COMMUNITYVIZ SCENARIOS METHODOLOGY

Prepared for the City of Boulder, February 2015

Envision East Arapahoe Corridor Study

placeways

Contents

1.0 Introduction

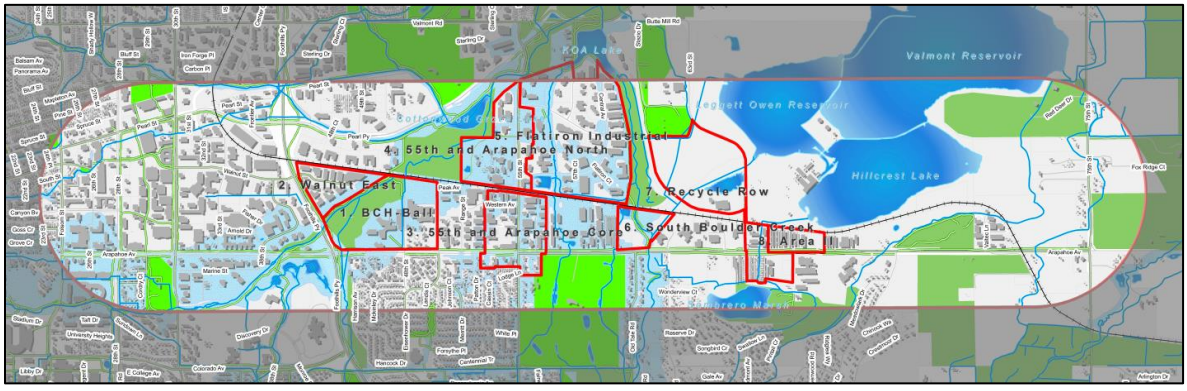
This paper describes the technical process used to analyze scenarios for the Envision East Arapahoe Corridor Study conducted from May through December of 2014. It provides information on the scenarios analyzed and a detailed list of the various indicator measured together with corresponding descriptions and calculation methods. The document provides more technical information behind the results being used in the public process.

This report is organized in 5 sections:

1. Introduction – general report information
2. Scenarios – about the alternative scenarios and analysis developed
3. Indicator Results Summary – results and information on the general dashboard indicators
4. Indicator Dictionary – detailed information about indicators and calculation methods

The study area includes properties as shown in the oval shape in Figure 1. This is approximately from Folsom Avenue on the west to 75th Street on the east. The northern and southern edges run parallel to Arapahoe at approximately ¾ of a mile to the north and ¼ mile to the south.

Figure 1: Study Area Map



2.0 Scenarios

The project looked at three future scenarios using theoretical build-out, maximum development possible given regulations and assumptions based on land ownership, as the timeframe. This section describes both the scenarios and methods used to prepare them.

2.1 Baseline

The first step in creating future scenarios was to establish a baseline analysis. Setting up a baseline analysis is important for understanding what future possibilities exist and where changes are unlikely or already determined. The analysis was built using Boulder County property appraiser parcel boundaries. While this data has a number of useful attributes for understanding baseline, there are several pieces of information that required estimation to work at this level of detail. For example, employment type distribution data was not available on a parcel basis. Instead, sales tax records, which provide business type, were used to estimate a given parcel's employee distribution by job types. This description of current conditions is commonly referred to as a "virtual present" since the data is not a precise reflection of the actual ground condition, but a best estimation of the likely present.

Baseline Analysis Preparation

The model uses several input datasets to estimate a virtual present at the parcel level. Geographic Information Systems (GIS) data was provided to Placeways by City staff between the months of May and August, 2014, including datasets for transportation, property assessment, sales taxes, zoning, open space, environmental resources and hazard areas, building footprints, and lakes and creeks, among others. Additional data was obtained via online sources, including the County of Boulder GIS Department, Denver Regional Council of Governments (DRCOG) Regional Data Catalog, the Denver Regional Transportation District GIS Data Download, and the US Census Bureau American FactFinder and Longitudinal Employer-Household Dynamics (LEHD) data resources.

In the parcel data provided by the City, complexes of condominiums or office/retail tenants were shown as multiple features to represent ownership patterns by address which presented challenges. The shape and existence of these individual features did not align with other datasets (e.g. dwelling unit points) in ways that made translation across layers easy. For the purposes of this model, these features were converted to show a single feature per condominium complex and/or office/retail complex. This allows for better estimation of true land information, such as density, and allows for summaries based on overlapping features. In the case of townhouses, features did have spatial correlation to each dwelling unit point within a development. These were left as provided, but coded with the full development area, including common space, for the purpose of density calculations.

2.2 Future Alternative Scenarios

Three future scenarios were developed:

- **Scenario A: Current Trends** – continuing to develop with current uses carrying forward
- **Scenario B: Districts** – looked at increasing services in strategic locations along the corridor to serve the existing industrial and office uses and substituting a small amount of the employment growth with residential
- **Scenario C: Housing Choices** – explored increasing residential opportunities and supplementing services for office and industrial growth in strategic locations in varying degrees

Scenario Preparation

In 2010, the City of Boulder analyzed employment growth potential for all parts of the City at a parcel level. This included both zoning allowances as well as realistic inputs of likelihood of businesses to redevelop and special projection areas (such as malls, hospitals, etc.). This analysis formed the basis for starting employment growth potential by parcel for all scenarios.

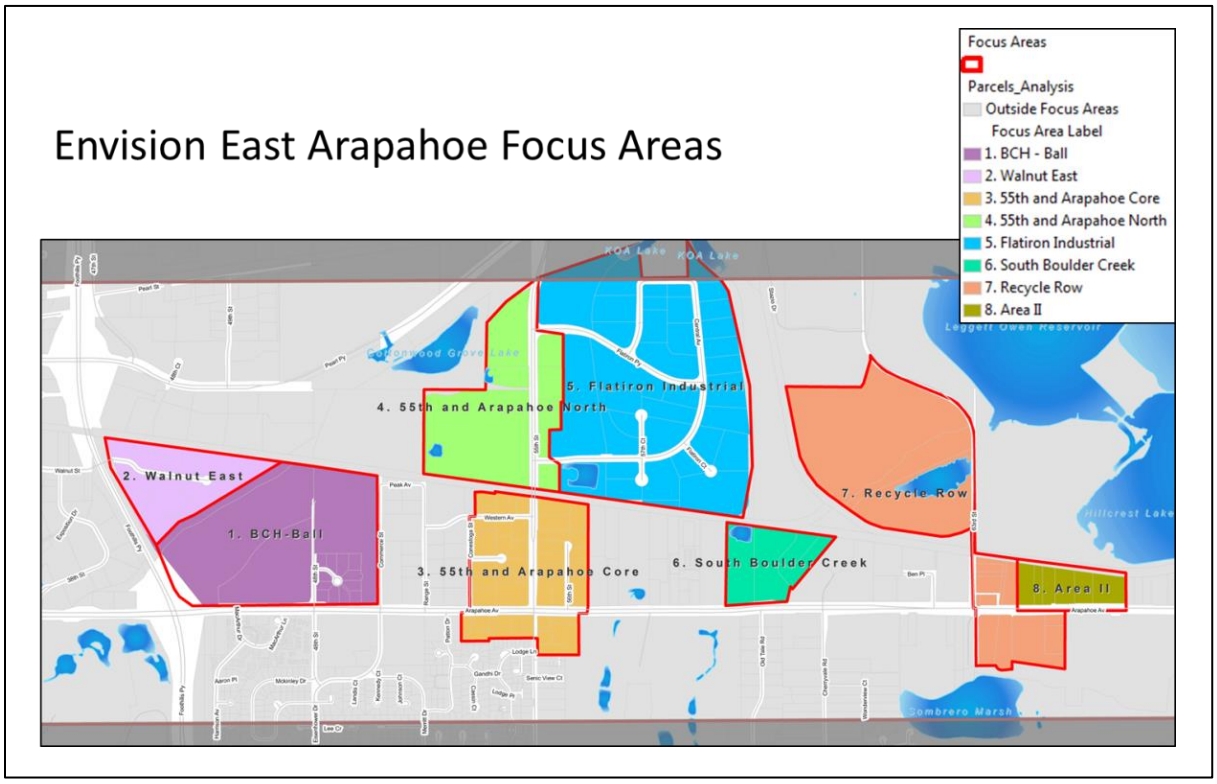
There are several projects currently under development or proposed for various properties in the corridor. A list of properties and development proposed was prepared through research and input from City Staff. This list became an overlay layer in the model and was treated as a constant for all scenarios.

The City also provided a list of "givens" for all scenarios which represents consistent treatment across all scenarios. This included things like BCH hospital expansion, existing stable residential neighborhoods, and the golf course becoming a community amenity with flood management on the south side.

New network links and new connections were addressed in a previous plan, the East Arapahoe Transportation Network Plan dated March 2004. For the purposes of the scenarios, all links and connections were carried forward as shown in this plan.

