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# Using CommunityViz Build-out Extension

CommunityViz Build-out is a wizard based ArcView 3.x extension that allows community planners to estimate the amount and location of development for an area. Real world examples of Build-out will be demonstrated.

Build-Out projects the number, location and appearance of buildings based on land use or zoning information. The wizard allows you to set density assumptions in dwelling units per acre, minimum lot size or floor area ratio. While there are default values, users can also assign design assumptions, including layout efficiency, building offsets, development constraints, layout pattern and building type. The results of Build-out include indicator charts summarizing the building counts or impacts, point shape files depicting building locations with attributes, and real time visualizations of the buildings in context with the community.

Build-out Analysis

Build-out analysis is a widely used technique applied by planners to estimate the amount and location of development allowed in an area, identifying the holding capacity of the land. These analyses are a "supply-side" calculation applied to a clearly delineated area and based on that area's land-use or zoning assumptions. Traditionally, planners performed build-out analyses through a painstaking process using spreadsheets and hard copy maps. GIS (geographic information systems) improved this technique by using digital land-use maps associated with a database, but planners (or their GIS technicians) still needed to do field calculations and map edits through time-consuming, manual methods. Today, the CommunityViz Build-Out Wizard automates the entire build-out analysis process, and it also allows planners to experiment with changes and see results automatically updated.

