How To Conduct A Build-Out Analysis

A build-out analysis is used to estimate and describe the amount and the location of future development that may be allowed to occur within a specified area or a given community under current development regulations. Through a series of maps and charts, the build-out analysis provides an estimate of the total number of houses, commercial/industrial square footage, and population that could result if all the unprotected, buildable land within a community or specified area is developed, if no more land is permanently protected, and if local zoning and subdivision regulations remain unchanged. This information is instrumental for estimating future demands on public infrastructure and the environment. It is also beneficial in allowing a community to test its development regulations – to get a glimpse of its possible future when all the remaining buildable land is developed to the maximum extent allowed under existing regulations.

In evaluating future development possibilities, a build-out analysis can help answer such questions as

- How much land area can be developed under existing land use regulations, and where will this growth occur?
- How many residential lots could there be, and how much will the population of the community increase at full build-out?
- Are there areas projected for development that the community would prefer not to develop, or to develop at lower densities?
- Are there areas that the community would prefer to develop at higher densities?
- What steps should the community be taking now to accommodate future growth?

When using a build-out analysis, a number of different future development scenarios can be compared, and a community can gain a better sense of the type of development pattern it would like to achieve. This in turn helps to remind us that we should plan if we desire to effect a different end result.

Helpful Hint: It is recommended that a build-out analysis be conducted primarily for those communities experiencing rapid growth and a dwindling supply of vacant land. It is not recommended for those communities that have preserved large amounts of vacant land because the analysis could result in misleading representations of the amount of buildable land available.

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There is a wide range of techniques and models used to conduct a build-out analysis, but basically such an analysis boils down to a two-phase process that involves mapping and quantitative estimates. The use of GIS significantly improves the process and makes it more efficient to complete. The following instructions are provided to assist small communities that may desire to undertake a simple, manual build-out analysis. Larger

cities and towns will want to use GIS. The methodology remains the same, except where noted.

Stage I: Mapping and Interpretation

The first step is to prepare a large base map of your community, which can be mounted on hard backing or on a wall, along with four clear overlay sheets. Additional overlay sheets will be added later to illustrate possible future development scenarios for your community.

The base map should show the following:

- the boundaries of your community
- a north arrow and map scale
- existing streets
- tax parcel boundaries
- surface water areas (lakes, rivers, streams)

On separate overlay sheets:

1. Delineate all the land area within your community that cannot be developed due to public ownership, conservation easements (deed restrictions), utility easements, or natural factors such as wetlands, floodplains, and steep slopes over 25%. This information should already be available from your natural resources inventory maps and your development constraints map.

2. Delineate all the undeveloped land area within your community that could be developed in the future. This information should already be available from your development opportunities map. It is important when delineating this information that you include both vacant lands and buildable lands. Buildable lands are those that are suitable for development, i.e. free from any development constraints.

3. Delineate all the land within your community that has already been developed and contains existing buildings and structures and lot lines. This information will be available from your existing land use map. You do not need to show each residential, commercial, or industrial land use type. You can combine all your developed land together as one overlay.

4. Delineate the zoning district boundaries from your community's zoning map. All you need to do here is just show the zoning district boundary lines.

When you have completed all four sheets, lay these sheets on top of your base map. Each one of the overlay sheets represents a data layer, if you are using GIS. Divide your community into equal geographical sections or regions. Within each section, take a close look at the undeveloped but buildable land area and how it is currently zoned. Identify the

tax map number of each parcel of buildable land. Within each parcel, highlight the land area that is buildable and calculate the acreage.

For each buildable land area that is zoned residential, apply your community's road standards and minimum lot size and frontage requirements, as if the land could be developed to the maximum extent allowable. In other words, estimate mathematically the number of housing units that could be allowed on the land based on these regulatory standards. For commercial or industrial zoned land, estimate the number of buildings or the maximum building size that could fit on each parcel, keeping in mind the possible use and your community's setback, parking, landscaping, building height, and other zoning standards. This should result in a floor area ratio.

Depending upon the size and scale of your base map, you may be able to mark physically, or illustrate directly on the overlay sheet, the number of new house lots or the relative size of the buildings that could be developed. Keep a running total of the number of new house lots and buildings and the acreage (the estimated future development potential) within each section or geographic region.

If your community has a high percentage of undeveloped or underdeveloped land, you may want to prepare staggered overlays showing a possible progression of growth in those areas. For example, the first overlay might show growth along major roads and on large parcels. The next overlay could show growth on the next most desirable parcels. The last overlay would show growth on the least desirable parcels. In this fashion, you would be developing and comparing possible growth scenarios.

Stage II: Quantitative Analysis

After you have completed all your build-out estimates, the next step is to quantify this information. This is where the use of GIS mapping layers and associated databases comes in handy. Under many GIS build-out models, the total number of potential new residential dwellings is calculated simply by dividing the total buildable residentially zoned acreage by the minimum lot size as set forth by the zoning district. Sometimes a development factor is applied to give this estimate a measure of reality, as it is to be expected that design issues and required rights-of-way in a large subdivision will often result in a smaller number of lots created than the maximum allowed. This approach is acceptable, but an even more realistic figure can be determined by estimating the number of new dwellings on a parcel-by-parcel basis, based on zoning and the size and shape of the individual parcel.

If you quantify your estimates in this fashion, you should prepare a spreadsheet for each section or region of your community, identifying the total acreage of buildable land by zoning district, the total number of potential new dwelling units, and the number of commercial and industrial buildings/square footage by zoning district.

Using your community's average household size, population, and housing data, you can then project a future population size and total number of housing units. You can also

calculate the future population and housing density of each section or region if you know the square mileage of each area. Density is typically expressed as the number of people or housing units per square mile. This information is particularly helpful as your community considers the demands that future build-out growth will have on schools, water supply, sewage, utilities, and the like. It is also helpful for evaluating your community's overall growth potential and in shaping the future development of your community with a preferred development scheme and future land use plan.

After you have completed all of the overlays depicting maximum growth potential of the area under study, take a close look at the resulting development patterns. Build-out analyses are meant to promote an understanding of the implications of current land use practices and the consequences of existing land development regulations. Is this how you would like to see your community develop in the future? Are there alternatives? If so, what are they?

At this point you should consider the various future development scenarios that were developed under Phase II of the master planning process. It is possible to use the same methodology as described above to prepare build-out estimates for each scenario. After you have completed this, compare the build out results and select the scenario that best fits your community's goals and visions.

Helpful Hint: *It is advisable to facilitate a public workshop at this point to present your findings and to seek public input. Once your community has had an opportunity to evaluate the results of the build-out analysis and to compare various development scenarios, the next step in the master planning process is to select a preferred development scheme. The preferred development scheme will form the basis of your future land use map.*