With all of this previous analysis taken into consideration, the areas in the corridor for scenario variation was narrowed to several strategic "focus areas." The focus areas for this potential change were chosen based on input from the project's outreach process and analysis around potential transportation opportunity areas, such as 55th and Arapahoe and the area east of the Boulder Community Health (BCH) Foothills campus. Figure 2 shows a map of the focus areas:

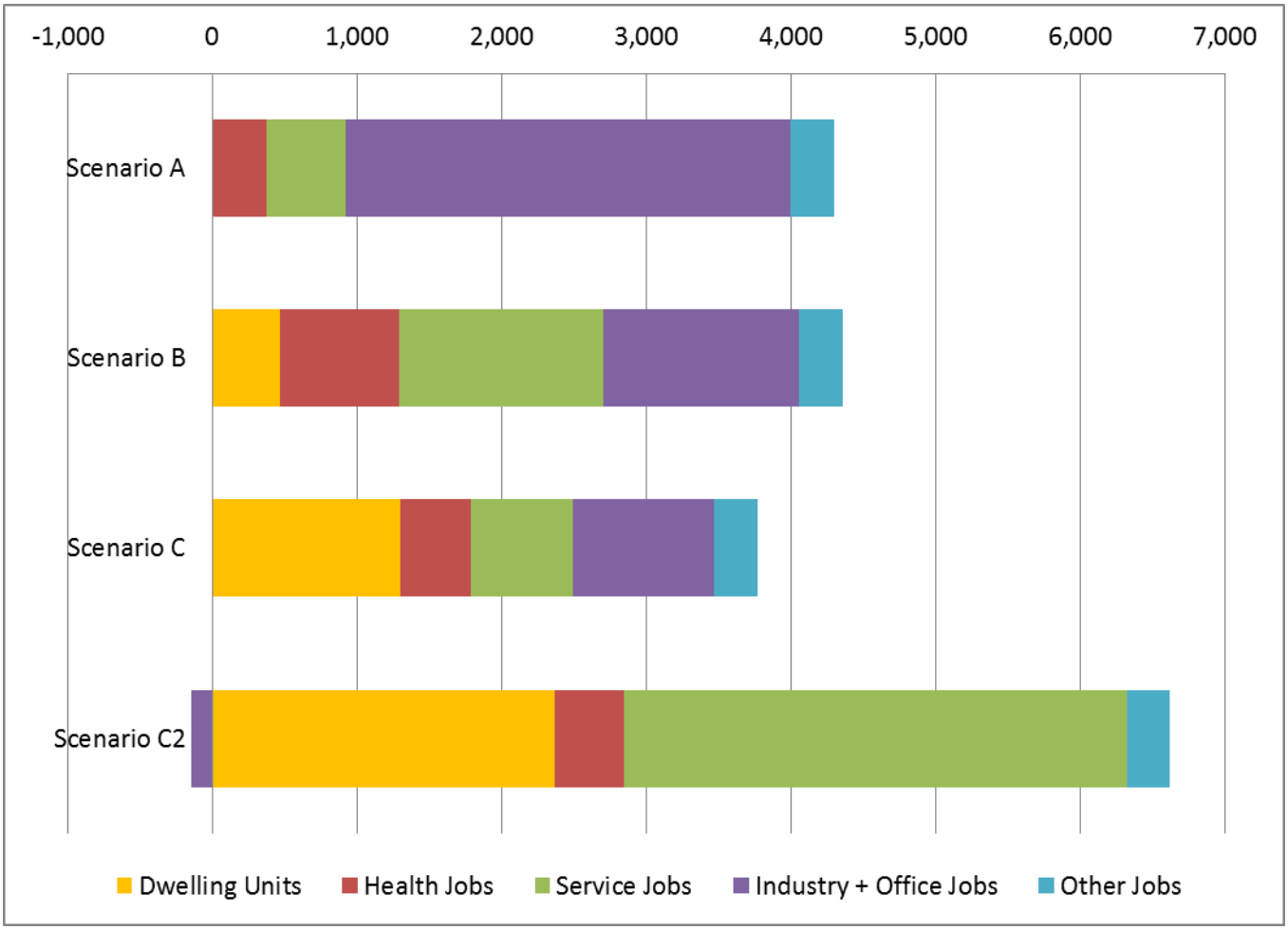
Figure 2: Focus Areas Map



Each scenario explored different use mixes in the focus areas to see what effect this could have on moving toward identified goals. Portions of the corridor that are outside of the focus areas were assumed to be the same across all scenarios.

The changes in added jobs and housing units within the focus areas by type is illustrated in the following chart:

Figure 3: Comparison of Scenario Employees and Dwelling Units Added to Focus Areas



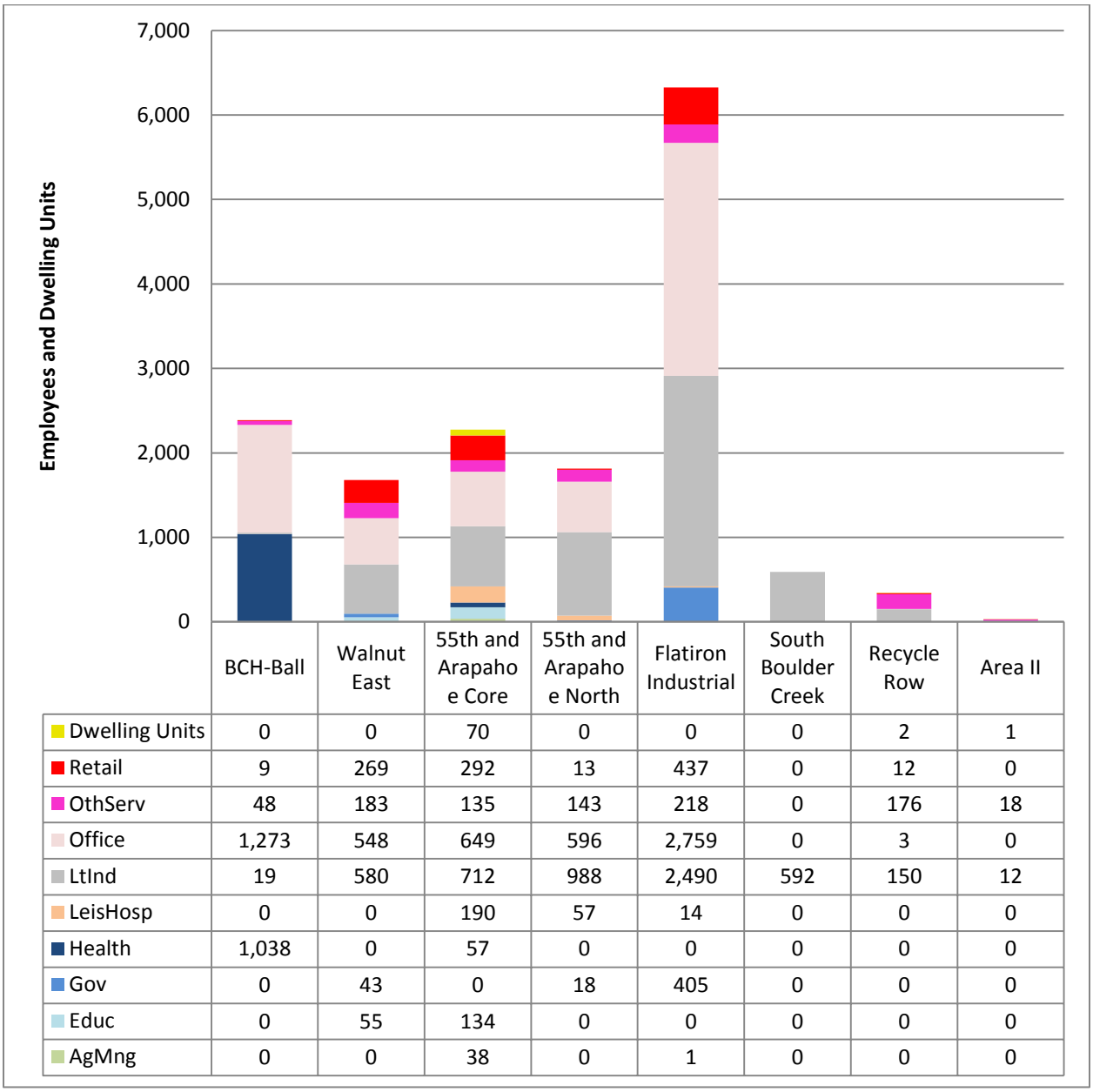
	Scenario A	Scenario B	Scenario C	Scenario C2
Dwelling Units	0	464	1,301	2,364
Health Jobs	376	825	482	482
Service Jobs	544	1,417	713	3,478
Industry + Office Jobs	3,080	1,351	975	-145
Other Jobs	299	299	299	299

2.2-A: Current Trends

The Current Trends scenario looked at the corridor growing in a similar fashion to its current makeup. The only residential growth in this scenario occurred in areas that were already approved or under review for growth areas, such as Boulder Junction. Stable residential neighborhoods remained as they are currently developed. Employment growth was set to the projection amounts from the City analysis previously described in the Scenario Preparation

