cost share needed upgrades to sanitary sewer. This creates better collaboration between planning and engineering staff and allows Belmont to provide faster and more accurate information to developers early in the planning stages.

Sincerely,
WithersRavenel

L . Eddie Staley, PLS, GISP
Chief Experience and Innovation Officer, WithersRavenel