# PITKIN COUNTY, CO

## BUILDOUT STUDY AND CORE INFRASTRUCTURE CAPACITY ANALYSIS

**DRAFT**

**JULY 2018**

RPI Consulting LLC

Durango, Colorado

# TABLE OF CONTENTS

# EXECUTIVE SUMMARY

County leadership has been engaged in a land use policy evaluation process aimed at better understanding the impacts of land use and development on key policy focus areas such as energy consumption and climate change, and on core infrastructure such as the landfill and transportation infrastructure. This report focuses on the impact of buildout possible under current land use regulations on the Pitkin County Solid Waste Center (landfill) and on county roads. This report establishes the linkages between the square feet of floor area permitted by current regulations and the impacts on these core facilities.

Many of the most direct impacts on core infrastructure are directly related to the physical volume of development (measured in sq. ft. of floor area) such as volume of construction related solid waste, construction hauling, traffic volume and employees. In the unincorporated areas and in the City of Aspen, buildout includes both new development and redevelopment that results in additional floor area.

County zoning allows up to 15,000 sq. ft. of residential floor area on residential/agricultural parcels in most of the county except for some areas in the Aspen/Pitkin Urban Growth Boundary and a few rural caucus areas where maximum floor area has been reduced. At the maximum sq. ft. allowed under zoning, the 1,267 new units possible under zoning and the 1,700 potential redevelopment sites could result in an additional 32,464,000 sq. ft. of residential floor area in the unincorporated county at buildout.

The county's Growth Management Quota System (GMQS) allows new homes or redeveloped/expanded homes greater than 5,750 sq. ft. only with the purchase of a transferable development right (TDR) for each additional 2,500 sq. ft. or by gaining approval for the additional sq. ft. through the annual GMQS allotment process. The base residential development right of 5,750 sq. ft. of floor area and the maximum sq. ft. allowed by zoning throughout the county are integrated throughout this analysis to establish two buildout scenarios. If homes are built only up to the 5,750 sq. ft. exemption threshold, new units and redevelopment sites could result in an additional 11,574,000 sq. ft. of residential floor area in the unincorporated county at buildout. This is just over one-third of the sq. ft. that would be possible were homes to be built to the maximum sq. ft. allowed under zoning.

The volume (sq. ft.) of additional residential development possible in the residential/agricultural areas of the unincorporated county exceeds the estimated future development potential in Snowmass Village and Aspen. The total residential development buildout potential in Aspen and Snowmass Village combined is about 1.3 million sq. ft. and the lodging and commercial development buildout potential is about 1 million sq. ft. combined. While the buildout potential sq. ft. and construction related impacts are projected to be significantly lower in the municipalities compared to the unincorporated county, commercial zones and planned developments are the location of future commercial

and lodging development. Non-residential development adds significantly to ongoing demand on facilities generated by employees and overnight visitors.

Impacts are viewed from two perspectives: construction impacts and post-construction impacts related to the occupancy of the development. Construction related impacts on the landfill are directly linked to the volume (sq. ft.) of construction.

Completing the 34.8 million sq. ft. of construction possible in the unincorporated county with homes built to the maximum allowed under zoning, and including all buildout in Aspen and Snowmass Village, will generate an estimated 3.4 million cubic yards of construction-related waste (see Figure 27). This 3.4 million cubic yards of solid waste would exceed the landfill's current remaining capacity plus the planned 900,000 cubic yard northern expansion by 1.3 million cubic yards. Completing the 13.9 million sq. ft. of construction possible with unincorporated county residential units built up to 5,750 sq. ft., will generate an estimated 1.3 million cubic yards of construction-related waste. The 1.3 million cubic yards of solid waste would exceed the landfill's current remaining capacity.

The hauling of materials to construction sites in the unincorporated county and the hauling of construction solid waste away from the sites creates direct construction related impacts on county roads. Load equivalency metrics, such as equivalent single axle loads (ESAL) establish a relative measure of the impacts of different loadings on roads, making it especially suited for measuring the impact of commercial truck traffic. Completing the 32.5 million sq. ft. of residential construction possible in the unincorporated county with homes built to the maximum allowed under zoning will generate an estimated one million ESALs on county roads. Given that the typical paved rural county road can handle up to 300,000 ESALs in its lifespan, one million ESALs is enough loading to consume three typical county roads from new condition to the point where they would need to be rebuilt. Completing the 11.6 million sq. ft. of residential construction possible in the unincorporated county with unincorporated county residential units built up to 5,750 sq. ft. will generate an estimated 360,000 ESALs.

Once development is occupied by people in various capacities (residents, part-time residents, employee-commuters, overnight visitors, customers), on-going impacts will accrue including "municipal waste" or day-to-day trash in the landfill. The 4,400 combined residents, part-time residents, employee-commuters and overnight visitors who occupy the additional residential and non-residential development possible at buildout will generate over 10,000 cubic yards of municipal waste each year.

The occupants of future potential county residential units will add 44,140 vehicle miles traveled on county roads, representing about a 50% increase over the 87,660 VMT the Transportation Impact Fee Support Study forecasts for 2019.

# BUILDOUT STUDY

The buildout study estimates how much development in various land use categories could occur given the current land use regulations and inventory of approved but unbuilt development. The buildout study includes unincorporated Pitkin County, City of Aspen and Snowmass Village. Because redevelopment is prevalent in the City of Aspen and in unincorporated Pitkin County, this study provides an estimate of both new development on currently undeveloped land and redevelopment of properties that already contain structures. The land use categories include residential, lodging and commercial development. Property owned by public entities and charitable organizations was not included in this study.

**Figure 1** – Components of the Buildout Study

# UNINCORPORATED PITKIN COUNTY

## RESIDENTIAL BUILDOUT

The residential buildout analysis is a summary of two buildout analyses performed by Pitkin County Staff.

- **New Development:** A 2014 residential buildout GIS-based study estimated the number of units possible under current zoning including development of vacant parcels and by theoretical subdivisions of unincorporated lands. This analysis uses Likely Buildout which is 60% of maximum buildout.
- **Redevelopment:** A 2018 residential redevelopment GIS-based study that estimated how much sq. ft. could be added to each home up to the 5,750 sq. ft. exemption threshold, how much additional sq. ft. possible under existing zoning and the number of transferable development rights such expansion would require. Note: the Frying Pan area was not included in this analysis.

The new development buildout analysis estimated likely buildout of 1,267 additional residential units in the rural caucus areas and 53 additional units within the Aspen/Pitkin Urban Growth Boundary (U.G.B.). The aggregate sq. ft. of these units was estimated by multiplying the maximum sq. ft. allowed by zoning in each area for a total of about 16.4 million sq. ft. About 7.6 million of sq. ft. are possible with up to 5,750 sq. ft. per dwelling.

**Figure 2** – Likely Additional Unincorporated County Residential Units at Buildout

| Planning Area | Existing Residential Units | Likely Additional Residential Units |
|---|---|---|
| **Rural Pitkin** | **2,139** | **1,267** |
| **Brush Wildcat** | 51 | 80 |
| **Crystal** | 435 | 351 |
| **East of Aspen/Ind** | 63 | 50 |
| **Emma** | 172 | 53 |
| **Frying Pan** | 95 | 81 |
| **Gap** (4) | 350 | 109 |
| **Owl Creek** | 57 | 83 |
| **Maroon/Castle** | 128 | 83 |
| **Snow/Cap** | 349 | 328 |
| **Woody Creek** | 439 | 49 |
| **UGB** | **1,155** | **53** |

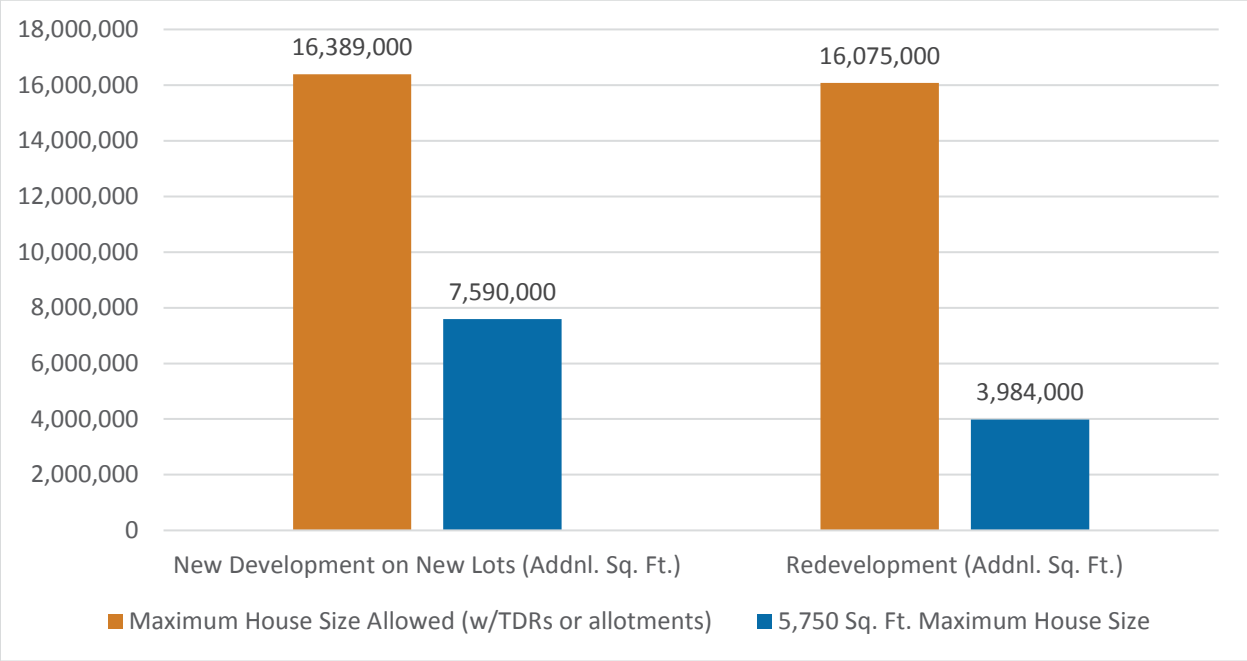
Source: Pitkin County Community Development

The redevelopment buildout analysis included 1,700 potential redevelopment properties in areas where transferable development rights (TDRs) can be 'landed' for building larger than 5,750 sq. ft. Calculations were performed on each parcel to estimate the difference between the sq. ft. that exists today and how much more is possible under zoning and up to

5,750 sq. ft. The parcel specific results were summarized in aggregate to show that over 16 million additional sq. ft. are possible under current zoning and just under 4 million of additional exempt sq. ft. are possible with up to 5,750 sq. ft. per dwelling.