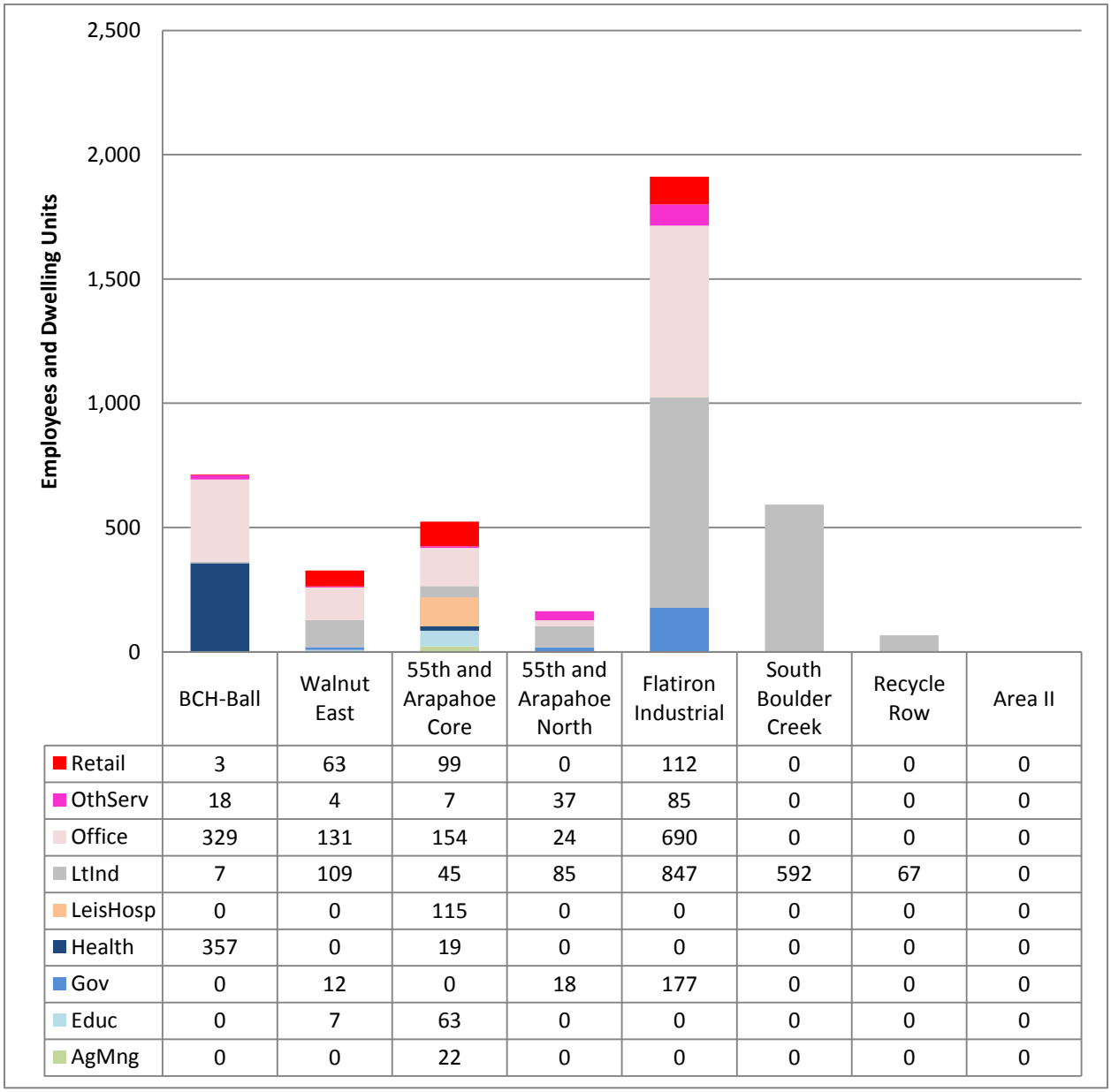
section. Employees were assigned job types by carrying today's distribution of jobs forward. For example, if a parcel was 40% Office, 55% Industrial and 5% Retail today, then the new employees assigned to that parcel were divided into these same job types by their respective percentages. The distribution of uses existing and added in focus areas are displayed in the following charts.

Figure 4: Existing Use Mix by Focus Area



	BCH-Ball	Walnut East	55th and Arapahoe Core	55th and Arapahoe North	Flatiron Industrial	South Boulder Creek	Recycle Row	Area II
Dwelling Units	0	0	70	0	0	0	2	1
Retail	9	269	292	13	437	0	12	0
OthServ	48	183	135	143	218	0	176	18
Office	1,273	548	649	596	2,759	0	3	0
LtInd	19	580	712	988	2,490	592	150	12
LeisHosp	0	0	190	57	14	0	0	0
Health	1,038	0	57	0	0	0	0	0
Gov	0	43	0	18	405	0	0	0
Educ	0	55	134	0	0	0	0	0
AgMng	0	0	38	0	1	0	0	0

Figure 5: Added Uses by Focus Area in Scenario A



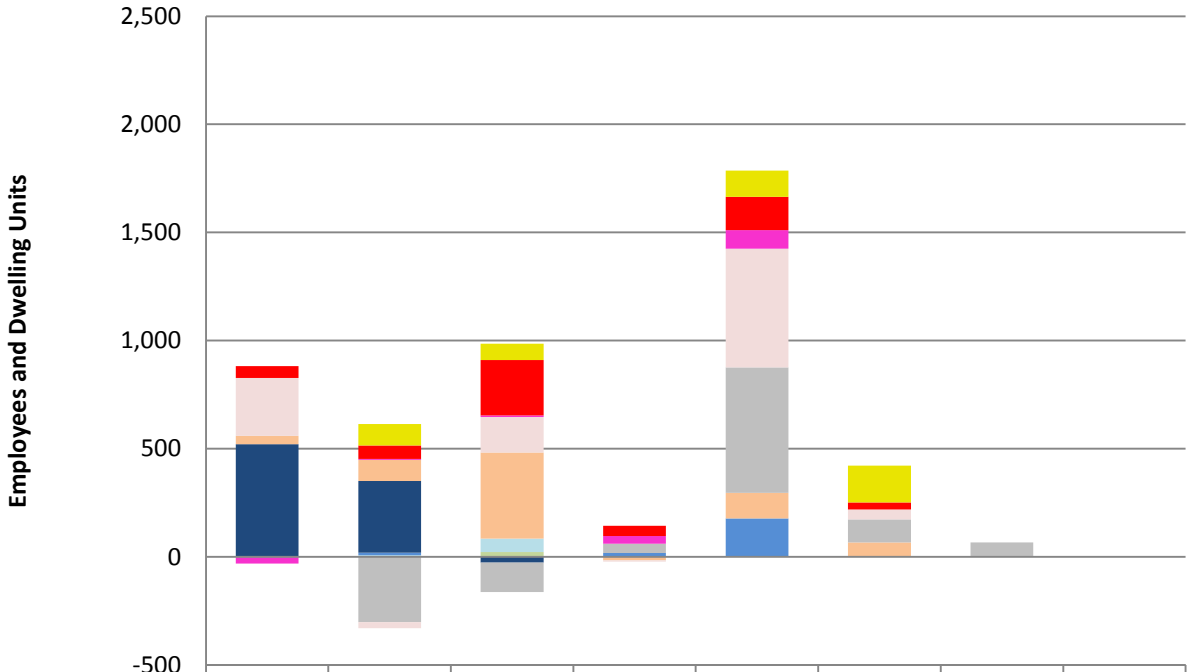
	BCH-Ball	Walnut East	55th and Arapahoe Core	55th and Arapahoe North	Flatiron Industrial	South Boulder Creek	Recycle Row	Area II
Retail	3	63	99	0	112	0	0	0
OthServ	18	4	7	37	85	0	0	0
Office	329	131	154	24	690	0	0	0
LtInd	7	109	45	85	847	592	67	0
LeisHosp	0	0	115	0	0	0	0	0
Health	357	0	19	0	0	0	0	0
Gov	0	12	0	18	177	0	0	0
Educ	0	7	63	0	0	0	0	0
AgMng	0	0	22	0	0	0	0	0

2.2-B: Districts

Scenario B looked at providing additional services to the strategic focus areas of the corridor that are currently predominately office and industrial employment areas. Outside of these focus areas, Scenario B was consistent with the changes in Scenario A.

This scenario also looked at extending 48th Street into Walnut East (focus area 2), providing a roadway connection between Arapahoe and Walnut east of Foothills.

