

PROJECT DOCUMENT

CommunityViz for GP Comprehensive Update

Task S1 Capacity Technical Report

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Introduction

Estimating residential or non-residential capacity is often called a *build-out analysis*. Build-out is an estimate of the theoretical maximum development capacity of the land using regulatory information and/or by looking at historical trends in development. Build-out does not predict what will or should be built. Modeling urban development requires an understanding of both supply and demand, and build-out addresses the supply component. Build-out could be analyzed as a future growth scenario, but typically build-out far exceeds the likely near term growth. What will likely be developed or what would be the desired development in a future scenario, using information such as population and employment projections, more directly addresses the demand issue. This will be covered in more detail in a separate task, Land Use Allocation.

Capacity is addressed in this analysis by primarily looking at two separate but related factors: historical trends and density standards established by land use regulation. Quantifying historic trends requires analyzing the number or size of existing built structures on the landscape and identifying general patterns of growth. Density standards can be calculated using numerical values taken from land use development regulations, primarily the County of Hawai'i (CoH) zoning.

In order to model capacity, it should be primarily thought of in terms of densities – how many residential or non-residential structures fit into an acre of land. The two units of measurement are dwelling units per acre (du per ac) and non-residential square feet per acre (nrsf per acre). In the following sections, density as it is addressed in the CoH land use regulations is described in more detail. Once a density value is established, this value can be multiplied by the area of parcel to calculate the gross capacity. Gross capacity is the *maximum development potential of a property as vacant*. This treats a property as an undeveloped area to estimate the potential from the ground up. After calculating gross capacity, net capacity can be generated comparing what has already been developed (existing) with this theoretical maximum and calculates *the difference between what is there today versus what could be there someday*. Net capacity is a primary input to the next task land use allocation where capacity is potentially filled using factors reflecting local demand (proximity to existing development, redevelopment demand, demand for ohana units, etc.) and future population and employment forecasts.

Residential Capacity

Residential capacity encompasses most forms of formal, legal dwelling units: single family homes, multifamily homes (apartments, condos, townhomes, etc.), farm dwelling units, and accessory dwelling units (ohana units). It does not address illegal dwelling units or group quarters such as student dorms, correctional facilities, medical facilities, nursing homes or religious group quarters.

Historical Trends

Using the CoH Real Property Tax (RPT) data, the number of residences per parcel was identified (not uncommonly, a parcel may contain multiple residences). The parcel dataset was then attributed with the zone designation and the mean and median dwelling units per acre were summarized for each unique zone type. Using the RPT residential build date, a refined version of these statistics were created using just residences built after 1995. These numbers provided historical and recent historical (post-1995) perspectives on residential density. After some internal discussion and review, the median numbers were found to be more representative of residential densities rather than the mean (the mean numbers being more influenced by extreme values than the median). See Zoning Capacity Excel Spreadsheet, Residential Capacities tab, columns L (historical) and M (recent historical) for the results of the historic trends analysis.

Zoning

CoH zoning describes the zoning types, specifying if a zone allows residential use. If allowed, the allowable residential density is determined through the minimum lot size per acre or required land area per dwelling unit. In addition to these values, many zones also allow for farm dwellings and ohana dwelling units that are allowed per parcel. While the ohana dwellings are limited to one per parcel, the number of agricultural dwelling units are not limited by the zoning regulations. After discussion with county staff and reviewing the historical trends data, an assumption of one agricultural dwelling per parcel appeared to be adequate for capacity modeling purposes. These values are organized and populated in the Zoning Capacity Excel Spreadsheet. See the Residential Capacities table, column J (Zoning Density) and column K (Zoning Density plus Accessory Units) for these values.

Comparing the zoning derived residential density with the historical trends revealed that for most zones, the residential densities were consistent with each other. Certain zoning types (e.g., A-500a, A-5a, CG-10, CG-20, and CG-7.5) had higher historic trend densities than what the zoning allowed. While some parcels in these zones had more dwelling units than what the zoning would normally allow, these case could represent many possible conditions: multiple farm dwelling units, properties granted variances or older residences established before the establishment of modern zoning (grandfathered non-conforming (which appeared to be the case in many of the CG zones)). In many of the agriculture zones, there were many cases where the parcel size was smaller than the zoning minimum parcel area, creating another type of non-conforming parcel. Discussing these cases with planning staff, it was decided that non-conforming parcels due to size could still receive a dwelling unit and any accessory dwelling units that were allowed by the zone.