In total, about 32.4 million of sq. ft. are possible when combining both new and redevelopment at maximum sq. ft. allowed under zoning. Altogether, 11.6 million sq. ft. of additional exempt development with up to 5,750 sq. ft. is possible, combining both new and redevelopment.

**Figure 3** – Unincorporated Residential Sq. Ft. Maximum Allowable House Size Under Zoning vs. 5,750 Sq. Ft. Maximum House Size

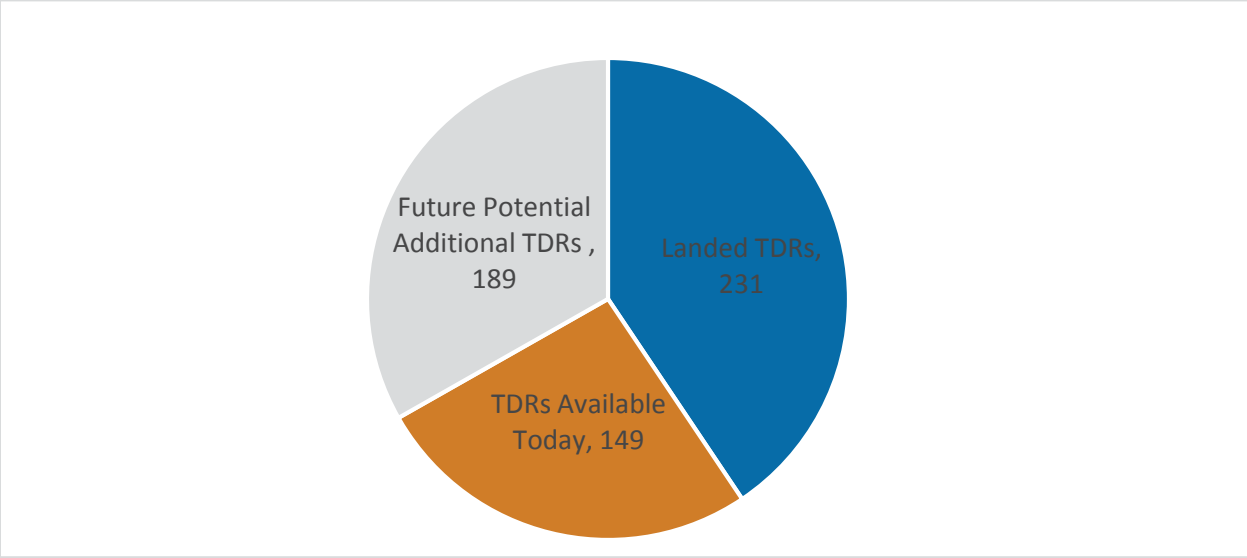



Source: Pitkin County Community Development and GIS, Unincorporated Buildout Studies 2014 and 2018

Ninety-six percent (96%) of the future residential sq. ft. would occur in the unincorporated rural areas. The UGB showed 99 redevelopment projects compared to 1,600 in the rural areas. There are only 53 new units likely in the UGB while there are 1,267 new units likely in the rural areas.

So far, 231 TDRs have landed, mostly for additional sq. ft. beyond 5,750 sq. ft. Another 149 TDRs exist that have not landed and could be available. An additional 189 TDRs could be created in the Rural and Remote Zone District for a total of 338 existing and potential TDRs. These 338 TDRs could be used to permit an additional 850,000 sq. ft. beyond 5,750 sq. ft.

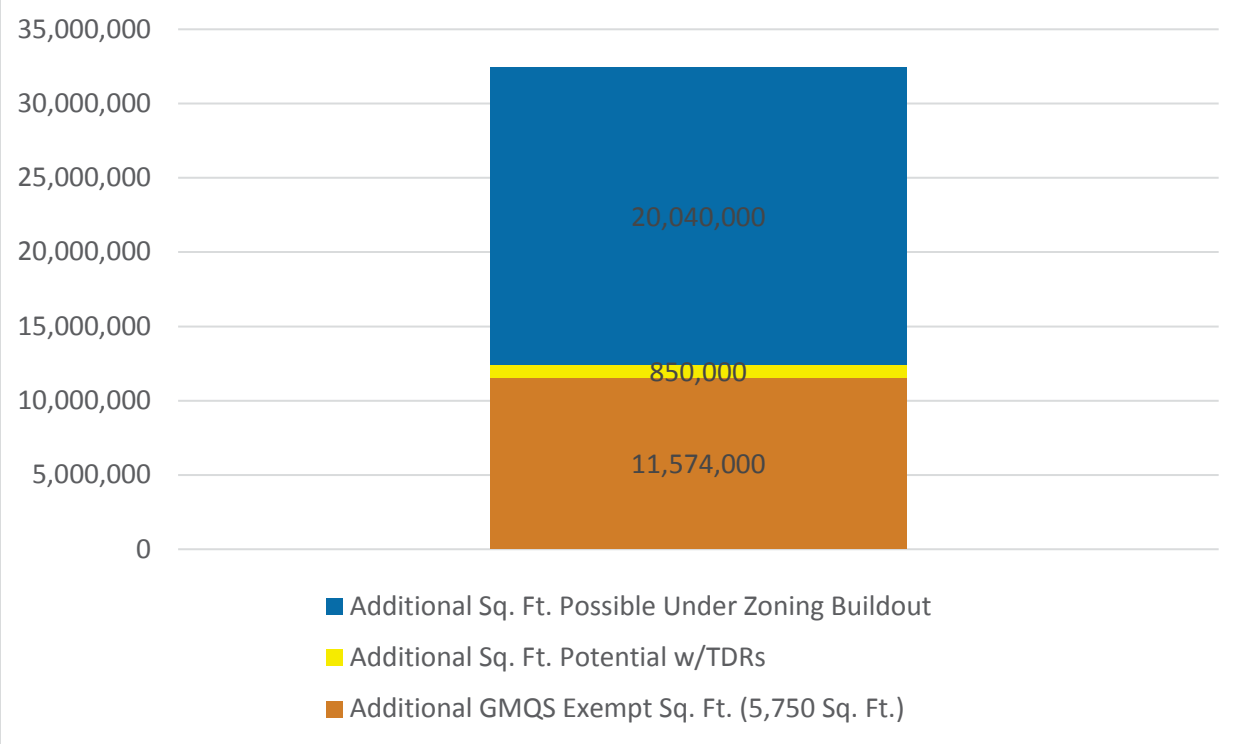
**Figure 4** – TDRs Inventory and Status




Source: Pitkin County Community Development TDR Inventory 2018

After accounting for the 11.6 million sq. ft. of exempt floor area and the additional 850,000 sq. ft. possible with the likely inventory of TDRs, there is over 20 million sq. ft. of floor area possible under zoning remaining. Under today's GMQS, the only way that this 20 million sq. ft. could be permitted is by approval through the annual GMQS allotment process.

**Figure 5** – Pitkin County Unincorporated Residential Sq. Ft. Buildout by GMQS Status




Source: Pitkin County Community Development: Unincorporated Buildout Studies 2014 and 2018, TDR Inventory 2018

Analysis of the Pitkin County Community Development Department TDR inventory and records for ten years from 2005-2014 showed that on average, 19 TDRs are approved for the purpose of expanding floor area each year. The median number of approvals is 15 per year. The 340 TDRs possible including those available and those that could become available should last 18-23 years if the rate of TDR approvals continues. The 149 TDRs that already exist today should last eight to ten years.

**Figure 6** – Transferable Development Right Supply Timeline

| | TDRs | Sq. Ft. Floor Area |
|---|---|---|
| Average Annual TDRs Approved 2005-2014 | 19 | 47,500 |
| Median Annual TDRs Approved 2005-2014 | 15 | 37,500 |
| Remaining Potential TDRs | 340 | 850,000 |
| | **Years** | |
| Years of TDRs Remaining - Average Projection | 18 | |
| Years of TDR - Median Projection | 23 | |

## COUNTY NON-RESIDENTIAL

The unincorporated county possesses limited capacity for future non-residential development. Unincorporated non-residential nodes such as Redstone and Old Snowmass may add sq. ft. over time, but because it is difficult to determine how much and what type, these nodes were not included. Properties classified as exempt by the county were also not included in this analysis.

The most tangible potential for unincorporated non-residential development is in the Airport Business Center (ABC). Two land use inventories were conducted in the ABC show that the ABC expands slowly, by less than 10,000 sq. ft. in 4 years between the inventories.

**Figure 7** – Airport Business Center Inventory Summary 2008 and 2012

| Type | 2008 Inventory Floor Area | 2012 Inventory Floor Area |
|---|---|---|
| **Residential** | 96,534 | 108,006 |
| **Non-Residential** | 416,523 | 413,995 |
| **Total** | 513,057 | 522,001 |

Source – ABC Inventories 2008 and 2012, Pitkin County Community Development by TG Malloy Consulting

Parking and vehicle circulation are the primary constraints on expansion at the ABC. Additionally, there is limited motivation for a building owner to redevelop with tenants already in place. Given these constraints, consultants estimate that over time as buildings in the ABC redevelop, these properties could reasonably expand by about 10% beyond current floor area on average. This means that 52,000 additional sq. ft. could result from redevelopment at the ABC, about 20% of which is projected to be residential floor area and the rest non-residential floor area.

**Figure 8** – Additional Sq. Ft. Possible at the Airport Business Center

| | Variable | Quantity | Formula/Source |
|---|---|---|---|
| **A** | Total Square Feet (2012) | 522,001 | TG Malloy Consulting - ABC 2012 Use Data |
| **B** | Additional Square Feet | 52,000 | C + D |
| **C** | Residential Square Feet | 10,000 | 10% potential buildout applied |
| **D** | Non-Residential Square Feet | 42,000 | 10% potential buildout applied |

# CITY OF ASPEN

Buildout potential changes based on the age and location of the neighborhoods. Most of the development west of Maroon Creek and along Castle Creek Road has been master planned and subsequently developed over the past 25 years. Buildout in the commercial zone districts and historic/older neighborhoods will mostly occur as redevelopment of properties that contain structures today.