Figure 6: Added Uses by Focus Area in Scenario B

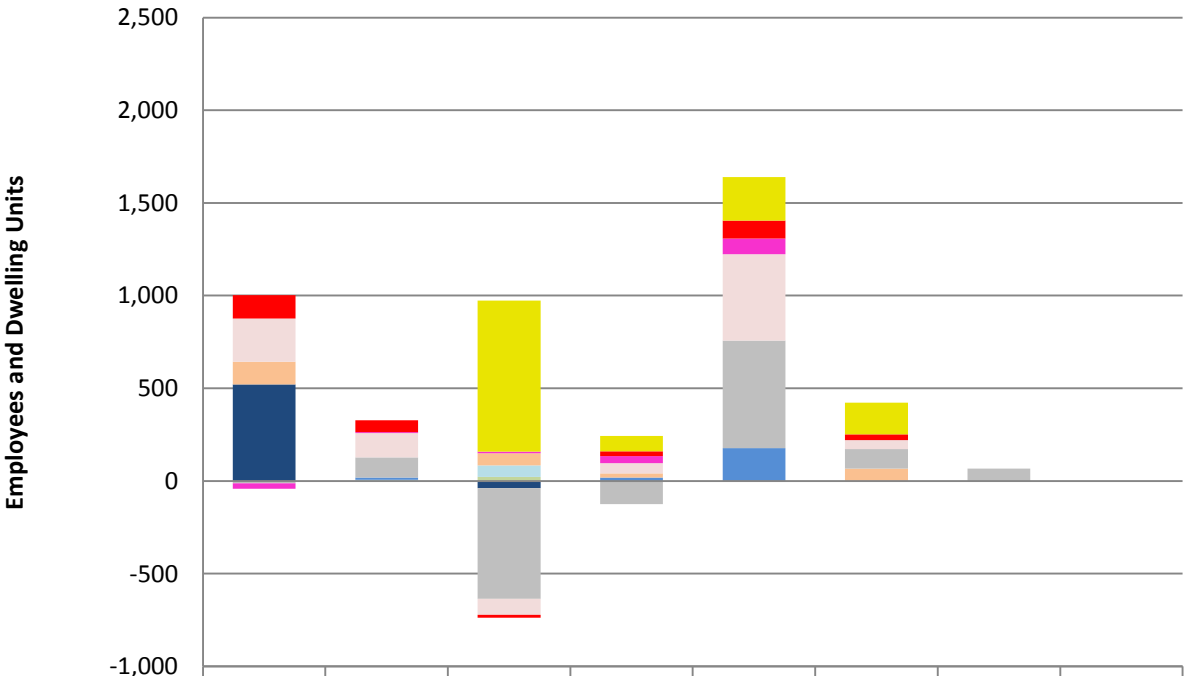


	BCH-Ball	Walnut East	55th and Arapahoe Core	55th and Arapahoe North	Flatiron Industrial	South Boulder Creek	Recycle Row	Area II
Dwelling Units	0	99	75	0	120	170	0	0
Retail	56	63	257	47	155	33	0	0
OthServ	-30	4	7	37	85	0	0	0
Office	266	-29	164	-6	550	47	0	0
LtInd	-1	-301	-135	42	579	107	67	0
LeisHosp	40	97	397	-16	119	66	0	0
Health	520	331	-27	0	0	0	0	0
Gov	0	12	0	18	177	0	0	0
Educ	0	7	63	0	0	0	0	0
AgMng	0	0	22	0	0	0	0	0

2.2-C: Housing Choices

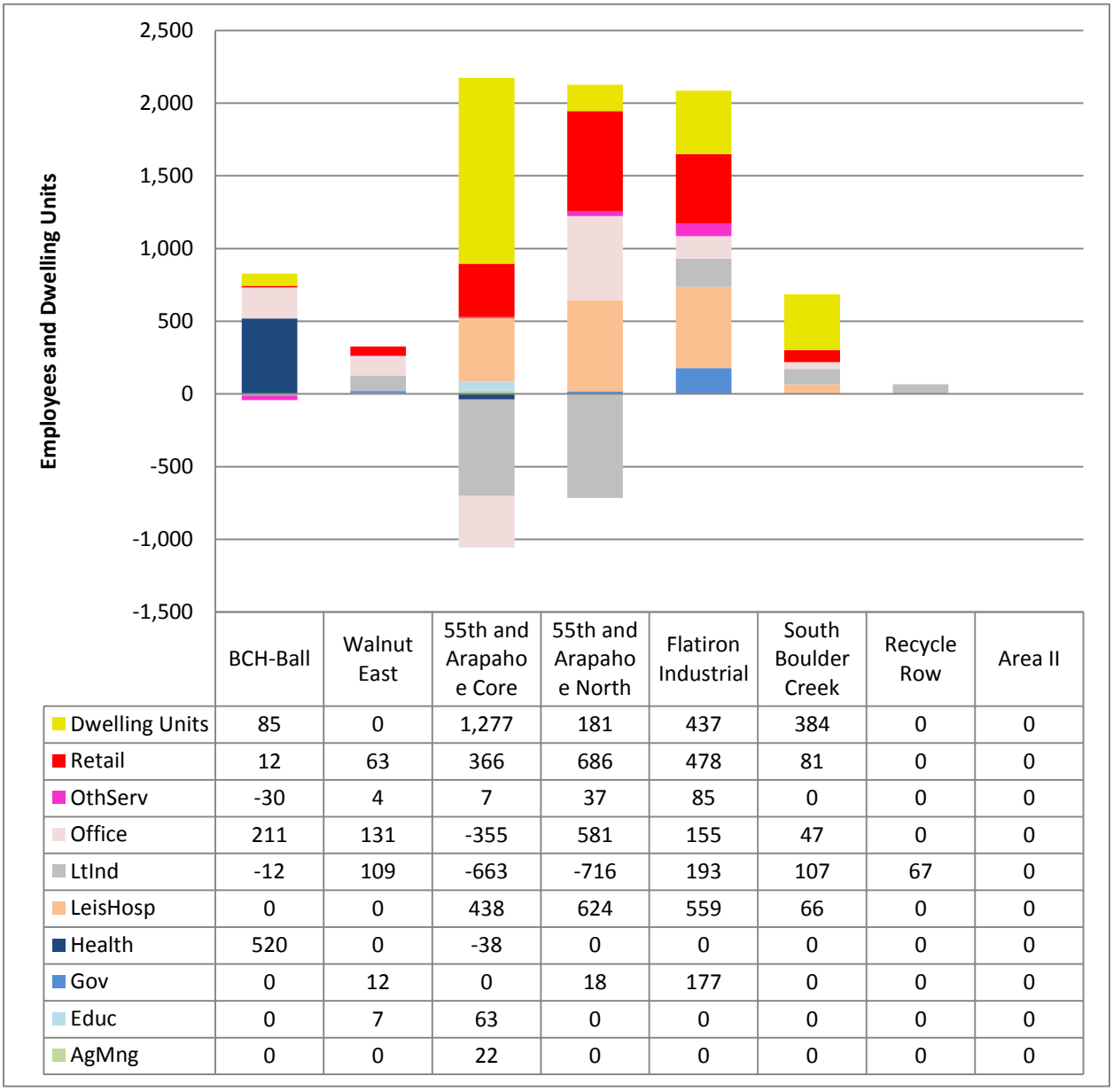
Scenario C looked at increasing services in focus areas, and also at providing new opportunities for residential development. This scenario tested out a range to see how different development options would result in the performance indicators of interest. The low range is shown as Scenario C and the high range Scenario C2. Scenario C swapped job growth for residential. Scenario C2 increased both jobs and housing options.

Figure 7: Added Uses by Focus Area in Scenario C



	BCH-Ball	Walnut East	55th and Arapahoe Core	55th and Arapahoe North	Flatiron Industrial	South Boulder Creek	Recycle Row	Area II
Dwelling Units	0	0	815	81	235	170	0	0
Retail	127	63	-16	27	96	33	0	0
OthServ	-30	4	7	37	85	0	0	0
Office	233	131	-85	55	466	47	0	0
LtInd	-12	109	-598	-124	579	107	67	0
LeisHosp	124	0	66	24	0	66	0	0
Health	520	0	-38	0	0	0	0	0
Gov	0	12	0	18	177	0	0	0
Educ	0	7	63	0	0	0	0	0
AgMng	0	0	22	0	0	0	0	0

Figure 8: Added Uses by Focus Area in Scenario C Version 2



	BCH-Ball	Walnut East	55th and Arapahoe Core	55th and Arapahoe North	Flatiron Industrial	South Boulder Creek	Recycle Row	Area II
Dwelling Units	85	0	1,277	181	437	384	0	0
Retail	12	63	366	686	478	81	0	0
OthServ	-30	4	7	37	85	0	0	0
Office	211	131	-355	581	155	47	0	0
LtInd	-12	109	-663	-716	193	107	67	0
LeisHosp	0	0	438	624	559	66	0	0
Health	520	0	-38	0	0	0	0	0
Gov	0	12	0	18	177	0	0	0
Educ	0	7	63	0	0	0	0	0
AgMng	0	0	22	0	0	0	0	0

3.0 Dashboard Indicators

To analyze how these scenarios perform in helping to achieve the City's Sustainability Framework goals and objectives, changes were tested using CommunityViz scenario planning software. Quantitative measures, called indicators, were identified for each of the goals. The analysis provided hundreds of indicators on a variety of topics. This is a lot of information to digest, so indicators are presented using a tiered approach. At the highest level is a dashboard with symbolic representation of scenario performance (See Appendix A).

Table 1: Scenario Dashboard Raw Results

Indicators	Units	Baseline*	A	B	C	C2
Improve Neighborhood Accessibility Score Percent of Land Area in 15 Minute Neighborhoods	Percent	20.18%	19.97%	19.97%	28.13%	28.13%
Increase Access to Nature Weighted Average Distance to Parks and Open Space (employees + population)	Miles	0.086	0.083	0.083	0.083	0.081
Better Balance Jobs and Housing Ratio of Employees at MFI to Housing Units Affordable to MFI	Jobs to Housing	NA	5.25	5.10	3.08	2.32
Improve Housing Choices Housing Choice Index (blend of housing calculations)	Score (0-trend to 1-best)	NA	0.00	0.09	0.42	1.00
Provide Housing in 15-Minute Neighborhoods Percent Total Residential Units in 15 Minute Neighborhoods	Percent	40.65%	66.61%	61.46%	77.57%	80.97%
Enhance Travel Options Percent within Half Mile of BRT (employees and population)	Percent	79.21%	76.15%	77.61%	77.87%	78.76%
Reduce Greenhouse Gas Emissions GHGs per Functional Population (employees + residents)	Metric Ton CO2eq per Person per Year	NA	11.94	11.74	11.27	11.22
Reduce Building Energy Use Energy Use per Functional Population (employees + residents)	Million BTU per Year	NA	47.11	46.30	44.47	44.27
Maintain Employment Diversity Employment Mix Index	Score (0-least to 1-most)	0.804	0.824	0.854	0.849	0.832
Minimize Water and Wastewater Utility Impacts Water Use per Capita for New Residential Units	Gallons per Day per Capita	NA	772	517	378	291

**An indicator which shows NA for baseline indicates that this was only calculated on the net change from baseline. Employment Mix was calculated for present day mix, and future scenarios were calculated as mix of the net change.*

Note: The Indicator Dictionary that follows provides more details

Appendix A describes in more detail how these raw results were converted to a dashboard style output for ease of scenario comparison.