Reviewing this information CoH planning staff, in conversation with consultants, elected to primarily use the zoning-derived residential densities for the capacity analysis, supplemented by the historical trend density values for certain multi-family zones (e.g., RCX, RM, V). The zoning-derived values tended to greatly overestimate the densities typically achieved in these zones and reflected in the historical trends densities. In order to develop a more realistic build-out analysis, historic trend

densities were applied to these multifamily and mixed use zones. These values can be found in the Zoning Capacity Excel Spreadsheet. See the Residential Capacities tab, column L (Historic Res Density) and column M (Recent Historic Res Density) for these values.

Additional Residential Factors

With residential densities established for all zones, the following factors reduce or void parcel residential capacity. It is important to note that there are many factors that are not included here that could reduce or eliminate capacity. These conditions include but are not limited to covenants (e.g., restricting accessory units), conservation easements or site-specific limitations (road access, appropriate soils for construction, etc.).

Residential Efficiency

This factor is applied to the area of a parcel, reducing the amount of land that will be subject to the residential density. The purpose of this factor is to effectively remove area that is “lost” during the land development process to sidewalks, open space requirements, utilities, local roads, etc. Residential efficiency tends to be much higher for areas that are already developed as much of this infrastructure is already in place. The factor was estimated by the CoH planning staff for both the east and west sides of the island and both urban and rural environments. This factor only applies to parcels that have significant subdivision potential (i.e., greater than five times the minimum lot size for the purposes of this model).

- Urban East Hawai’i: 70.4%
- Urban West Hawai’i: 81.2%
- Rural East Hawai’i: 77.0%
- Rural West Hawai’i: 86.0%

There are additional factors which may disqualify a parcel from having residential capacity:

- Unbuildable areas such as steep slopes (>50% slope), wetland and open water areas (>75% slope) unless the parcel already has a residential or non-residential structure.
- Existing parcels smaller than 2000 square feet.
- Current land use types of conservation, transportation, unknown and government with the following exceptions: Department of Hawaii Home Lands (DHHL) properties, Hawaii Public Housing Authority (HPHA) and state properties leased by a private party (e.g. Banyan Drive in Hilo).
- Tax-exempt properties with uses such as churches, schools, non-profit and other community organizations. This does not include properties owned by the DHHL and the HPHA which are included in the residential capacity analysis.

Gross and Net Residential Capacity

Gross capacity is calculated by multiplying the zone (or historic) density by the area of the parcel where the parcel size exceeds the minimum lot area. If the parcel is more than double the minimum parcel size, it is then subject to the residential efficiency factor. Gross capacity then subtracts the number of existing dwelling units to produce net capacity. In the CommunityViz analysis, the net capacity can be overridden by a “spot capacity” that can be used to correct the model in special cases where the model is either incorrect or a special case needs to be applied. This is the case for select resort vacation zones in the Kona and Kohala regions and cases such as DHHL parcels where development plans specify specific development patterns. Net capacity is a primary input to the following task, land use allocation

where it will dictate the maximum number of new units that could be built in a future scenario. The gross and net capacity results can be seen below summarized by district. They can be viewed in additional detail in the CommunityViz analysis.

	Existing Dwelling Units	Gross Dwelling Units	Net Dwelling Units
HAMAKUA	1,644	13,381	11,737
KAU	3,360	37,917	34,557
NORTH HILO	1,136	4,185	3,049
NORTH KOHALA	2,122	13,405	11,283
NORTH KONA	11,294	45,889	34,595
PUNA	17,031	87,669	70,638
SOUTH HILO	14,498	45,152	30,654
SOUTH KOHALA	6,143	48,100	41,957
SOUTH KONA	2,947	22,787	19,840
TOTAL	60,175	318,485	258,310

Non-Residential Capacity

Non-residential capacity considers both commercial (retail, service, office, etc.) and industrial uses. Non-residential capacity does not address informal or small scale commercial or industrial uses (farm stands, home businesses, food trucks, etc.).