## CITY OF ASPEN COMMERCIAL ZONE DISTRICT BUILDOUT

The 2012 Aspen Area Community Plan (2012 AACP) Existing Conditions Report established that the buildout potential of city commercial zone districts is attributable to redevelopment of parcels that already contain buildings. Additional floor will come from demolish and replace projects, remodels/additions and new structures on parcels that can accommodate them.

Many factors combine to determine the floor area after redevelopment including the purpose/design of the building, zoning, historic preservation, parking, lot size/shape, and environmental factors. All these factors come together as development applications are submitted to the city and as they may be awarded development permits for final project design, floor area and uses.

The complex factors that result in additional floor area beyond what exists today, are best represented by examining actual development proposals in the commercial zoning districts. The city tracks the "development pipeline" which includes a set of redevelopment projects in commercial zone districts that have achieved some level of approval but that have not yet been developed. This development pipeline allows a comparison between the building size and uses that are slated to occur and the size of the existing structure(s) according to the county assessor database. Some of the development pipeline projects include historic structures and HPC review/approval. A handful of the projects are older condominiums that are being demolished and replaced with new buildings. These projects deliver a real-world estimate of how much additional building floor area could result from redevelopment.

**Figure 9** – Additional Sq. Ft. of Floor Area from Pending Redevelopment Projects in Aspen Commercial Zones

| Item | Variable | Quantity | Formula/Source |
|---|---|---|---|
| A | Redevelopment Projects (Complete Data) | 24 | City of Aspen Community Development, August 2017 |
| B | Zoning Districts Encompassed by Projects | CC, C-1, MU, L, LP | City of Aspen Community Development, August 2017 |
| C | Sum of Existing Heated Floor Area Existing Before Redevelopment | 334,000 | Pitkin County Assessor Database see Appendix A, January 2018 |
| D | Sum of Planned Gross Floor Area in Redevelopment Projects | 437,000 | City of Aspen Community Development, August 2017 |
| E | Additional Floor Area | 103,000 | D - C |
| F | Aggregate Percent Increase in Floor Area of Redevelopment Projects | 31% | E / C |

The projects in the city development pipeline were filtered down to 24 redevelopment projects encompassing five commercial zone districts. Residential zone projects, public ownership parcels, vacant land development and incomplete/uncertain records were excluded. The total resultant gross floor area of the 24 projects is 437,000 sq. ft. in aggregate according to city development pipeline records. This is 103,000 sq. ft. more than what exists prior to redevelopment according to the county assessor database. The 31% aggregate increase in floor area represents an educated estimate of what is possible for the entirety of city commercial zoned parcels that could still be redeveloped.

There are 3,176,000 sq. ft. of floor area in the commercial zone districts. Multiplying the 31% aggregate increase of the sample redevelopment projects by the existing floor area in the commercial zones yields an estimate of just over one million square feet of additional floor area. This estimate is consistent with the 2012 Aspen Area Community Plan (AACP) Existing Conditions Report buildout study that examined redevelopment in the same zoning districts (1,015,102 sq. ft. floor area). This AACP study was conducted using a parcel by parcel basis whereas this updated analysis is conducted on an aggregate basis. Although several years have elapsed since the AACP study, the consistent results from two methodologies strengthens confidence in the results.

**Figure 10** – Estimated Additional Sq. Ft. from Redevelopment in Aspen Commercial Zones

| Item | Variable | Quantity | Formula/Source |
|---|---|---|---|
| A | Private Ownership Heated Floor Area Sq. Ft. in Commercial Zones | 3,510,000 | Pitkin County Assessor Database, January 2018 |
| B | Aggregate Percent Increase in Floor Area of Redevelopment Projects | 31% | Figure 9, Row F |
| C | Aggregate Estimated Additional Floor Area from Future Redevelopment | 1,088,000 | A * B (rounded to 1000s) |

The one million plus sq. ft. of floor area estimated to result from redevelopment in the commercial zone districts will consist of commercial use, lodging, affordable housing and a limited amount of free market residential. Recent code amendments significantly restrict free market residential development in commercial zones but continues to allow affordable housing, so the use mix was adjusted to reflect these newer zoning regulations. The recent code amendments also encourage lodging development in over half of the zone districts, which is also reflected in the adjusted use mix shown in Figure 11. A significant portion of redevelopment is projected to result in affordable housing (15%) due to required mitigation units, new affordable housing in the mixed-use zone and conversion/redevelopment of free market condominiums into affordable housing units to provide mitigation units.

**Figure 11** – Estimated Use Mix of Redevelopment in Commercial Zone Districts

| | Redevelopment Sample Use Mix | Adjusted Use Mix | Estimated Redevelopment Use Mix Floor Area (sq. ft.) |
|---|---|---|---|
| Commercial | 40% | 40% | 435,200 |
| Lodging | 37% | 40% | 435,200 |
| Free Mkt. Residential | 16% | 5% | 54,400 |
| Affordable Housing | 7% | 15% | 163,200 |

Source: City of Aspen Community Development, August 2017; Pitkin County Assessor.

## CITY OF ASPEN RESIDENTIAL ZONES EAST OF MAROON CREEK

This component of the City of Aspen buildout focuses on the following long-established neighborhoods located east of Maroon Creek: Mountain Valley, Riverside, Cemetery Lane, Aspen Mountain, Meadowood, East End, West End, Shadow Mountain, Main & Mill Streets, Midland and Park. This analysis refers to the total area of these neighborhoods combined as the study area.

The 2012 Aspen Area Community Plan (AACP) correctly focused on the redevelopment potential of these long-established neighborhoods. Redevelopment potential is complex and involves several factors such as the sliding scale zoning floor area ratios, presence of historic structures, parking, parcel configuration, infrastructure availability and environmental constraints. The 2012 AACP residential neighborhood buildout analysis included a site-specific analysis of 50% of the parcels in the neighborhoods and extrapolated the results of the sample to the full inventory of lots in the study area. The analysis established the redevelopment potential of the study area as measured in the additional square footage possible over what was in place at the time of the study.

The physical layout, number of lots and the geographic extent of these neighborhoods has not changed so the information from the AACP study only requires an update, not a complete regeneration of the study. The update addresses the following research questions:

- How much residential development has occurred in the study area since 2008 (the year the AACP residential buildout study was conducted)?

- How much residential development occurred on vacant lots and was not redevelopment?
- How many of the parcels that were identified as potential sites for residential redevelopment have been redeveloped since the 2008 study?
- How many of the parcels that were identified as potential sites for residential redevelopment in the 2008 study have not since been redeveloped and remain potential sites for redevelopment?
- How much additional square footage could occur on the remaining potential redevelopment parcels?
- How many vacant parcels remain and how much additional square footage is possible on those vacant parcels?

The county assessor database shows that 77 residential structures were developed between 2008 and 2017 (Figure 12, line I) and that 35 of those were developed on vacant lots (Figure 12, line G). This means that 42 of the new residential structures were redevelopment projects (Figure 12, line H). Given that the 2008 study identified 236 parcels that were potential redevelopment projects and that 42 of these parcels have since redeveloped, 196 parcels are still potential redevelopment parcels as of year-end 2017.

**Figure 12** – Estimated Number of Vacant Parcels and Potential Residential Redevelopment Parcels in Aspen Residential Zones

| Item | Variable | Quantity | Formula/Source |
|---|---|---|---|
| C | Vacant residential parcels in Study Area in 2008 | 61 | 2008 assessor data (archived from AACP) |
| D | Vacant residential parcels in Study Area in 2017 | 29 | 2017 assessor data |
| E | Parcels that were vacant in 2008 and remained vacant in 2017 | 26 | 2017 assessor data; D - F |
| F | New vacant residential parcels created 2008-2017 | 3 | 2017 assessor data; D - E |
| G | Vacant parcels that were built-on 2008-2017 | 35 | 2017 assessor data; C - E |
| H | Parcels redeveloped 2008-2017 | 42 | 2017 assessor data; I - G |
| I | Parcels with new residences built between 2008 and 2017 | 77 | 2017 assessor data, all residential parcels built between 2008 and 2017 |
| J | Potential residential redevelopment parcels in 2008 | 236 | 2012 AACP |
| K | Potential residential redevelopment parcels in 2017 | 194 | 2017 assessor data; J - H (in Table 1) |

Sources: 2012 Aspen Area Community Plan Existing Conditions Report, Pitkin County Assessor

The AACP residential buildout study estimated that redevelopment of the 236 parcels would result in 575,620 sq. ft. of additional floor area. This means that on average, each parcel that is redeveloped results in 2,439 sq. ft. of additional floor area beyond what exists prior to redevelopment. Multiplying this average additional sq. ft. by the 194 remaining potential redevelopment parcels means that there could be an estimated 473,000 sq. ft. of additional floor area in aggregate due to future redevelopment in this study area.

**Figure 13** – Estimated Additional Residential Floor Area Possible from Redevelopment and Vacant Parcel Development in Aspen Residential Zones

| Item | Variable | Quantity | Formula/Source |
|---|---|---|---|
| M | Estimated additional redevelopment residential sq. ft. | 575,620 | 2012 AACP, provided estimate of SF remaining |
| N | Average additional residential sq. ft. per redevelopment parcel | 2,439 | M / J |
| O | Estimated potential redevelopment residential square feet 2017 | 473,000 | 2012 AACP, 2017 parcel information; N * K (rounded) |
| P | Average sq. ft. of residential structure built since 1990 in study area | 5,500 | 2017 assessor data |
| L | Estimated new residential square feet on remaining vacant parcels | 160,000 | D * P (rounded) |
| M | Total potential new residential square feet | 633,000 | L + O |

According to the county assessor database, the average residential structure built since 1990 in the study area is 5,500 sq. ft., meaning that development of the remaining 26 vacant lots could result in an additional 160,000 sq. ft. of residential floor area. In total, the study area including the ten residential neighborhoods east of Marron Creek in the City of Aspen could be site to 633,000 sq. ft. of additional residential floor area.

## CITY OF ASPEN WEST OF MAROON CREEK AND ALONG CASTLE CREEK ROAD

This area includes several subdivisions, many of which were platted and developed in the past 20 or so years: Aspen Highlands, Burlingame, Marolt Ranch, Maroon Creek Club, Moore Family PUD, Stage Road, and Water Plant Affordable Housing. With the exception of the Highlands Villas affordable housing condominiums and a few other buildings, the structures in this area were all developed starting in 1995 and continuing through 2015. With an inventory of relatively new structures and development approvals that in most cases specify maximum size, future redevelopment that adds square footage will be rare and difficult to predict. A query of the county assessor database showed no vacant lots, in other words, this area has been recently built out.