4.0 Indicator Dictionary

This section describes the complete set of indicators analyzed. Indicators are sorted according to the categories of Boulder's Sustainability Framework and the goal achievements they are measuring. The table at the beginning of this section provides an overview or index, and the paragraphs that follow describe each indicator in more detail.

Some indicators were calculated only for existing conditions, some only for future scenarios, and some for both. These choices were driven by the type of indicator, available data, or other factors. The distinctions are noted in the summary table.

Certain indicators are calculated separately. These are moved to the end of the definitions as the methodology is not provided in this report. Indicators not calculated in the CommunityViz model include travel metrics from travel demand modeling software, and indicators that are waiting for other studies to compete, such as future floodplain currently being analyzed. Such indicators are marked in the following list as placeholders. City staff has been trained on continued use of the analysis for future calculations and methods to make additions once data becomes available. Training also include templating the analysis to other area studies and planning analysis citywide.

Those indicators shown in red font represent the indicator value used for the dashboard (from previous tables).

Table 2: Envision East Arapahoe Indicators List

Sustainability Category	Goal	Indicators	Existing or Future	Units
General		Total Scenario Dwelling Units	Existing + Future	Dwelling Units
		Total Scenario Employees	Existing + Future	Employees
		Total Scenario Population	Existing + Future	People
		Study Area Size (parcels excluding right-of-way, open space and water)	Constant	Acres
Safe 	**Maintain Emergency Response Times**			
	To be determined at a later point in study			
	Reduce Bicycle and Pedestrian Crash Conflict Points			
	To be determined at a later point in study			
Healthy & Socially Thriving 	**Improve Neighborhood Accessibility Score**			
		Land Area in 15 Minute Neighborhoods	Existing + Future	Acres
		% of Land Area in 15 Minute Neighborhoods	Existing + Future	Percent
	Increase Access to Nature			
		% of Study Area in Open Space	Constant	Percent
		Open Space Area within Study	Constant	Acres
		Weighted Average Employment Distance to Parks and Open Space	Existing + Future	Miles
		Weighted Average Population Distance to Parks and Open Space	Existing + Future	Miles
		Weighted Average Residential Unit Distance to Parks and Open Space	Existing + Future	Miles
		Weighted Average Distance to Parks and Open Space (employees + population)	Existing + Future	Miles
	Provide Access to Health Care Facilities			
	To be determined at a later point in study			

Sustainability Category	Goal	Indicators	Existing or Future	Units
Livable 	**Better Balance Jobs and Housing**			
		Number of Employees at Median Family Income (80-99% of MFI)	Future New	Employees
		Ratio of Employees at MFI to Housing Affordable to MFI	Future New	Jobs to Housing
	Improve Housing Choices			
		Dwelling Units	**Both**	**Dwelling Units**
		Single Family-Detached	Both	Res. Units
		Duplex/Triplex	Both	Res. Units
		Townhouses	Both	Res. Units
		Condominiums	Both	Res. Units
		Multifamily (4 to 8 units)	Both	Res. Units
		Multifamily (9+ units)	Both	Res. Units
		Married Student Housing	Both	Res. Units
		Mobile Home	Both	Res. Units
		Population in Study Area	**Both**	**People**
		Single Family-Detached	Existing Only	People
		Duplex/Triplex	Existing Only	People
		Townhouses	Existing Only	People
		Condominiums	Existing Only	People
		Multifamily (4 to 8 units)	Existing Only	People
		Multifamily (9+ units)	Existing Only	People
		Married Student Housing	Existing Only	People
		Mobile Homes	Existing Only	People
		Housing Mix Index	Future New	Score (0 to 1)
		New Units Affordable to MFI (including permanently affordable)	Future New	Dwelling Units
		Percent of New Units Affordable to Median Income	Future New	Percent
		New Permanently Affordable Units	Future New	Dwelling Units
		Percent of New Units Permanently Affordable	Future New	Percent
		Housing Choice Index (blend of above calculations)	Future New	Score (0 to 1)

Sustainability Category	Goal	Indicators	Existing or Future	Units
	Provide Housing in 15-minute Neighborhoods			
		New Residential Units in 15 Minute Neighborhoods	Future New	Employees
		Percent New Homes in 15 min	Future New	Percent
		Total Residential Units in 15 Minute Neighborhoods	Existing + Future	Dwelling Units
		Percent Total Residential Units in 15 Minute Neighborhoods	Existing + Future	Percent
Accessible & Connected 	**Increase Street Connectivity**			
		Intersection Density	Existing Only	Intersect./ Sq. Mile
	Enhance Travel Options			
		% of Employees within Half Mile of BRT	Existing + Future	Percent
		% of Population within Half Mile of BRT	Existing + Future	Percent
		% within Half Mile of BRT (employees and population)	Existing + Future	Percent
		Employees within 1/2 Mile of BRT Stops	Existing + Future	Employees
		Population within 1/2 Mile of BRT Stops	Existing + Future	People
		Residential Units within 1/2 Mile of BRT Stops	Existing + Future	Dwelling Units
		Existing Residential Units less than 1/4 Mile of Current Transit	Existing Only	Dwelling Units
		Existing Residential Units in 1/4 to 1/2 Mile of Current Transit	Existing Only	Dwelling Units
		Existing Residential Units in 1/2 to 3/4 Mile of Current Transit	Existing Only	Dwelling Units
		Existing Residential Units more than 3/4 Mile of Current Transit	Existing Only	Dwelling Units
		Existing Employees less than 1/4 Mile of Current Transit	Existing Only	Employees
		Existing Employees in 1/4 to 1/2 Mile of Current Transit	Existing Only	Employees
		Existing Employees in 1/2 to 3/4 Mile of Current Transit	Existing Only	Employees
		Existing Employees more than 3/4 Mile of Current Transit	Existing Only	Employees

Sustainability Category	Goal	Indicators	Existing or Future	Units
	Manage Traffic Congestion			
	To be determined at a later point in study			
	TDM and Managed Parking			
	To be determined at a later point in study			
Environmentally Sustainable 	**Reduce Greenhouse Gas Emissions**			
		Estimated GHGs from Structures	Future New	CO2eq
	Reduce Building Energy Use			
		Est. New Energy Use: Non-Res. Structures	Future New	Mill. BTU/year
		Energy Use per Employee	Future New	Mill. BTU/year
		Est. New Energy Use: Res. Structures	Future New	Mill. BTU/year
		Energy Use per Resident	Future New	Mill. BTU/year
		Estimated New Energy Use: TOTAL	Future New	Mill. BTU/year
		Energy Use per Functional Population (employees + residents)	Future New	Mill. BTU/year
	Protect Ecological Diversity and Open Space			
	To be determined at a later point in study			
	Avoid Floodplain and Wetlands Areas			
	To be determined at a later point in study			
Economically Vital 	**Maintain Employment Diversity**			
		Active Businesses	**Existing Only**	**Businesses**
		Agriculture and Mining	Existing Only	Businesses
		Education	Existing Only	Businesses
		Government	Existing Only	Businesses

Sustainability Category	Goal	Indicators	Existing or Future	Units
		Health	Existing Only	Businesses
		Leisure and Hospitality	Existing Only	Businesses
		Light Industrial	Existing Only	Businesses
		Office	Existing Only	Businesses
		Other Services	Existing Only	Businesses
		Retail	Existing Only	Businesses
		Employees in Study Area	**Both**	**Employees**
		Agriculture and Mining	Both	Employees
		Education	Both	Employees
		Government	Both	Employees
		Health	Both	Employees
		Leisure and Hospitality	Both	Employees
		Light Industrial	Both	Employees
		Office	Both	Employees
		Other Services	Both	Employees
		Retail	Both	Employees
		Building Square Feet	**Both**	**Sq. Feet**
		Finished Floor Above Grade	Existing Only	Sq. Feet
		Finished Floor Below Grade	Existing Only	Sq. Feet
		Employment Mix Index	Future New	Score (0 to 1)
	Minimize Fiscal Impacts			
	To be determined at a later point in study			
	Maintain Commercial and Industrial Affordability			
	To be determined at a later point in study			
	Minimize Water and Wastewater Utility Impacts			
		Estimated New Water Use: Residential Structures	Future New	Gallons per Day
		Water Use per Capita - New Residential Units	Future New	Gallons per Day per Capita

4.1 General Indicators

4.1.1 Total Scenario Dwelling Units and Population

Scenario dwelling units and population were estimated for present day and future at the parcel level.

Existing Dwelling Units Methodology

Existing dwelling units within City of Boulder jurisdictional limits were provided to Placeways as a point feature layer, providing an easy way to summarize dwelling units by parcel. Dwelling unit counts for properties in the Unincorporated Boulder County area were estimated based on assessor building data design codes and finished floor area. For both the jurisdictions, dwelling units were classified based on assessor design codes into one of the eight housing types shown in the table below.

Existing Population Methodology

Estimated existing population was determined for each dwelling unit point. Dwelling unit points obtained their persons per housing unit ratio from corresponding 2010 US Census block features. Population was then estimated and population and housing units were summarized by dwelling unit type, excluding dwelling units which did not exist in the US Census data for 2010. The summaries were used to calculate population per housing unit rates by dwelling unit type. These unit based ratios were then used to approximate population for all dwelling units.

Dwelling unit point data was available for parcels that extended just beyond the final study area. Population ratio estimates used data for all features provided, while total estimated population for the study area only is presented below.