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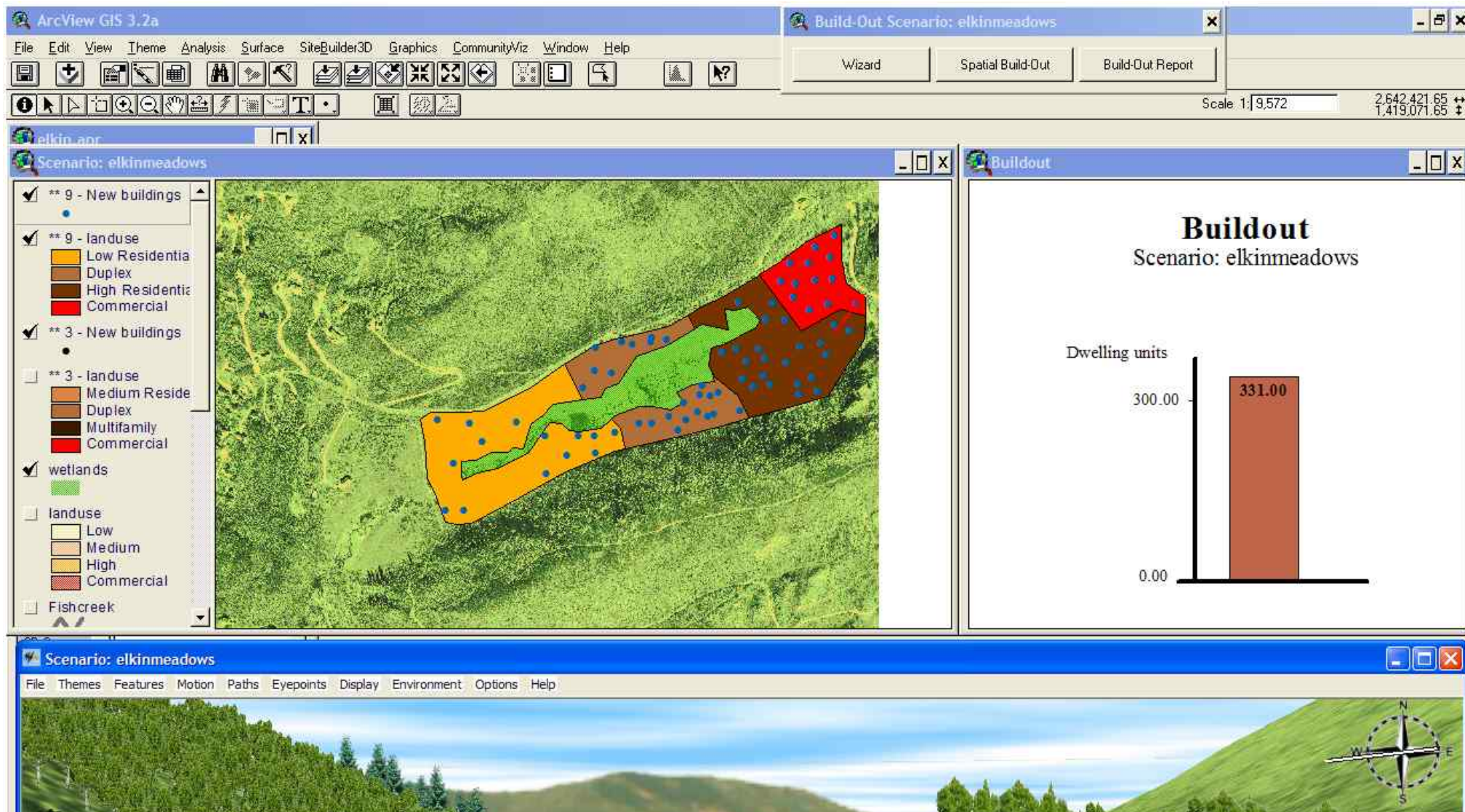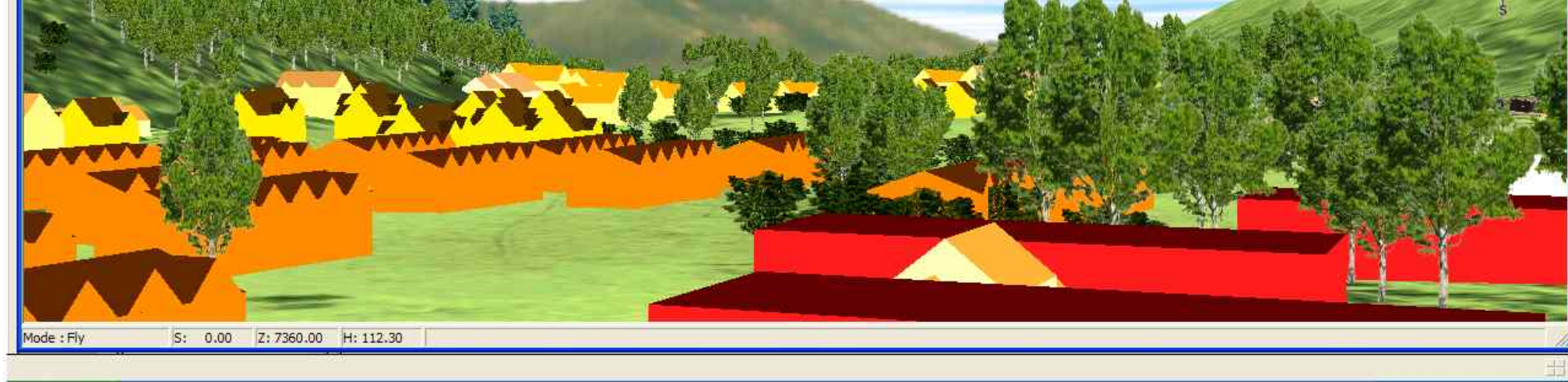
The CommunityViz Build-Out process contains 3 separate, but integrated steps: numeric, spatial and visual (see Figure 1). Together, these allow users to project the number, location and appearance of buildings an area will support at full capacity based on land-use or zoning information. A step-by-step Wizard guides users through the choices and selections that form the basis of the analysis. These include density assumptions for dwelling units per acre, minimum lot size, or floor area ratio, as well as design assumptions including layout efficiency, building offsets, development constraints, layout pattern, and building type. The Wizard provides default values, but users also have the option to specify their own density and design assumptions. In cases where users have generated CommunityViz Policy Simulator forecasts, the forecasted point themes can be used along with the CommunityViz Build-Out Wizard to generate 3D visualizations.