The most likely future development identified in this area is 81 additional affordable housing units in Burlingame Ranch Phase 2. Given that the average dwelling unit floor area in Burlingame Phase 2 is 1050 sq. ft., this means that there could be about 85,000 sq. ft. of additional residential floor area in Phase 2.

**Figure 14** – Estimated Potential Future Development in Aspen West of Maroon Creek and Including the Castle Creek Road Area

| | |
|---|---|
| Burlingame Ranch Phase 2 Future Units | 81 |
| Average Sq. Ft. of Burlingame Unit | 1,050 |
| Estimated Additional Residential Sq. Ft. | 85,000 |

Source: 2012 ACCP Existing Conditions Report, Pitkin County Assessor Records

The BMC West parcel will also be developed in the future, but there is not enough information available today to determine the type and volume of eventual development on this parcel.

# TOWN OF SNOWMASS VILLAGE BUILDOUT

Most of the recent development in Snowmass Village has been master planned development. The Comprehensive Plan currently in the review process includes a buildout analysis that consists of an inventory of approved but unbuilt development in the town. Town Staff provided a 2018 update of the buildout statistics included in the Comprehensive Plan to include in this analysis. This analysis does not include an inventory or analysis of potential sites and estimated outcomes for future master planned development.

## TOWN OF SNOWMASS VILLAGE RESIDENTIAL BUILDOUT

In 2017, the Town of Snowmass Village compiled a residential buildout analysis that identified existing residential parcels, vacant residential parcels, and remaining buildout potential for existing residential parcels. According to this buildout analysis, single-family residential units in Snowmass Village are 94% built-out. Using the average sq. ft. area of parcels within residential zone districts, the remaining potential sq. ft. for vacant residential parcels was determined. This average sq. ft. area was obtained from the Pitkin County Assessor Database and calculated by residential units built since the year 1990.

The projects in the Town of Snowmass Village's buildout analysis included single-family and multi-family units. The average heated sq. ft. of the single-family parcels within Snowmass Village built since 1990 was 4,500 sq. ft. per parcel. There were 53 identified vacant single-family units in the town of Snowmass Village in 2017 which represent potential buildout projects. The total resultant additional floor area of the 53 parcels is approximately 239,000 sq. ft. This additional floor area represents a likely estimate for vacant single-family residential unit buildout.

Similarly, the potential additional sq. ft. of approved/unbuilt multi-family units were calculated using county assessor data and the Town of Snowmass Village's 2017 buildout analysis. There were 71 identified vacant residential-multi-family units identified in the buildout analysis. The average sq. ft. of existing residential-multi-family units in Snowmass Village is 1,400 sq. ft. per unit. Applying this average sq. ft. to all approved and unbuilt multi-family units gives an estimated additional 99,400 sq. ft. The total additional potential buildout of all vacant single-family lots and unbuilt multi-family residential units is 338,400 sq. ft.

**Figure 15** – Town of Snowmass Village Residential Buildout Analysis

| | Variable | Quantity | Formula/Source |
|---|---|---|---|
| A | Average Sq. Ft. of Residential-Single Family Parcels in Snowmass Village | 4,500 | Pitkin County Assessor Database, 2017; Parcels built 1990 and after |
| B | Average Sq. Ft. of Residential-Multi-Family Units in Snowmass Village | 1,400 | Pitkin County Assessor Database, 2017; Parcels built 1990 and after |
| C | Vacant Residential-Single Family Parcels | 53 | Snowmass Village Planning Department, 2018 |
| D | Approved and Unbuilt Residential Multi-Family Units | 71 | Snowmass Village Planning Department, 2018 |
| E | Potential Additional Sq. Ft. of Residential-Single Family Parcels | 239,000 | A * C |
| F | Potential Additional Sq. Ft. of Residential-Multi-Family Units | 99,400 | B * D |
| G | Total Potential Additional Sq. Ft. of Residential Parcels | 338,400 | E + F |

## TOWN OF SNOWMASS VILLAGE COMMERCIAL BUILDOUT

The Town of Snowmass Village provided a summary of available and existing commercial spaces within three commercial space "nodes." These nodes include: Snowmass Mall, Base Village, and Snowmass Center. Each of these nodes' current and expected leasable commercial sq. ft. is provided in Figure 16. There is currently 214,600 sq. ft. of existing commercial space within these nodes. At full build-out, the Town of Snowmass Village can expect 266,000 sq. ft. of commercial space. The remaining 51,410 sq. ft. of development would be an approximate 24% increase in commercial space.

**Figure 16** – Town of Snowmass Village Commercial Buildout Analysis

| | Variable | Quantity | Formula/Source |
|---|---|---|---|
| A | Snowmass Mall Current Sq. Ft. | 97,661 | TOSV Planning Dept. 2018 |
| B | Snowmass Mall Max. Potential Sq. Ft. | 120,000 | TOSV Planning Dept. 2018 |
| C | Base Village Current Sq. Ft. | 63,089 | TOSV Planning Dept. 2018 |
| D | Base Village Max. Potential Sq. Ft. | 75,000 | TOSV Planning Dept. 2018 |
| E | Snowmass Center Current Sq. Ft. | 53,840 | TOSV Planning Dept. 2018 |
| F | Snowmass Center Max. Potential Sq. Ft. | 71,000 | TOSV Planning Dept. 2018 |

| | | | |
|---|---|---|---|
| G | Total Current Commercial Sq. Ft. | 214,590 | A + C + E |
| H | Max. Potential Commercial Sq. Ft. | 266,000 | B + D + F |
| I | Approved/Unbuilt Commercial Sq. Ft. | 51,410 | H - G |

## TOWN OF SNOWMASS VILLAGE LODGING BUILDOUT

The lodging units included in this buildout study were provided by the Town of Snowmass Village 2018 buildout analysis. This analysis indicated that there are 1,785 existing lodging units and an additional 150 lodging units proposed for future buildout. Provided that all lodging units are 350 sq. ft. on average, the full lodging build-out in Snowmass Village is approximately 677,250 sq. ft.

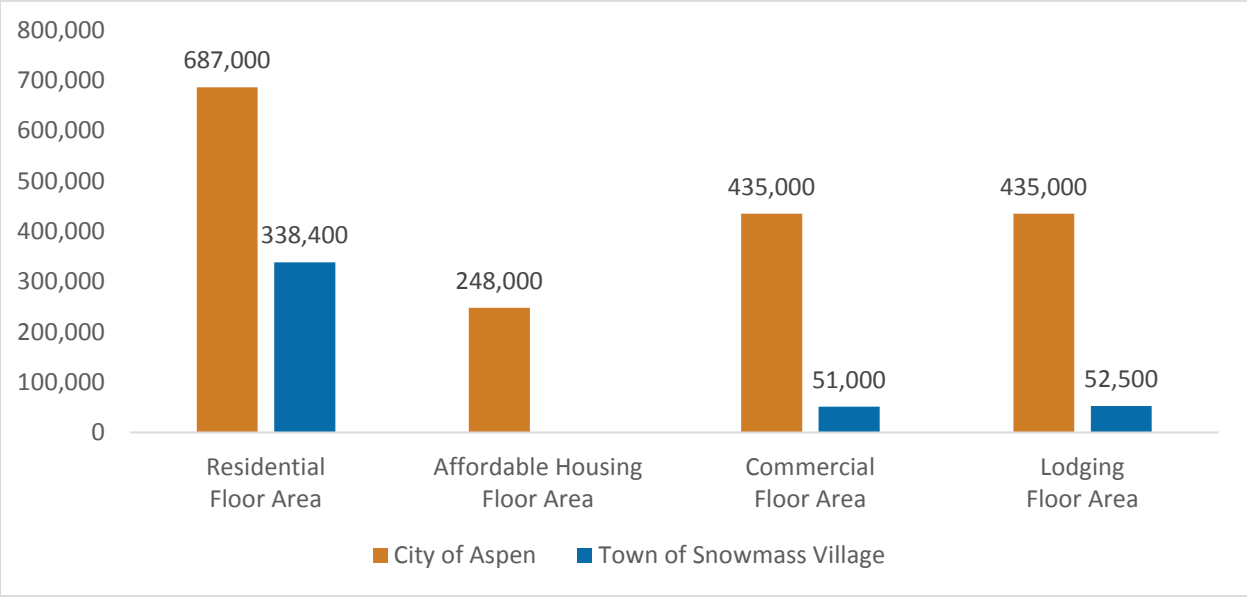
**Figure 17** – Town of Snowmass Village Lodging Buildout Analysis

| Item | Variable | Quantity | Source/Formula |
|---|---|---|---|
| A | Existing Lodging Units | 1,785 | TOSV Planning Dept. 2018 |
| B | Future (Approved/Unbuilt) Lodging Units | 150 | TOSV Planning Dept. 2018 |
| C | Total Future Lodging Units | 1,935 | A + B |
| D | Average Lodging Unit Sq. Ft. | 350 | RPI estimate based on existing lodging unit sq. ft. |
| E | Approximate Existing Lodging Sq. Ft. | 624,750 | A * D |
| F | Approximate Potential Lodging Sq. Ft. | 677,250 | C * D |
| G | Estimated Remaining Lodging Sq. Ft. | 52,500 | F - E |

# ASPEN AND SNOWMASS VILLAGE BUILDOUT SUMMARY

Together Aspen and Snowmass Village are estimated to accommodate just under 1 million sq. ft. of additional commercial and lodging development. Future residential development is estimated to add just under 1.3 million sq. ft.