Table 3: Estimated Existing Dwelling Units and Population (Baseline)

Dwelling Unit Type	Estimated Number of Dwelling Units	Persons per Housing Unit	Estimated Population
1. Single Family, Detached	433	2.42	1,048
2. Single Family, Attached	60	2.06	124
3. Townhouses	131	2.07	271
4. Condominiums	685	1.11	760
5. Multifamily (4 to 8 units)	82	1.88	154
6. Multifamily (9+ units)	949	1.65	1,566
7. Married Student Housing	228	2.11	482
8. Mobile Homes	25	2.88	72
TOTAL	**2,593**		**4,476**

Future Dwelling Units and Population Methodology
To estimate future dwelling units, the model used land use placetypes to test potential changes to focus areas from employment type categories to more mixed use or pure residential type categories. Densities ranging from approximately 10 to 55 dwelling units per acre (.5 to 1.5 FAR) were used to test out residential opportunities in focus areas. Unit types were associated with given densities. Population was then estimated using the baseline unit type based persons per housing unit ratios from table 5.

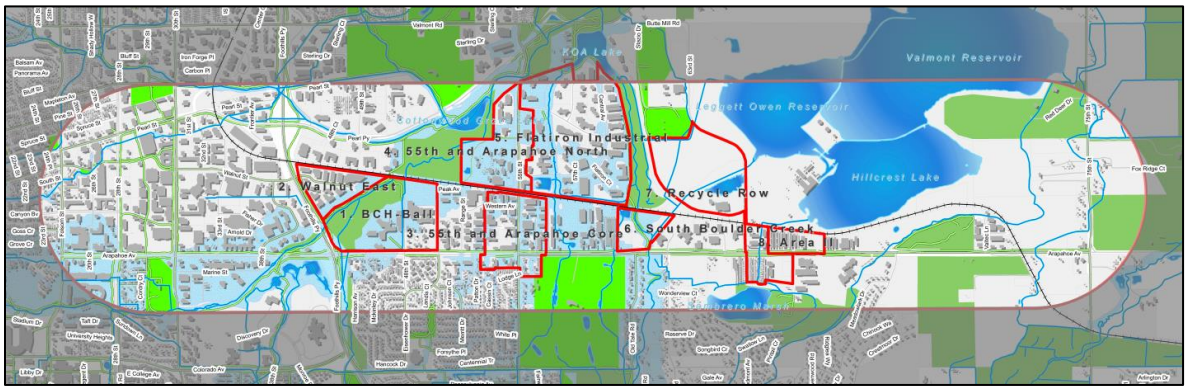
4.1.2 Total Scenario Employees
Employees were estimated for present day and future scenarios at the parcel level.

Existing Employees Methodology
Employee estimates within City of Boulder jurisdictional limits came from the 2010 Comprehensive Plan Update analysis that was done citywide to determine existing and future possible jobs. In the case of larger "special projection" sites, the City merged individual property features into single site features. Examples of this include the 29th Street Mall, the Village Shopping Center and the Boulder Community Health property.

Future Employees Methodology
Future employees in focus areas were determined through land use placetypes, allowing a means to test alternative use mixes in strategic locations. Floor area ratios (FAR) were primarily set at 0.5 with frontage properties ranging as high as 1.0 FAR. The main difference between alternative scenarios and the Status Quo scenario, then, was in the use mix, incorporating increased services and tiered residential in lieu of office and industrial for new growth.

4.1.3 Study Area Size (parcels excluding right-of-way, open space and water)
The study area includes all parcels within the oval corridor boundary. Generally, this area covers from just west of Folsom Street, just east of 75th Street, approximately ¼ mile south of Arapahoe Avenue, and approximately ¾ mile north of Arapahoe Avenue. Parcels which overlap the boundary edge and extend beyond were also included in study.

Figure 9: Study Area Map



4.2 Healthy and Socially Thriving Indicators

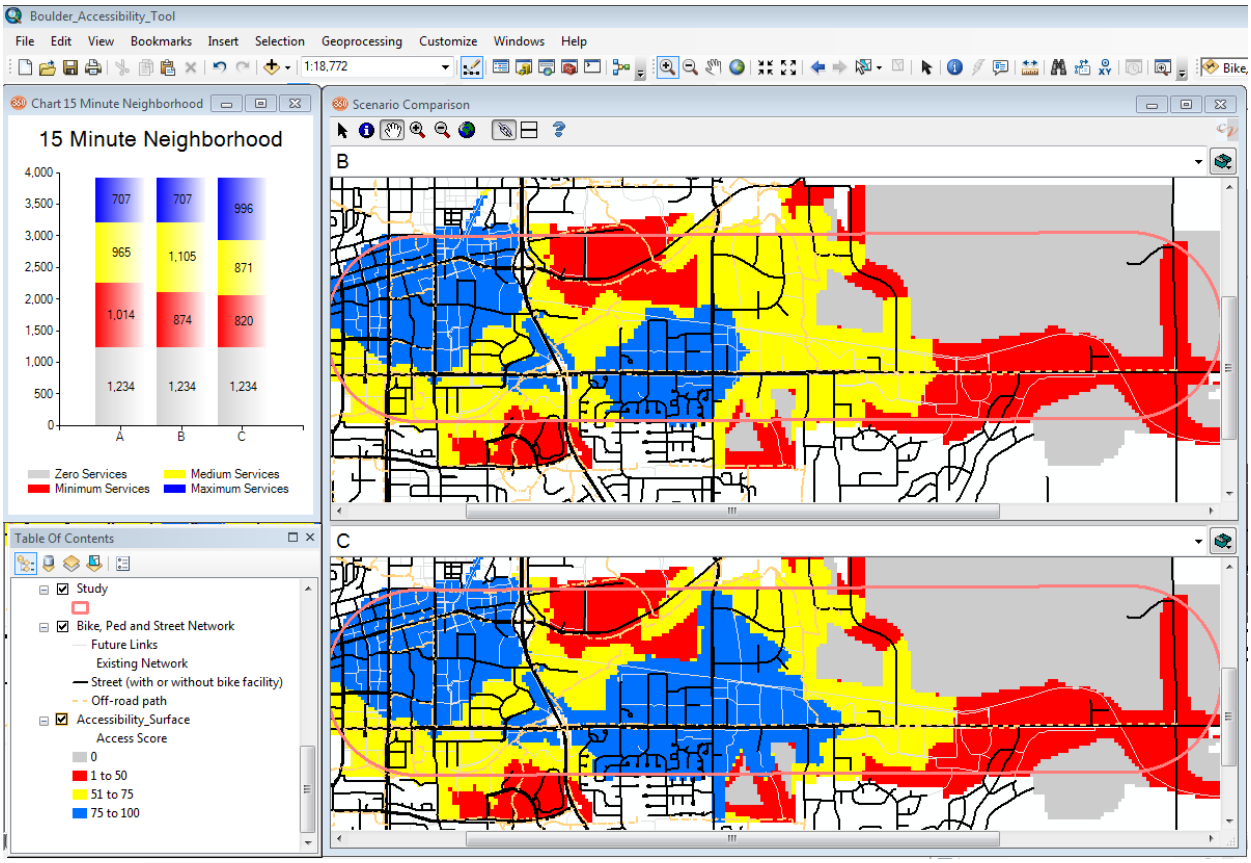
4.2.1 Improve Neighborhood Accessibility Score

Neighborhood accessibility is an analysis of how walkable and complete neighborhoods are in terms of access to amenities such as grocery stores, bus stops, restaurants and recreation facilities. Under a separate effort the City has developed a tool which directly scores location based on accessibility to various amenities. This project was a parallel effort and aimed to build on similar methods to the tool currently under development.

Existing neighborhood accessibility was provided directly from the external tool in the form of a vector surface with scores of 0 to 9, 9 being most available services. To measure future neighborhood accessibility, an ArcGIS walk and bike network was developed using proposed new network links from the East Arapahoe Transportation Network Plan dated March 2004 and the current walk/bike network. Within each scenario, future locations for amenities were estimated based on placetype locations. Points for things like restaurants, cafes, social gathering spots and grocery stores were assumed based on the location of scenario changes to use mix. This provided the potential to create service areas boundaries using Esri's Network Analyst extension to ArcGIS desktop. A ½ mile distance (15 minute walk) was assumed for the network buffers. Amenity service area boundaries were summarized for each scenario using the CommunityViz Suitability Wizard, which allows for a quick and easily adjustable weighted overlay analysis. A vector grid surface (feature size of 100 x 100 feet square) was scored based on the stack of overlapping network service areas. Adjustable weighting slider bars were provided for each amenity allowing for an easy way to set priorities.

The suitability analysis results in a score of 0 to 100, 100 representing accessibility to all possible amenities within the ½ mile buffers. In order to summarize results, an adjustable threshold was set for 75 out of 100 as being "within 15 minute neighborhoods". Each scenario was scored based on total land area for these top scoring features.