Zoning Density

In many jurisdictions, non-residential buildings are regulated using a density measurement such as floor area ratio (FAR). In CoH, FAR is not commonly referred to and the land use regulations lack a standard method for regulating commercial density. Planners often use commercial square feet per acre as a reference but it does not codified as a regulation per se. However, design standards from the zoning regulations do limit the size of non-residential building using specifications like maximum building heights, parking requirements, setback distances and minimum building sites. Using these numbers as inputs, the non-residential density was calculated according to these standards. These values are populated Zoning Capacity Excel Spreadsheet, see the NonResidential Capacities tab, column F (commercial) and I (industrial) for the final values. See also the FAR Commercial Calculator tab for how these values incorporated the design standards.

Historical Trend Density

A similar technique to residential analysis was used to identify the historical trends in non-residential development. Using the CoH RPT data, the amount of non-residential square feet per parcel was identified. The parcel dataset was then attributed with the zone designation and the mean and median non-residential square footage per acre were found for each unique zone type. Commercial and industrial uses were separately identified using the RPT land use. Using the RPT non-residential build date, a refined version of these statistics were created using just buildings constructed after 1995.

These numbers provided historical and recent historical (post-1995) perspectives on non-residential density. For industrial uses, there weren't enough recent historical developments to confidently create these summary statistics so there are only historic numbers available. As with residential density, the median values were found to generally be more representative of non-residential gross floor areas than the mean values. These values are found in the Zoning Capacity Excel Spreadsheet, see the NonResidential Capacities tab, column G (historic commercial), column H (recent historic commercial) and column J (historic industrial) for the final values.

In most zones, there was a considerable difference between the zoning and the historical trends non-residential densities. In almost all cases the zoning densities vastly overestimated what was traditionally being built in much of the County. This result was not entirely unexpected; design standards such as those stated in development regulations establish maximum specifications and do not represent market and developer norms. What is ultimately built is a reflection of multiple factors: the intended use, transportation/access issues, local market economics, and an owner's own design preferences. After reviewing these results, an additional analysis was undertaken using known non-residential properties in the North and South Kona districts. Properties representing common non-residential types (office, retail, service, storage and industrial) in different zones were selected by CoH planning staff and the gross floor areas were found using the RPT data. In some cases the RPT floor area data was compared to the planning department's own records, submitted by the developer for review. The floor areas and floor area per acre were compared to the historical trend values and found to be consistent, especially with the more recent values.

Commercial and industrial uses on agricultural lands are an important part of Hawai'i's cultural and economic heritage. These uses are permitted by the zoning regulations on a limited basis and in certain areas of the island are not uncommon. However the historical trends analysis revealed that they are actually quite rare. Typically less than 1% of agricultural properties have nonresidential structures according to the RPT data. See Column D (Developed Parcels Percent) in the Zoning Capacity Excel Spreadsheet, NonResidential Capacities for this information. At this time the capacity model does not address these uses.

Reviewing this information CoH planning staff, in conversation with consultants, elected to use the historical trend density to calculate non-residential capacity where these uses are allowed by the conventional zoning. The zoning derived density data suggested unrealistic densities that were not in character with what the historical trend densities suggested. As a modeling process, these values and assumptions could be revisited during the creation of alternate scenarios. The draft final density values are found in the Zoning Capacity Excel Spreadsheet, see the NonResidential Capacities tab, column K (commercial) and column L (industrial).

Additional Non-Residential Factors

With non-residential densities established for all zones, the following factors reduce or void parcel non-residential capacity. It is important to note that there are many factors that are not included here that could reduce or eliminate non-residential capacity. These include covenants, conservation easements or site-specific limitations (road access, appropriate soils for construction, etc.).

Commercial absorption

This factor estimates the amount of area potentially available for commercial development. In many ways it is similar residential efficiency as its purpose is to reduce the amount of commercial capacity that is potentially available for development. It assumes that a certain amount of capacity is actually

occupied by residential or other uses. It is especially important in mixed use areas that allow both residential and commercial development. Typically in mixed zones this value is low (10-30%) rising as the commercial use becomes more dominant land use. Commercial absorption rates were calculated using the RPT commercial square feet values, finding the percent of parcels with commercial use in each of the zones. The weighted mean for each zoning type was then calculated for each zone that allows commercial development. The values can be found in the Zoning Capacity Excel Spreadsheet, see the NonResidential Capacities table, column M.

There are additional factors which may disqualify a parcel from having non-residential capacity:

- Unbuildable areas such as steep slopes (>50% slope), wetland and open water areas (>75% slope) unless the parcel already has a residential or non-residential structure.
- Existing parcels smaller than 2000 square feet.
- Current land use types of conservation, transportation, unknown and government with the following exceptions: DHHL properties and state properties leased by a private party.
- Tax-exempt properties with uses such as churches, schools, non-profit and other community organizations. This does not include properties owned by the DHHL and which are included in the non-residential capacity analysis (where appropriate).