**Figure 18** – City of Aspen and Town of Snowmass Village Estimated Additional Sq. Ft. Floor Area Buildout

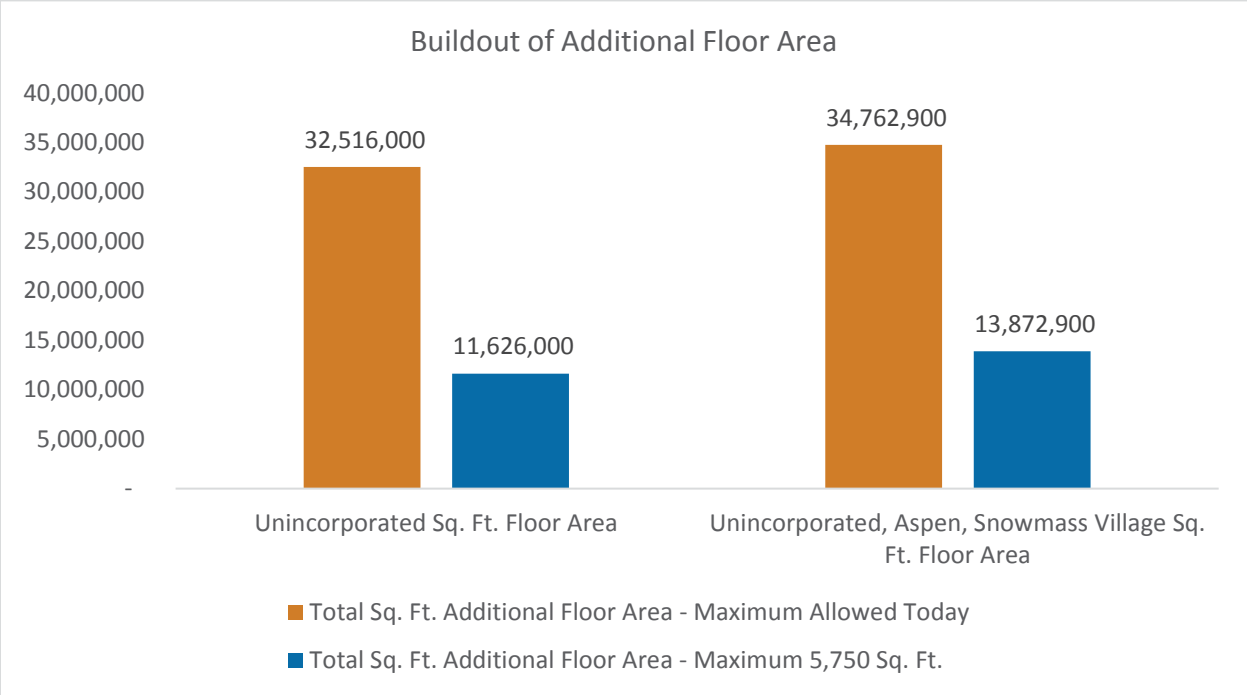



Sources: Summary diagram, see figures above for sources.

## COMBINED BUILDOUT SUMMARY

Buildout for the entire county with unincorporated new residences and redeveloped residences built to the maximum sq. ft. allowed under zoning will total 38.8 million sq. ft. of additional floor area. Altogether, 34.5 million of this potential sq. ft. would occur in the unincorporated county, 93.5% of the total. With new and redeveloped unincorporated county residences built to no more than 5,750 sq. ft., buildout total sq. ft. is drastically lower at around 13.9 million sq. ft.

**Figure 19** – Combined Buildout for Unincorporated County, Aspen and Snowmass Village

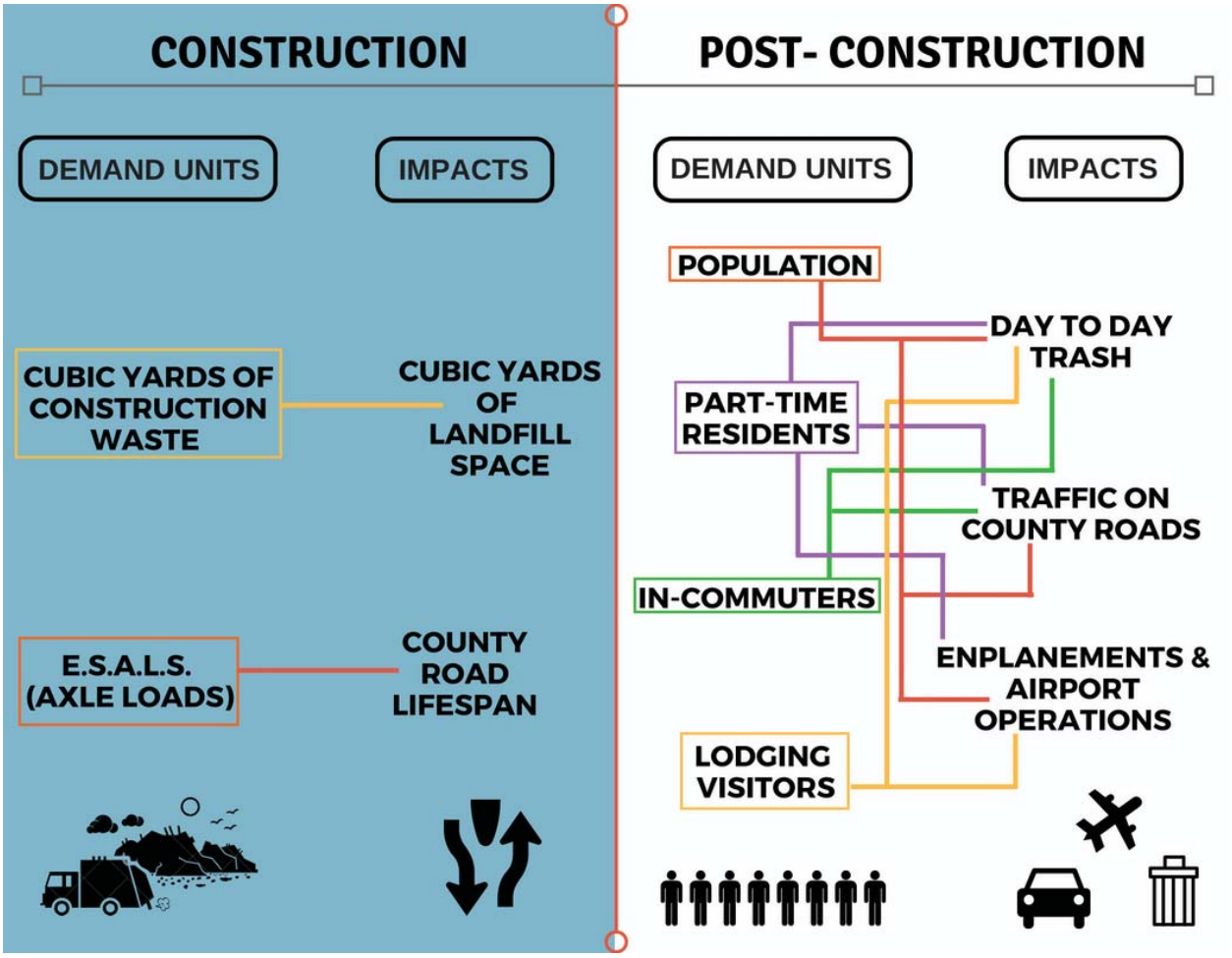



Sources: Summary diagram, see figures above for sources.

# POST-CONSTRUCTION DEMAND UNITS

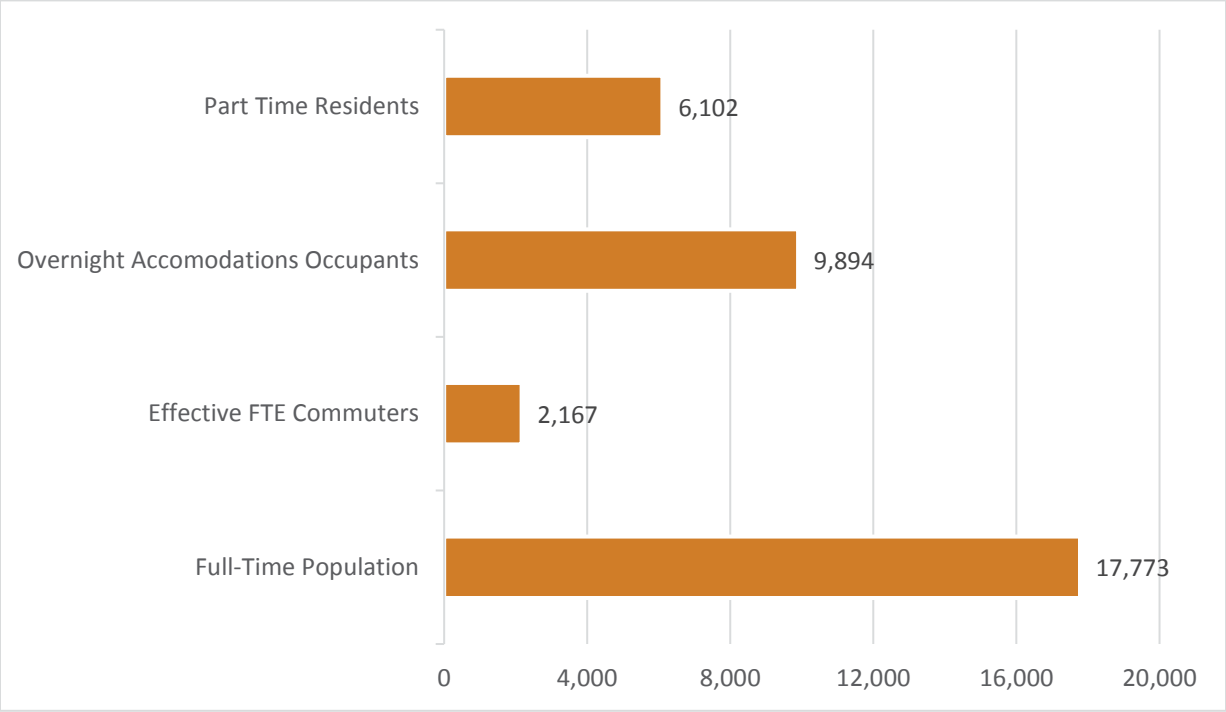
Once development is occupied by people in various capacities (residents, part-time residents, employee-commuters, lodging occupants). These 'demand units' will generate on-going impacts including "municipal waste" or day-to-day trash in the landfill and vehicle miles traveled on county roads.

**Figure 20** – Construction and Post Construction Demand Units




Using census data, employment data from Colorado Department of Local Affairs and Colorado Department of Labor and Employment, survey data from Northwest Colorado Council of Governments (NWCCOG) second home studies, and lodging capacity analysis contained in the 2017 Pitkin County Airport Runway Relocation Environmental Assessment, analysts established the baseline demand units for 2016. Demand units are higher during peak season and lower during off-seasons, but this analysis uses the annual average because infrastructure/facility impacts are viewed annually. There are approximately 36,000 demand units in the county on an annual average basis.