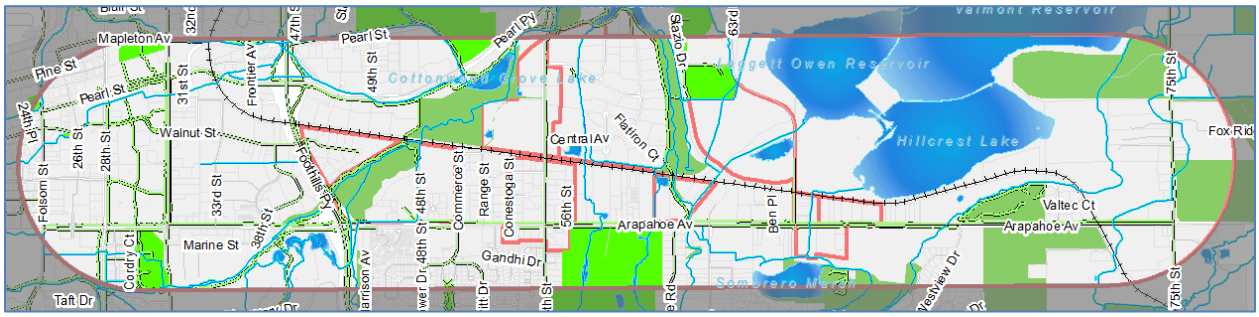
Figure 10: Neighborhood Accessibility Score



4.2.2 Increase Access to Nature

Access to nature was measured based on prevalence of open space and park areas (open space area in study area and percent of study area that is open space) as well as weighted distance to open space and park areas.

Figure 11: Corridor Parks and Open Space



4.3 Livable Indicators

4.3.1 Better Balance Jobs and Housing

The East Arapahoe corridor and the City of Boulder in general serve as an employment center for surrounding Denver metropolitan communities. This means that employment has been historically high in comparison with available housing. To better understand the need for more affordable housing in each of the scenarios, this indicator instead looked at the ratio of jobs at the median family income (MFI) to houses affordable to this group.

We used the job type classifications available in the model (see section Maintain Employment Diversity) to estimate median family income. Incomes were estimated from the US Census American Community Survey data, 2013, for Boulder County[1]. Using the NAICS codes associated with each job type, a median income was derived. A standard Census-based multiplier of 1.3 was applied to convert employee income to family income[2].

Table 4: Estimated Median Family Income by Job Type

Job Type	Industry Median Income	Industry Median Family Income
1. Agriculture or Mining	$ 31,983	$ 41,578
2. Education	$ 50,597	$ 65,776
3. Government	$ 53,662	$ 69,761
4. Health	$ 69,109	$ 89,842
5. Leisure and Hospitality	$ 35,098	$ 45,627
6. Light Industrial	$ 36,048	$ 46,862
7. Office	$ 76,848	$ 99,902
8. Other Services	$ 60,235	$ 78,306
9. Retail	$ 41,798	$ 54,337

These job-based MFI estimates were then used to quantify the number of employees at 80-99% of Boulder County MFI, currently $67,403[3].

Next, the number of new housing units affordable to MFI was estimated. For housing cost estimation, see the following section, Improve Housing Choices.

[1] 2013 American Community Survey 1-Year Estimates, Table B24021 - OCCUPATION BY MEDIAN EARNINGS IN THE PAST 12 MONTHS (IN 2013 INFLATION-ADJUSTED DOLLARS) FOR THE FULL-TIME, YEAR-ROUND CIVILIAN EMPLOYED POPULATION 16 YEARS AND OVER, Universe: Full-time, year-round civilian employed population 16 years and over with earnings.
[2] http://www.census.gov/hhes/www/cpstables/032012/hhinc/hinc05_000.xls.
[3] Boulder County: http://factfinder2.census.gov/faces/nav/jsf/pages/community_facts.xhtml.

New employees at 80-99% MFI was divided by new housing units affordable to MFI to provide a ratio used in scenario comparison.

4.3.2 Improve Housing Choices

There were several measures that went in to the measure looking at overall housing choice.

- Housing use mix (index)
- New housing units affordable to MFI
- Percent of new units affordable to MFI
- New permanently affordable housing units
- Percent of new units permanently affordable
- Housing Choice Index (blend of previous calculations)

Housing use mix was calculated using an entropy calculation. An entropy calculation is a valuable way of summarizing the combined uses on any feature with a score of 0 to 1, with 0 representing only a single use is present and 1 indicating a balance of all uses on a feature. The following is the standard entropy formula:

$$-\frac{\sum_k (p_k \ln p_k)}{\ln N}$$

Where *k* is the land use type; *p* is the share of the total uses that the *k* land use occupies; *N* is the number of unique land use types, which can vary depending on how you define your land uses. As shown Table 2, there were eight housing types used to analyze housing in the study area: single family, detached; duplex/triplex; townhouses; condominiums; multifamily (4 to 8 units); multifamily (9+ units); married student housing; and mobile homes.

New housing units affordable to MFI was calculated based on an average square footage by use and an average price per square feet of $304[4]. The following housing unit size assumptions were used:

[4] *Housing Choice Survey and Analysis*, BBC Research and Consulting, dated May 12, 2014. https://www-static.bouldercolorado.gov/docs/BBC_-_Housing_Choice_Survey_and_Analysis-1-201405131151.pdf.

Table 5: Estimated Square Feet and Home Value by Housing Unit Type

Dwelling Unit Type	Average Square Footage	Estimated Home Value
1. Single Family, Detached	2,392	$727,168
2. Duplex/Triplex	1,600	$486,400
3. Townhouses	1,600	$486,400
4. Condominiums	1,300	$395,200
5. Multifamily (4 to 8 units)	1,000	$304,000
6. Multifamily (9+ units)	1,000	$304,000
7. Married Student Housing	1,000	$304,000
8. Mobile Homes	500	$152,000

These housing value estimates were compared to an estimated affordable mortgage for Boulder County 80-99% MFI, $307,985[5]. Units at or below this value were assumed affordable, including permanently affordable homes (see following).

Percent of new units affordable to MFI was calculated as the ratio of the above new units divided by the total new units in any given scenario.

New permanently affordable housing units were calculated as 20% of new housing stock regardless of type per city regulations.

Percent of new units permanently affordable is 20% across all scenarios. This percentage is left as a component of the calculation for ease of being able to adjust in future scenario testing.

Housing Choice Index (blend of previous calculations) is a score combining the above calculations into a single number, 0 to 100, 0 representing the lowest housing choice and 100 representing the most. Values were normalized based on a straight-line distribution of the maximum and minimum values across scenarios. They were then summed as equal proportions. The spreadsheet contains a weighting option should the City want to prioritize the above values.

4.3.3 Provide Housing in 15-minute Neighborhoods

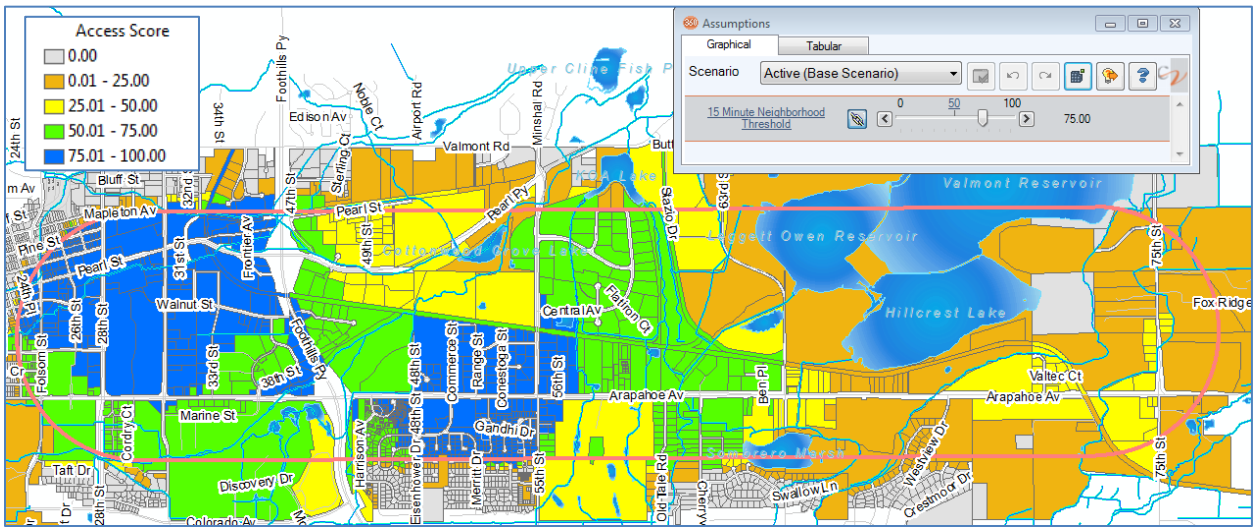
15-minute neighborhoods are those areas that score highly on the Neighborhood Accessibility score, the 0 to 100 score of available amenities within a ½ mile walkable distance (this score is explained in more detail in section 5.3.1). Here, top scores (features scoring 75 or higher out of a possible 100) were used to define the 15-minute neighborhoods. These were places that had walkable (1/2 mile) access to most the most varied amenities.

[5] http://www.zillow.com/mortgage-calculator/house-affordability/

An overlap analysis with parcels was used to determine what houses in the scenarios were within these 15-minute neighborhoods. For example, if a parcel had 50% overlap with the 15-minute neighborhoods, and it had 100 homes, then 50 of the houses on that parcel were tallied for inclusion.

This calculation was done for all new housing units in 15-minute neighborhoods, total (existing plus new) housing units in 15-minute neighborhoods, the percent of new units in 15-minute neighborhoods and the percent of total housing units in 15-minute neighborhoods. For scenario comparison, percent of total housing units in 15-minute neighborhoods was used as this most closely aligns with the City's goal to achieve 80% of all homes with access to 15-minute neighborhoods.

Figure 12: Parcel Accessibility Score – Present Day



4.4 Accessible and Connected Indicators

Most of the indicators analyzed under this goal will be provided by transportation consultants running outside analysis on the scenario outputs. There are a handful of calculations that are being calculated directly in CommunityViz.