Numeric Analysis

Numeric build-out is a mathematical calculation that measures the holding capacity of land. It converts land use assumptions into building counts. The assumptions include density, design efficiency factors, and constraints to development. Density is most often expressed as residential dwelling units per acre (DU/ac), minimum lot sizes, or floor area ratios (FAR). Outputs of numeric build-out are the number of residential dwellings and the square footage of non-residential buildings.
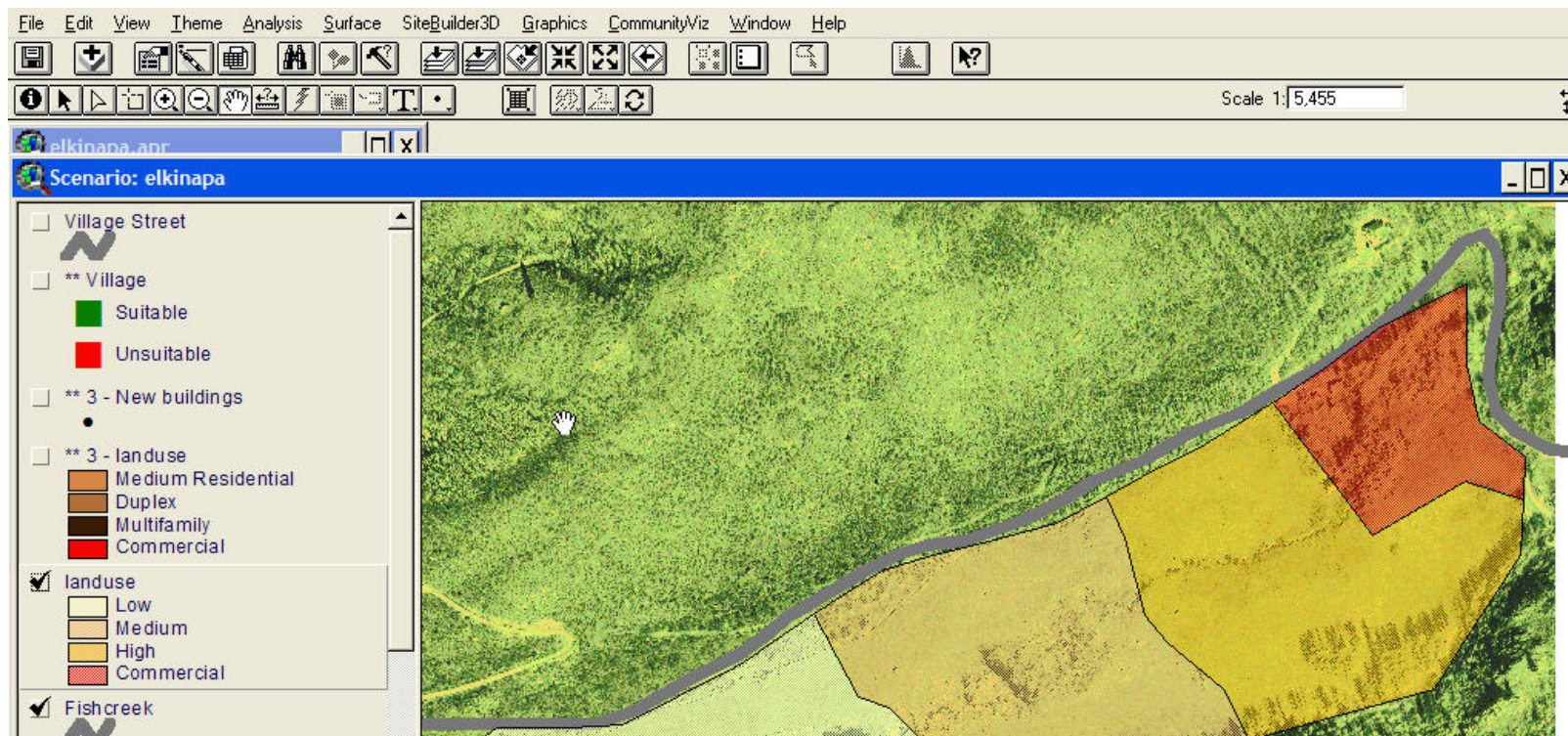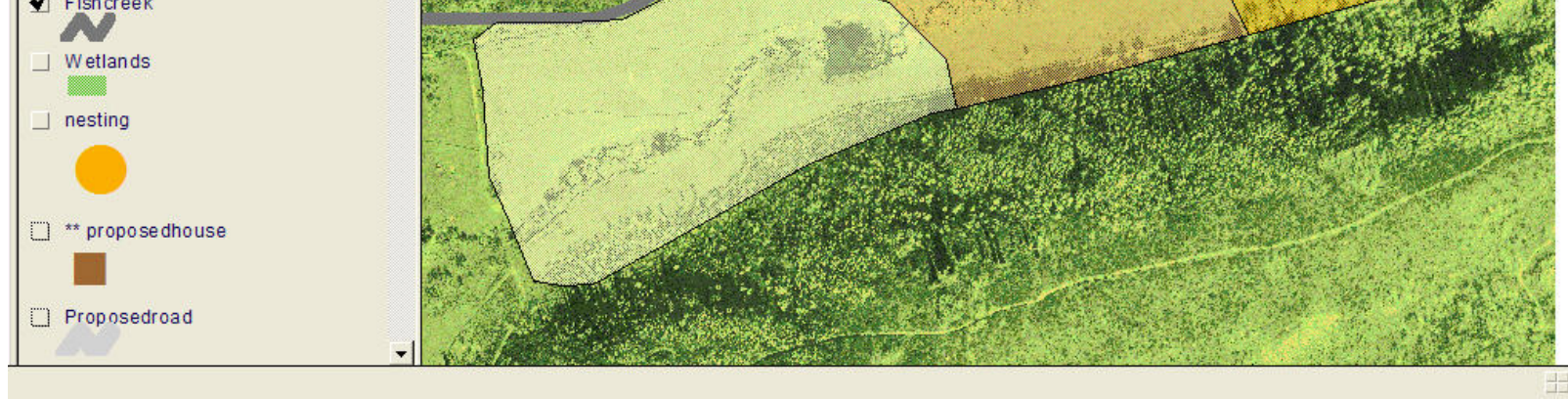
CommunityViz Numeric Build-out estimates the number of buildings per polygon based on density and acreage. This function requires input data in the form of a polygon land-use, zoning or parcel theme. A community or master plan usually proposes a range of residential density in DU/ac. Zoning codes specify the minimum lot size. Non-residential density is described in both cases as an FAR or relies on site design factors (such as setbacks, coverage, open space requirements, and parking standards) to limit density. In cases where DU/ac, minimum lot size, or FAR are not available or not specified, planners can use density estimates based on typical standards or local studies. When using CommunityViz Build-Out, it is also easy for them to experiment with density assumptions, trying out several options and illustrating the results. CommunityViz Build-Out can also take into account reductions in density due to ancillary activities such as roads and parks, and due to other constraints to development such as floodplains.