**Figure 21** – Estimated Demand Units 2016 – Annual Average

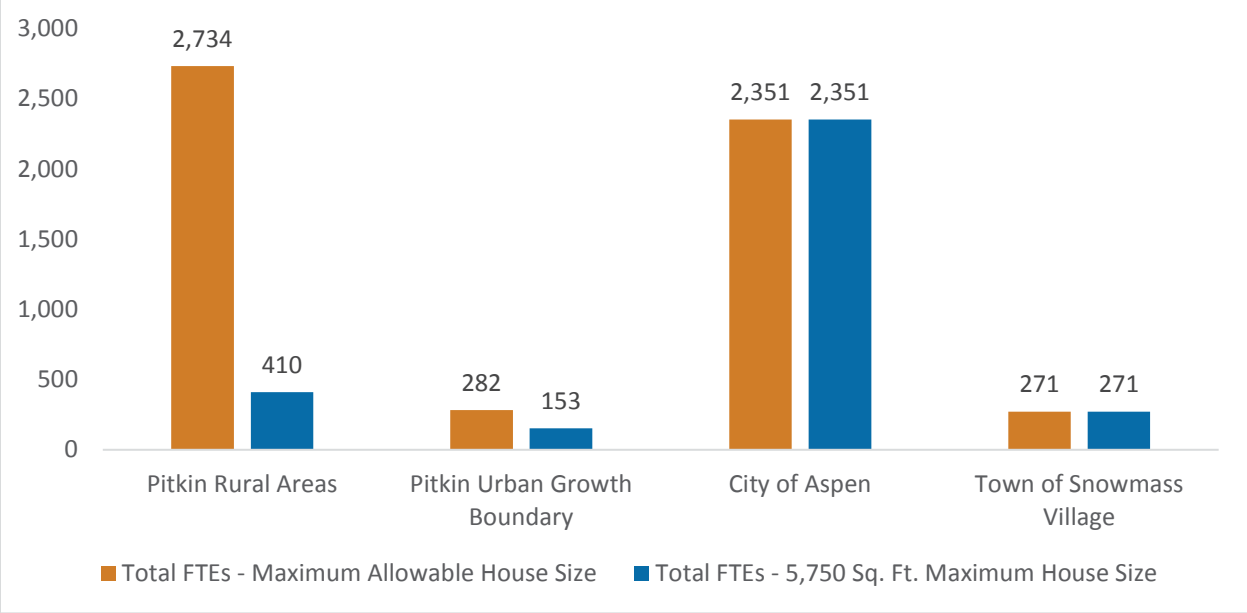



Sources: Pitkin County Land Use Code, U.S. Census, Colorado Department of Local Affairs, Colorado Department of Labor and Employment, Pitkin County Airport Runway Relocation Draft Environmental Assessment 2017 Draft, Aspen Chamber Resort Association, Northwest Colorado Council of Governments

The projected sq. ft. of development possible at buildout was converted to demand units for each land use type to estimate additional demand units at buildout. Employment generation tables in the Pitkin County Land Use Code were consulted to estimate employees generated by future land uses. Because employment increases exponentially with the size of a home in the unincorporated county, full residential buildout allowed under current zoning in the unincorporated county would results in over 3,000 full-time equivalent (FTE) employees but buildout of exempt floor area (up to 5,750 sq. ft.) would result in about 460 FTE employees.

Commercial FTEs and lodging FTEs are also directly related to the estimated additional square footage for these land use types. Estimated additional commercial and lodging development in Aspen and Snowmass Village at buildout is projected to add about 2,700 FTE employees.

**Figure 22** – Full-Time Equivalent Employees Generated by Buildout in Unincorporated County, Aspen and Snowmass




Source: Pitkin County Land Use Code

Effective full-time equivalent commuters were estimated by consulting state employment data to find the total number of jobs filled by commuters and then adjusting this figure to account for the fact that commuters are only present in the county while they are working. One commuter working full-time in Pitkin County represents about one quarter of a demand unit (40 hour workweek divided by168 hours in a week). New homes and redeveloped homes in the unincorporated county built up to 5,750 sq. ft. would add 353 demand units and homes built to the maximum allowed under zoning, commuters would add 624 demand units (includes commercial and lodging employees in the municipalities).

Demand units generated by occupancy of new residential units possible at buildout were estimated using home occupancy rates. Occupancy for full-time residences in Pitkin County is 2.3 people per unit and occupancy for second homes is estimated at 3.6 people per unit based on the City of Aspen Summer Visitor survey results that show the average visitor party size is 3.6 people. The analysis assumes that new residences built in the future will be 50% full-time residences and 50% part-time residences.

Lodging occupants were estimated assuming 500 sq. ft. per lodging unit in Aspen and 350 sq. ft. per lodging unit in Snowmass Village. The overnight accommodations capacity analysis contained in the 2017 Pitkin County Airport Runway Relocation Environmental Assessment showed that the average practical occupancy per lodging unit is 2.6 guests. Lodging occupants were estimated by multiplying the number of units by the practical occupancy per unit.

At buildout of all three jurisdictions and assuming unincorporated residential units will be built to the maximum size allowed under zoning, there will be 4,400 additional demand

units in the county occupying this future potential development in some capacity. Because fewer commuters would be generated if future unincorporated homes and redeveloped homes were built up to 5,750 sq. ft. vs. what is allowed under zoning, 4,100 additional demand units would result (300 less than with homes up the sq. ft. allowed by zoning).

**Figure 23** – Additional Demand Units by Type

| | 2016 Annual Average | Annual Average Additional at Buildout: Max Pitkin House Size | Annual Average Additional at Buildout: 5,750 Sq. Ft. Pitkin House Size |
|---|---|---|---|
| Full-Time Population | 17,773 | 1,708 | 1,708 |
| Effective FTE Commuters | 2,167 | 624 | 353 |
| Overnight Accommodations Occupants | 9,894 | 1,364 | 1,364 |
| Part Time Residents | 6,102 | 658 | 658 |
| **Total (rounded to 100s)** | **35,900** | **4,400** | **4,100** |

Sources: Pitkin County Land Use Code, U.S. Census, Colorado Department of Local Affairs, Colorado Department of Labor and Employment, Pitkin County Airport Runway Relocation Draft Environmental Assessment 2017 Draft, Aspen Chamber Resort Association, Northwest Colorado Council of Governments

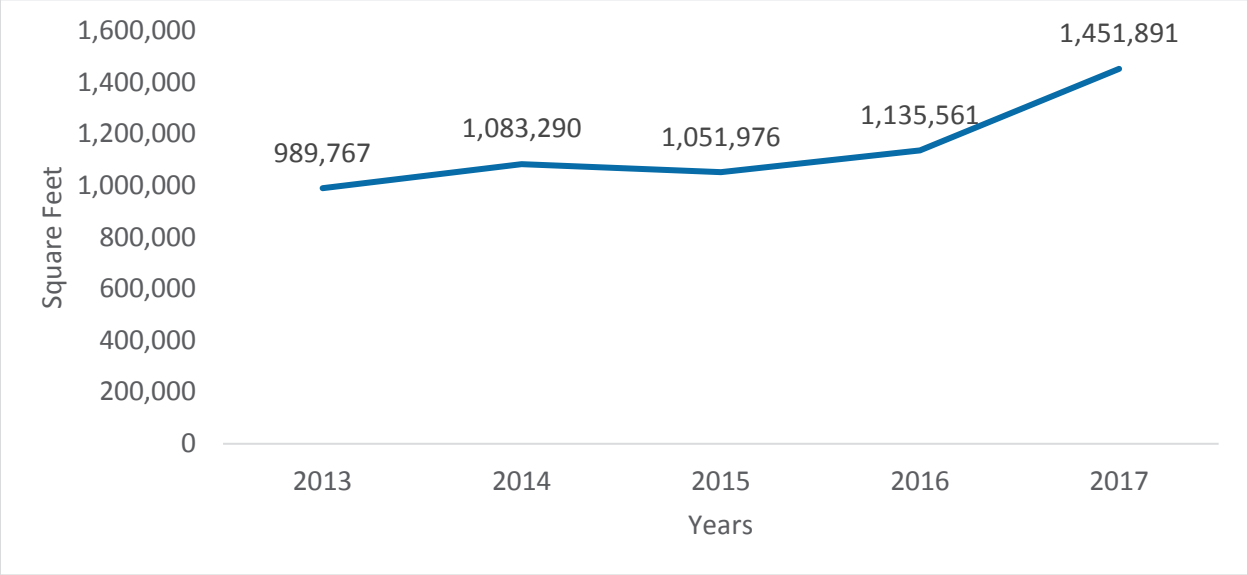
# LANDFILL IMPACT ANALYSIS

Landfill impacts are analyzed from two perspectives: construction-related impacts and post-construction impacts. Construction impacts are directly attributable to constructing the remaining sq. ft. of buildout. Non-construction-related impacts, or post-construction impacts, occur when new occupants who live and work in the newly built sq. ft. create day-to-day waste which is added to the municipal solid waste stream (MSW). Both impact classifications result in diminishing physical capacity at the Pitkin County Solid Waste Center (PCSWC).

## BACKGROUND

Construction as measured in new and additional sq. ft. of floor area per year throughout the county rose by 47% between 2013 to 2017 in unincorporated Pitkin County, the City of Aspen and the Town of Snowmass Village combined (see Figure 24).