Gross and Net Non-Residential Capacity

Similar to residential capacity, the non-residential gross capacity is calculated by multiplying the zone density by the area of the parcel where the parcel size needs to exceed the minimum lot area. Gross capacity then subtracts the amount of existing non-commercial square feet to produce net capacity. In the CommunityViz analysis, the net capacity can be overridden by a "spot capacity" that can be used to correct the model in special cases where the model is either incorrect or a special case needs to be applied. This is the case for select resort vacation zones in the Kona and Kohala regions. This is the case for select resort vacation zones in the Kona and Kohala regions and cases such as DHHL parcels where development plans specify specific development patterns. Net capacity is a primary input to the following task, land use allocation where it will dictate the maximum amount of new non-residential space that could be built in a future scenario. The gross and net capacity results is summarized below by district. It can be viewed in additional detail using the CommunityViz analysis.

	Existing Industrial Area	Gross Industrial Area	Net Industrial Area	Existing Commercial Area	Gross Commercial Area	Net Commercial Area
HAMAKUA	38,200	171,273	133,073	437,579	451,240	574,125
KAU	0	446,141	444,749	324,862	877,373	795,563
NORTH HILO	19,179	719,857	703,857	64,630	774,621	1,425,317
NORTH KOHALA	55,609	0	0	289,381	731,752	610,709
NORTH KONA	5,138,728	19,174,459	16,848,402	6,700,656	30,465,328	24,928,424
PUNA	904,281	5,170,519	4,559,131	1,485,452	6,863,254	6,103,887
SOUTH HILO	3,772,345	10,609,327	7,579,373	9,456,891	15,073,950	9,608,448
SOUTH KOHALA	337,678	2,020,951	2,270,048	6,710,524	11,697,737	10,335,021
SOUTH KONA	12,709	0	0	679,684	1,070,106	771,802
TOTAL	10,278,729	38,312,527	32,538,633	26,149,659	68,005,360	55,153,296

Capacity Categories

Capacity has been categorized using the types listed below. These types are visible using the CommunityViz Analysis. This classification is for the internal review team to help understand the different types of capacity that the model is rendering. The capacity types are defined below:

- Greenfield Subdivided. There are no existing residential or nonresidential units on the parcel (according to our RPT records). The parcel can be developed to its full capacity but minimum parcel areas restrict further subdivision.
- Greenfield with Subdivision Potential. There are no existing residential or nonresidential units on the parcel (according to our RPT records). The parcel can be developed to its full capacity and the parcel can be further subdivided (the parcel area is greater than the two times the minimum parcel area).
- Farm Dwelling Unit. Residential only. In zones that allow an extra farm dwelling unit, there is one residential structure on the parcel and capacity for one additional farm dwelling.
- Ohana Dwelling Unit. Residential only. In zones that allow an ohana dwelling unit, there is one residential structure on the parcel and capacity for one ohana unit.
- Potential Redev Low Existing Density. This class uses the term “redevelopment” very loosely and describes areas where additional development could likely occur by subdivision of the existing parcel or with very little change to the existing structure on the parcel. There are one or more existing structures on the parcel and the zoning allows for greater density than what currently exists. In this case, the existing residential or non-residential structures exist at low densities relative to the gross capacity (the existing development is less than ½ of the gross capacity).
- Potential Redev High Existing Density. Similar to Redevelopment 1, one or more structures exist on the parcel and the zoning allows for greater density than what currently exists. In this case, the existing residential or non-residential structures exist at higher densities than found in type 1 (the existing development is more than ½ of the gross capacity).
- At or Over Capacity. The number of dwelling units on the parcel meets or exceeds the allowed capacity.
- Govt or Conservation. The land ownership is government or dedicated to conservation uses. Note that DHHL and HPHA properties are not included in this category for this analysis.
- Unbuildable. A physical limitation, either steep slopes or wetlands are restricting the capacity of the parcel.
- Other No Capacity. The parcel has no capacity. This usually occurs in areas where the zoning does not allow residential development but the parcel is usually privately owned, such as in parcels zones “Open”.

Residential Capacity Flow Diagram



Non-residential Capacity Flow Diagram



*Process is identical for commercial and industrial capacity