Spatial Analysis

CommunityViz Spatial Build-Out converts numeric building counts into points on a map that represent individual structures. From a data perspective, this spatial placement functionality creates and populates a build-out point theme. Potential building points are distributed 2-dimensionally by polygon.

The numeric building counts can come directly from CommunityViz Numeric Build-Out or they can be specified by the user, as might be appropriate for a PUD (planned unit development) or other case where building counts are known. (Users specify the counts with a field in the land-use or zoning theme.) Regardless of the source of total numeric building counts, CommunityViz Spatial Build-Out places building points so that they avoid development constraints, other buildings, and polygon boundaries (land-use areas, zone districts, or lot lines). However, it is important to note that CommunityViz Spatial Build-Out is not a layout tool, which would be need for, for example, designing roads, orienting buildings, or accounting for site amenities.
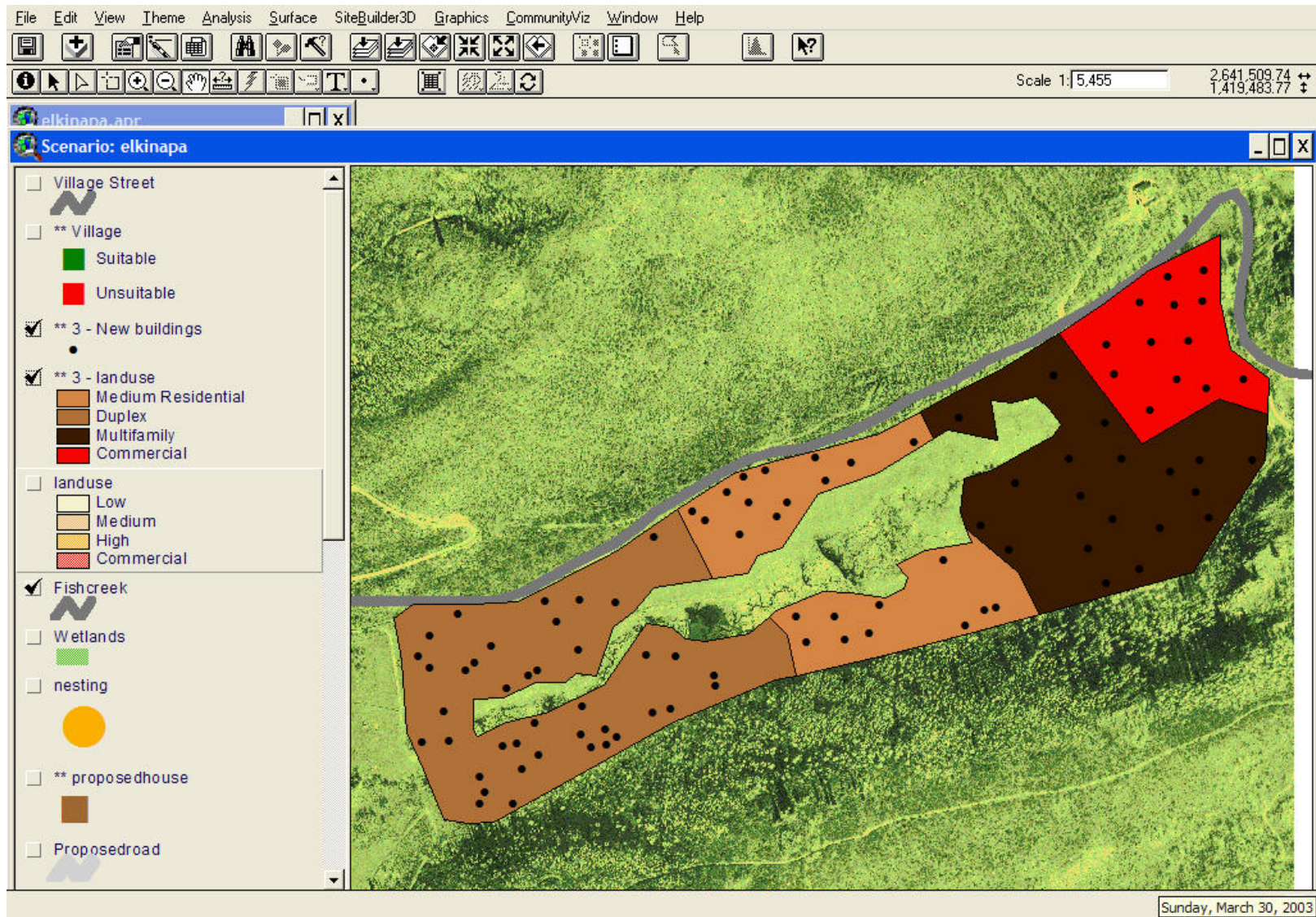
Visual Analysis