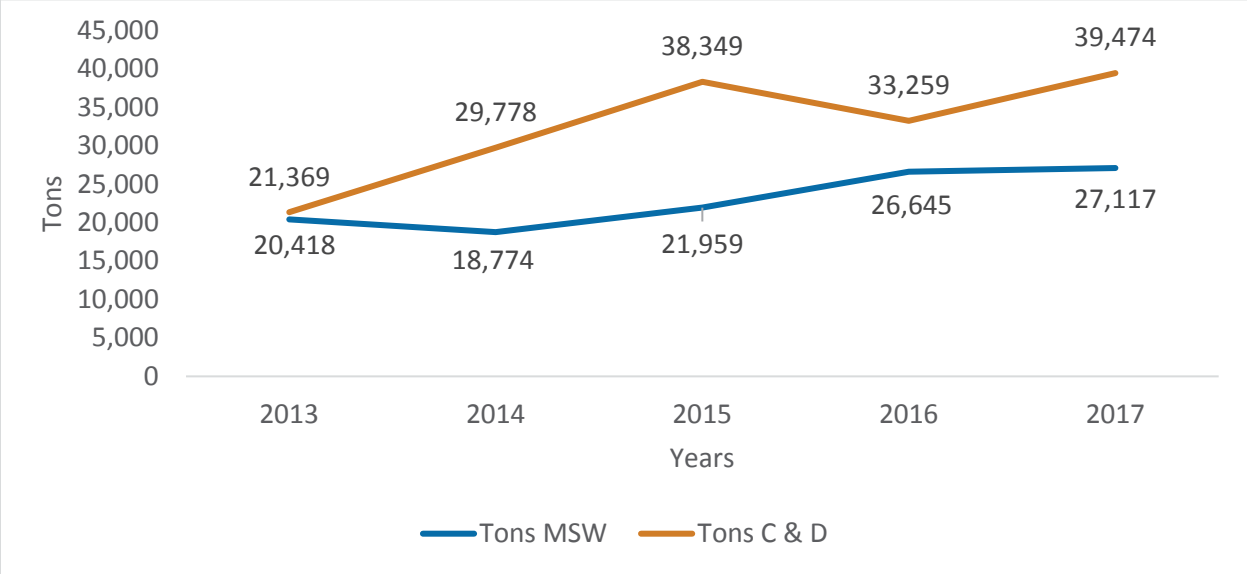
**Figure 24** – Combined (Unincorporated, City of Aspen, Town of Snowmass Village) Historic Estimated New & Additional SQF Built (2013-2017)




Sources: Pitkin County, City Aspen and Town of Snowmass Village building permit reports.

Construction and demolition (C&D) and municipal solid waste (MSW) combined volumes rose 60% during this time. The PCSWC accepted 39,474 tons of C&D waste (131,567 cubic yards) in 2017, an 18% annual increase since 2013 and 85% increase overall. MSW totaled 27,117 tons (90,381 cubic yards) in 2017, an 8% annual increase since 2013 and 33% increase overall. Annual C&D volumes exceeded MSW volumes by an average of 16% throughout this time. Figure 25 shows the volumes collected by waste stream for the study period (2013-2017).

**Figure 25** – Historic C&D and MSW Volumes Collected (2013-2017)




Source: PCSWC 2010-2017 Solid Waste Volume Report

A regression analysis shows a 68% correlation between the sq. ft. built and total C&D volumes collected throughout the study period (see Figure 26). The average weight of construction waste generated, 38 pounds per sq. ft (64 cubic yards per 1,000 sq. ft.) is calculated by applying the correlation coefficient to the annual C&D waste volumes collected and allocating the resulting weight to each square foot of new construction (see Figure 26 ). This figure is then converted to cubic yards.

**Figure 26** – Construction Waste Weight Generated per Square Foot

| | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|
| Total sq. ft. built | 989,767 | 1,083,290 | 1,051,976 | 1,135,561 | 1,451,891 |
| Correlated waste (lbs.) | 28,898,686 | 40,270,216 | 51,861,231 | 44,977,315 | 53,382,352 |
| Pounds of waste per sq. ft. | 29 | 37 | 49 | 40 | 37 |

Source: Pitkin County, City Aspen and Town of Snowmass Village building permit reports, PCSWC 2010-2017 Solid Waste Volume Report

Construction activities also produce cover dirt which is hauled from construction sites to the landfill and used to cover trash. From 2014 to 2017, PCSWC managed 160,080 tons of cover dirt or 65.5 pounds per developed sq. ft (109 cubic yards per 1,000 sq. ft). The impacts of future buildout on the landfill are calculated based on 1,000 sq. ft. of development resulting in 64 cubic yards of C&D waste and 109 cubic yards of cover dirt.

Another direct link exists between added sq. ft. from buildout and diminishing landfill capacity due to post-construction-related activities. Additional sq. ft. from buildout facilitates increased occupancy; more occupants produce greater volumes of MSW (see Demand Units section above). The estimated volume of MSW attributable to the additional occupants is 4.07 pounds per unit, per day.

The remaining capacity at the PCSWC totaled 1,197,000 cubic yards in 2017 (J. Briest, Weaver Consultants Group); impacts of both construction and non-construction-related buildout activities diminish this capacity. Two expansion options will extend the capacity for a relatively finite period given recent trends in waste volumes collected. The northern expansion could add 900,000 cubic yards; the southern expansion could add 18 million cubic yards.

## CONSTRUCTION IMPACT ANALYSIS

Waste generated and hauled to the landfill increases directly proportionate to the volume of construction measured in sq. ft. Because of this proportionate relationship, buildout with homes built up to the maximum sq. ft. allowed under zoning will have a drastically higher impact on the landfill than if future homes are built to the 5,750 sq. ft. GMQS exempt floor area threshold. All other residential and non-residential development buildout estimated in the Aspen and Snowmass Village are included in this analysis to display the full impact.

Completing the 34.8 million sq. ft. of buildout in the unincorporated county, Aspen and Snowmass Village will generate an estimated 3.4 million cubic yards of construction-related waste (see Figure 27).

**Figure 27** –Landfill Impacts with Residential Units Built to Maximum Sq. Ft. Under Zoning

| | |
|---|---|
| Total Buildable SQ. FT. | 34,762,900 |
| Additional C&D Waste (CY) | 2,225,134 |
| Additional Cover Dirt Total (CY) | 1,137,576 |
| Total Additional CY Contributed | 3,373,594 |

Completing the 13.9 million sq. ft. of buildout with unincorporated county residential units up to 5,750 sq. ft. will generate an estimated 1.3 million cubic yards of construction-related waste (see Figure 28).

**Figure 28** – Landfill Impacts with Unincorporated County Residential Units Built to 5,750 sq. ft

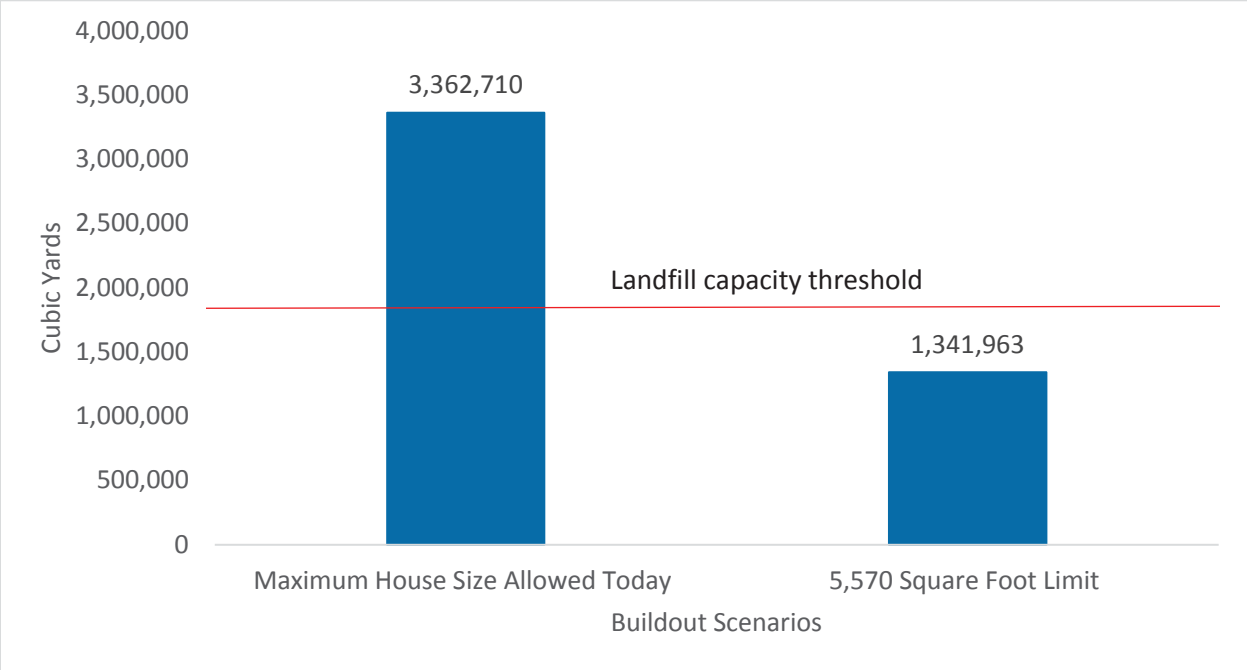
| | |
|---|---|
| Total SQF | 13,872,900 |
| Additional C&D Waste (CY) | 887,989 |
| Additional Cover Dirt Total (CY) | 453,975 |
| Total Additional CY Contributed | 1,341,963 |

With unincorporated residential units built to maximum sq. ft. under zoning, the 3.4 million cubic yards of construction related solid waste generated will exceed the remaining landfill capacity of 1.2 million cubic yards plus the 900,000 cubic yards planned for northern landfill expansion by 1.3 million cubic yards. These estimates include buildout

and construction for all land use types in the unincorporated county, Aspen and Snowmass Village.

Were unincorporated residential units built to the GMQS exemption threshold of 5,750 sq. ft., the 1.3 million cubic yards in construction related solid waste would exceed the current capacity of 1.2 million cubic yards, but would not fill the 900,000 CY planned for northern landfill expansion. In both home size scenarios, landfill capacity will diminish due to construction related solid waste.

**Figure 29** – Construction-Related Waste Volumes Generated by Buildout Scenarios




## POST CONSTRUCTION IMPACT ANALYSIS

Once development is occupied by people in various capacities, or 'demand units' (residents, part-time residents, employee-commuters, lodging occupants) on-going impacts will accrue including "municipal waste" or day-to-day trash in the landfill. The difference in municipal waste generation between building unincorporated county residences to the maximum allowed under zoning vs. up to 5,750 sq. ft. is slight because the only increase in demand units due to the larger homes allowed under zoning would be 300 additional commuter employees. These additional commuters are a result of the fact that in Pitkin County, larger homes employ more people. Over 10,000 cubic yards of additional municipal waste at buildout will accrue each year. Most of the municipal waste will be generated by the estimated additional full-time residents and lodging occupants.