CommunityViz Visual Build-Out takes building points located 2-dimensionally and creates a 3-dimensional representation of the buildings. In the 3D scene, buildings are represented with 3D models designated by Visual Build-Out. The default settings select simple "monopoly-style" 3D building models with low polygon counts (which maximizes refresh and fly-through speeds). These models are false colored to represent land-use type (yellow for residential, red for commercial, blue for municipal, and grey for industrial). The CommunityViz Model Library offers many additional choices that can be selected to replace the default settings. These choices may more accurately reflect local architecture, more complex structures, or photo-real buildings. The complexity of a 3D scene is limited only by the capabilities of the computer system being used.
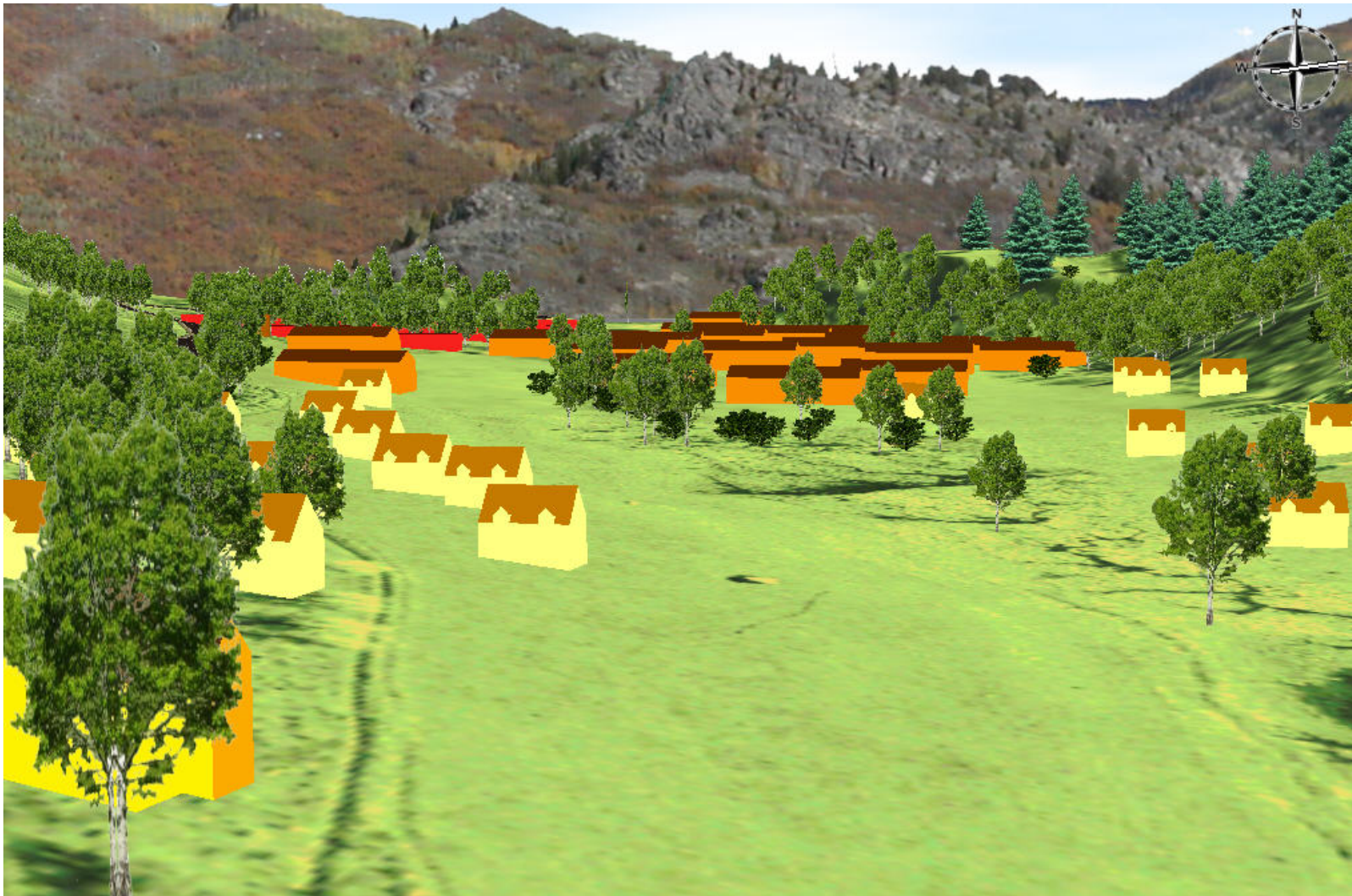
Build-out versus Forecasting

Forecasting is a complex demand- and supply-driven process, while build-out is a simple supply-based process. Forecasting adds the demand component by considering factors like economic and demographic trends over time. Though forecasts such as those produced by CommunityViz Policy Simulator may be constrained by zoning, they are not build-out computations as commonly practiced by planners. Even in growing places where regional forecasts may approach residential holding capacity if run for long enough, these forecasts are still different in nature from typical build-out analyses that examine 100% development at a snapshot in time.

Example

A typical analysis of build-out might start with 10 acres of land with a proposed density of 10 dwelling units per acre. A simple multiplication would produce a target of 100 units.

A more complex analysis might deduct road right-of-way (ROW) by multiplying, say, 1740 linear feet of road by a 50 foot ROW to produce 2 acres of reduction. This leaves 8 acres with 80 units allowed (an efficiency factor of 80%). The land might contain 2 acres of flood plain, a constraint to development. Some communities allow the developer to shift the density, keeping the total units at 80. Other communities prohibit density shifting, reducing the target number of units to 60 units.

Existing structures will limit the number of additional new dwelling units allowed on the land. If an existing subdivision contains 20 dwelling units, the available capacity is reduced to 60 or 40 units. Distributing these units on a 2-dimensional map must consider the separation distance between structures and the pattern of the development. The pattern may be a grid or may be random. The placement of individual building points must avoid development constraints, existing structures, and parcel lines.

Visualization takes the mapped locations and associates a building model with each structure. Stakeholders can see in 3 dimensions the approximate density, pattern, and bulk of the proposed structures located in the context of the neighborhood or region.

REFERENCES OR ACKNOWLEDGMENTS

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