**Figure 30** – Additional Annual Cubic Yards of Municipal Waste (Day-to-Day Trash) at Buildout

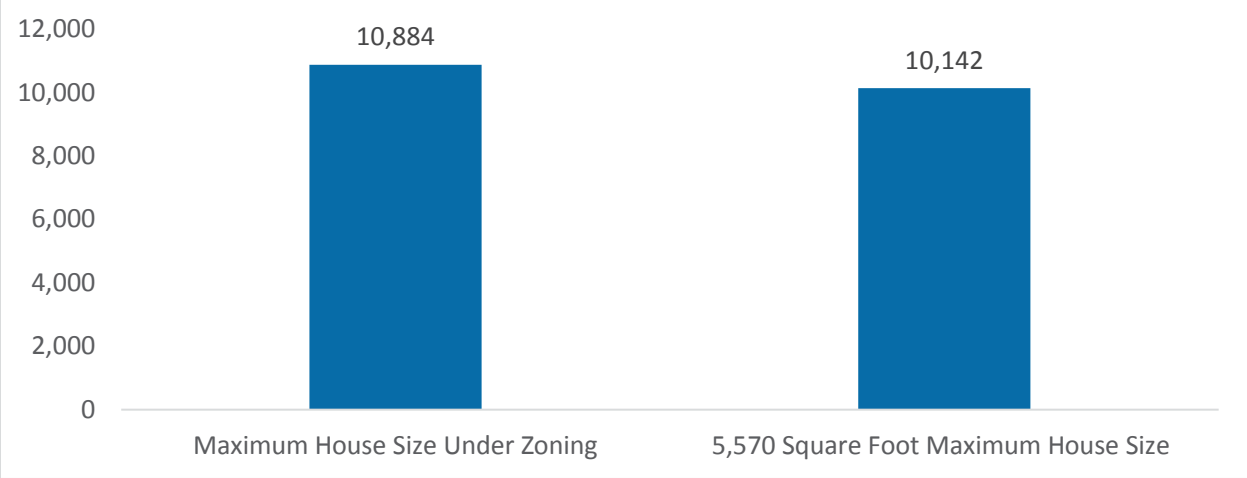
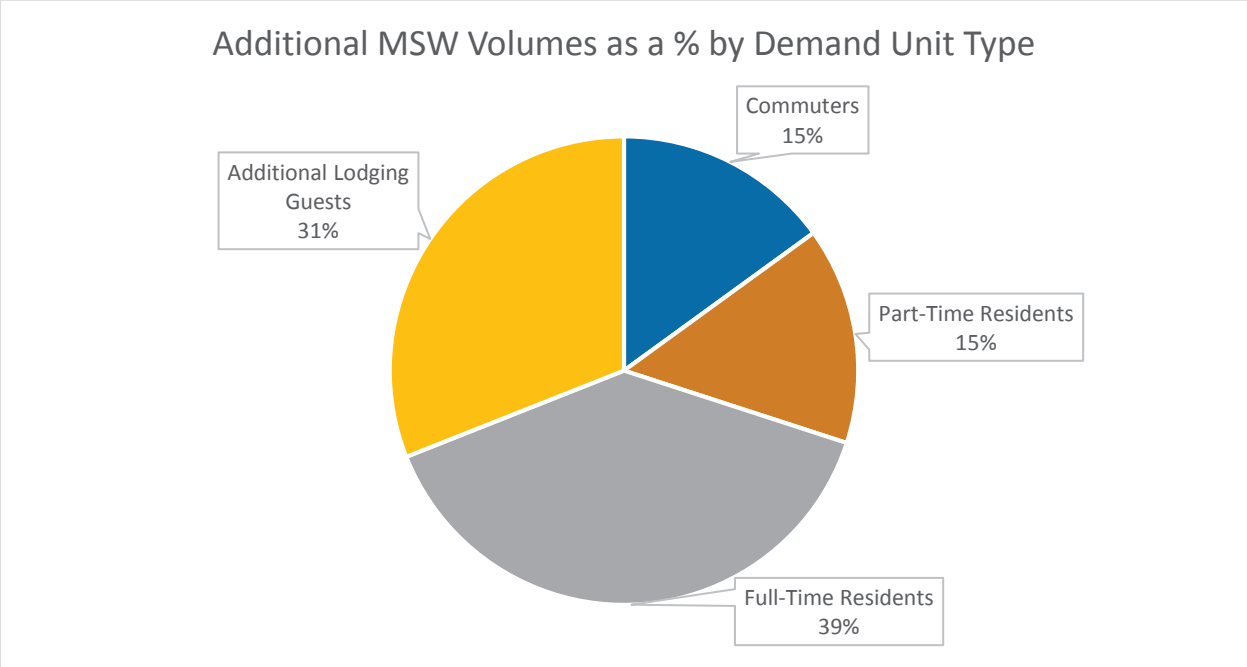



**Figure 31** – Additional MSW Volumes as a % by Demand Unit Type



# COUNTY ROAD IMPACT ANALYSIS

## CONSTRUCTION IMPACT ANALYSIS

The most direct impacts from future buildout on county roads will result from construction related commercial truck hauling to and from homes under construction in the unincorporated county. Hauling occurs throughout construction and includes hauling materials to the site and hauling construction solid waste away from the site. Load equivalency metrics, such as equivalent single axle loads (ESAL) establish a relative measure of the effects of different loadings on road surface, making it especially suited for measuring the impact of commercial truck traffic. By convention, a single pass by one 18,000 pound axle equals 1 ESAL. This means that a vehicle with an ESAL = 3 has 3 times the impact on the road than does a vehicle with and ESAL = 1. Loaded trucks have a far greater impact on any road, for example a loaded semi has 338 times more road impact in one pass than a full-size pickup.

There are three sources of commercial truck traffic hauling: construction materials to site, construction and demolition waste, and dirt and concrete waste. The materials also need to be hauled to the construction site and construction materials for a luxury home weigh significantly more than a typical home. Construction hauling on county roads increases proportionately to the sq. ft. of construction that occurs in the unincorporated county. Unincorporated homes built out to the maximum sq. ft. allowed under zoning would create 623,000 tons of construction and demolition waste hauling, 1 million tons of dirt and concrete waste hauling and 2.8 million tons of construction materials hauled to the site. Unincorporated homes built out to 5,750 sq. ft. would create 222,000 tons of construction and demolition waste, 379,000 tons of dirt and concrete waste hauling and 984,000 tons of construction materials hauled to the site.

This weight was mathematically 'loaded' evenly between two and three axle trucks to calculate the number of passes. The per pass ESAL was calculated assuming that half of the loads are empty and half are full.

**Figure 32** – Axle Loading Metrics

| | 2 Axle Truck | 3 Axle Truck |
|---|---|---|
| Empty Weight (Kips) | 20.0 | 22.6 |
| Max Weight (Kips) | 32.0 | 48.0 |
| Load Weight (Kips) | 12.0 | 25.4 |
| ESAL Per Trip (one pass) | 0.96 | 0.58 |

Sources: AASTO Guide for Design of Pavement Structures, 1993

Completing the 32.5 million sq. ft. of residential construction possible in the unincorporated county with homes built to the maximum allowed under zoning will require an estimated one million ESALs on county roads. Given that the typical paved rural county road can

handle up to 300,000 ESALs in its lifespan, one million ESALs is enough loading to consume three typical paved county roads from new condition to the point where they would need to be rebuilt. Completing the 11.6 million sq. ft. of residential construction possible in the unincorporated county with unincorporated county residential units built up to 5,750 sq. ft. will generate an estimated 360,000 ESALs.

**Figure 33** – ESALs on County Roads by Type of Material – Unincorporated Residential Development Scenarios

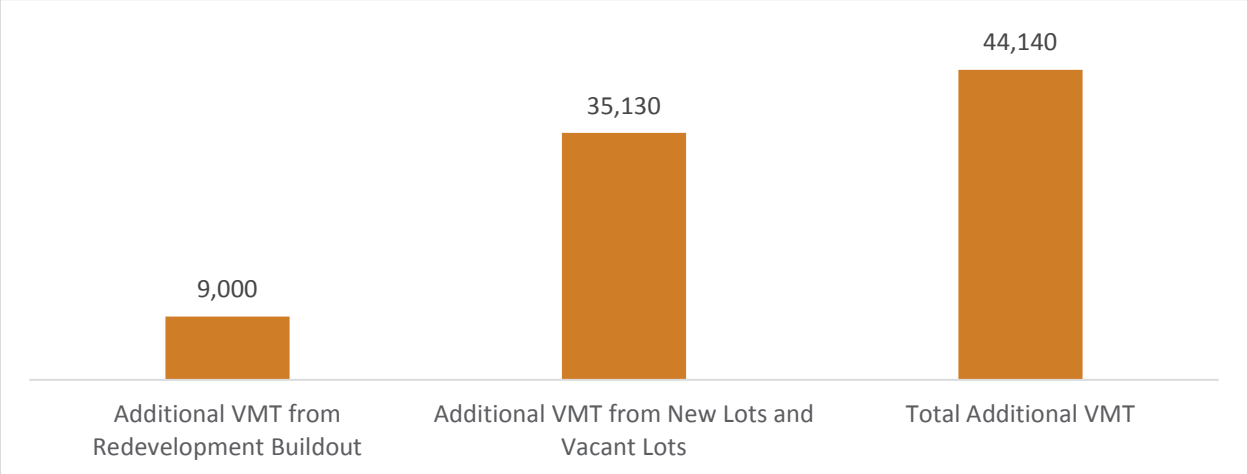
| | Max House Size Allowed | 5,750 SQFT Limit |
|---|---|---|
| Construction Material ESALs | 625,586 | 223,033 |
| C&D Waste ESALs | 141,343 | 50,391 |
| Dirt & Concrete Hauling ESALs | 240,842 | 85,865 |
| Total ESALs | 1,007,772 | 359,289 |

Sources: Construction hauling weights were derived from Land Fill Impact Analysis above, AASTO Guide for Design of Pavement Structures, 1993

## POST CONSTRUCTION IMPACT ANALYSIS

Once occupied, dwelling units in the unincorporated county will have an ongoing impact on the volume of traffic on county roads. The 2008 Transportation Impact Fee Support Study shows that traffic volume measured in average daily vehicle miles traveled increases with the size of the home up to 5,800 sq. ft. This means that there is no known difference between VMTs generated by a 5,750 sq. ft. maximum house size and the maximum allowed under zoning. However, many homes in unincorporated Pitkin County are smaller than 5,750 sq. ft., so redevelopment/expansion contributes about 20% to the additional VMT on county roads. The total of 44,140 VMTs on county roads represents about 50% increase over the 87,660 VMT the Transportation Impact Fee Support Study forecasts for 2019.

**Figure 34** – Additional Average Daily Vehicle Miles Traveled on County Roads Generated by Unincorporated Residential Development Buildout




Sources: Pitkin County Transportation Impact Fee Support Study, Pitkin County Community Development Department Residential Buildout Studies 2014 and 2018