4.4.1 Enhance Travel Options

One of the key elements of the future of East Arapahoe is looking at the Denver Regional Transportation District (RTD) plan as a potential bus rapid transit (BRT) corridor. There are a lot of design unknowns at this stage of the concept, but the alignment will most likely be along Arapahoe for the full length of the study area.

One question around this idea is what type of capture new BRT stations might achieve for employees and residents. To test this, it was assumed that station locations would be at major activity nodes (both existing and planned) and a ½ mile radius buffer area was used. Employees, residents and housing units (total scenario) were calculated within these buffer areas. This was then converted to a percentage of the total. As a single calculation to use for scenario comparison, the sum of all employees plus population (residents) within the buffers as a percent of the total employees plus population in the scenario was calculated.

The model also includes calculations for existing housing units and employees within various network-based buffers of existing transit stops. This was only done for existing (base scenario), but the model could be augmented for future transit access.

4.5 Environmentally Sustainable Indicators

4.5.1 Reduce Greenhouse Gas Emissions

Greenhouse gas (GHG) emissions were estimated from two key contributors: vehicles and buildings. Other stationary contributors were not considered in this analysis, such as power plants, but these sources would likely be consistent across all scenarios. Vehicles and buildings were variable across scenarios, thus GHG emissions will be slightly different in each.

Vehicle-based GHG emissions were measured as a separate calculation as part of the external transportation analysis.

Building-based GHG emissions were tied directly to energy consumption. So the more BTUs in a given scenario, the more emissions that scenario would have. A default rate of 1,906.06 lbs/MWh was assumed. This is the same model value the City used in the Greenhouse Gas Emissions Inventory[6].

4.5.2 Reduce Building Energy Use

Energy use is an important topic for the City. To estimate existing and future energy use, coefficients were assigned to the various building types, both residential and employment. These values were built as adjustable assumptions within CommunityViz, so as future more local data becomes available, they can be set accordingly. Default energy use rate estimates come from a national source, the US Energy Information Agency. Residential rates are specific to the West region of the US.

[6] https://www-static.bouldercolorado.gov/docs/2010-2011-community-guide-to-boulders-climate-action-plan-1-201305081156.pdf

Table 6: Residential Energy Consumption Rate Estimates

Dwelling Unit Class	Housing Unit Type from US EIA	Site Energy Consumption per Household (million Btu per year)[7]
1. Single Family, Detached	Single-Family Detached	89.6
2. Single Family, Attached	Single-Family Attached	63.3
3. Townhouses	Apartments in 2-4 Unit Buildings	47
4. Condominiums	Multifamily	37.3
5. Multifamily (4 to 8 units)	Apartments in 5 or More Unit Buildings	33.8
6. Multifamily (9+ units)	Apartments in 5 or More Unit Buildings	33.8
7. Dormitory	NA	NA
8. Mobile Homes	Mobile Homes	66

Table 7: Non-Residential Energy Consumption Rate Estimates

Job Type	Use Type from US EIA	Site Energy Consumption per Square Foot (thousand Btu per Year)[8]
1. Agriculture or Mining	NA	NA
2. Education	Education	83.1
3. Government	Public Assembly	93.9
3. Government	Public Order and Safety	115.8
4. Health	Health Care	187.7
4. Health	Inpatient	249.2
4. Health	Outpatient	94.6
5. Leisure and Hospitality	Food Service	258.3
5. Leisure and Hospitality	Lodging	100
6. Light Industrial	Warehouse and Storage	45.2
7. Office	Office	92.9
8. Other Services	Religious Worship	43.5
8. Other Services	Service	77
9. Retail	Mercantile	91.3
9. Retail	Retail (Other Than Mall)	73.9
9. Retail	Enclosed and Strip Malls	102.2
9. Retail	Food Sales	199.7

[7] West Region, 2009 Residential Energy Consumption Survey, US Energy Information Agency.
[8] National Survey, Consumption and Gross Energy Intensity for Sum of Major Fuels for All Buildings, 2003, Commercial Buildings Energy Consumption Survey (CBECS), US Energy Information Agency

4.6 Economically Vital Indicators

4.6.1 Maintain Employment Diversity

Employees were broken into one of nine job classes using summaries of the Standard Industry Classification (SIC) data from the sales tax GIS layer and the US Census North American Industry Classification System (NAICS). The nine job types and their associated 2 digit codes for each industry class by system are listed for reference here.

Table 8: Job Classes and Corresponding Industry Codes

Job Type	SIC Industry Class Code	NAICS Industry Class Code
1. Agriculture or Mining	01-14	11, 21
2. Education	82-83	61
3. Government	91-97	92
4. Health	80	62
5. Leisure and Hospitality	58, 70, 79, 84	71-72
6. Light Industrial	15-26, 28-47, 49-51	22-23, 31-33, 42, 48, 49
7. Office	27, 48, 60-67, 73, 78, 81, 87, 89	51- 56
8. Other Services	72, 75-76, 86, 88	81, 99
9. Retail	52-57, 59	44-45

A ratio of square feet per employee for each job type was estimated. Ratios here are estimated by summarizing single use property data (features with only one type of employment present) for average square feet per job. The study area contains 168 features (approximately one-third of all properties with jobs) that have a mix of job types present. Assessor building data and sales tax data provided did not break down overall square feet of finished floor space by either SIC or NAICS classes. The education job type used building footprint areas from the GIS footprints because assessor data was lacking structure information for these uses.

Future employees were broken out into these nine job classes at the parcel level. In the focus areas, placetypes were assigned percentages for health, leisure and hospitality, light industrial, office and other services. Agriculture or Mining, Education and Government uses were not included in placetypes, but existing facilities that included these uses grew as projected in the City's analysis.

Table 9: Estimated Existing Businesses and Jobs by Job Classes

Job Type	Number of Businesses (Sales Tax Points)	Number of Employees (City of Boulder and County Assessor Data)	Estimated Square Foot per Employee*
1. Agriculture or Mining	14	38	232
2. Education	17	1,141	637
3. Government	8	543	520
4. Health	91	1,455	344
5. Leisure and Hospitality	148	3,884	304
6. Light Industrial	162	8,281	347
7. Office	291	9,624	431
8. Other Services	189	2,317	270
9. Retail	419	8,117	410
TOTAL	**1,339**	**35,400**	

4.6.2 Minimize Water and Wastewater Utility Impacts

Water use estimates come from the City of Boulder Utilities water budgeting. Since non-residential uses are metered based on historic use by property, there was no easy way to correlate water use by non-residential employment types. This can be added in a future model iteration should data become available. Residential water use was associated with the structure types and landscaping area.

Table 10: Estimated Residential Water Use Rates

Housing Unit Type	Monthly Indoor [Gallons per Unit]*	Daily Indoor [Gallons per Unit]*	Monthly Outdoor [Gallons per Square Foot]*	Daily Outdoor [Gallons per Square Foot]*
1. Single Family, Detached	7,000	230	15	0.04
2. Single Family, Attached	7,000	230	15	0.04
3. Townhouses	5,000	164	15	0.04
4. Condominiums	5,000	164	15	0.04
5. Multifamily (4 to 8 units)	5,000	164	15	0.04
6. Multifamily (9+ units)	4,000	132	15	0.04
7. Dormitory	NA	NA	NA	NA
8. Mobile Homes	5000	164	15	0.04

*Boulder Water Utilities, https://bouldercolorado.gov/pages/the-basics-of-your-water-budget. Outdoor usage is based on estimated square feet of landscaped outdoor area in the parcel per City of Boulder estimation methods. Townhomes assumed 2,850 square feet common landscaped area per unit based on East Arapahoe study area townhome properties.

4.7 Indicators not Addressed in CommunityViz at this Time

4.7.1 Safety: Maintain Emergency Response Times
Can be calculated using network distances in the future.

4.7.2 Safety: Reduce Bicycle and Pedestrian Crash Conflict Points
Needs further research and analysis.

4.7.3 Healthy and Socially Thriving: Provide Access to Health Care Facilities
As part of the 15-Minute neighborhoods analysis, network distance to BCH was developed. This can be used for a future analysis is desired.

4.7.4 Accessible and Connected: Increase Street Connectivity
Results from transportation consultants pending.

4.7.5 Accessible and Connected: Manage Traffic Congestion
Results from transportation consultants pending.

4.7.6 Accessible and Connected: TDM and Managed Parking
Results from transportation consultants pending.

4.7.7 Environmentally Sustainable: Protect Ecological Diversity and Open Space
Future calculation placeholder.

4.7,8 Environmentally Sustainable: Avoid Floodplain and Wetlands Areas
Future calculation placeholder.

4.7.9 Economically Vital: Minimize Fiscal Impacts
Future calculation placeholder.

4.7.10 Economically Vital: Maintain Commercial and Industrial Affordability
Future calculation placeholder.

Appendix A: Scenario Comparison Dashboard

Indicators	Future Scenario Performance Scenario A	Scenario B	Scenario C	Scenario C2
Improve Neighborhood Accessibility Score Percent of Land Area in 15 Minute Neighborhoods	⇔	⇔	⇨	⇨
Increase Access to Nature Weighted Average Distance to Parks and Open Space (employees + population)	⇔	⇔	⇔	⇔
Better Balance Jobs and Housing Ratio of Employees at MFI to Housing Affordable to MFI	⇔	⇔	⇨	⇨
Improve Housing Choices Housing Choice Index (blend of housing calculations)	⇔	⇔	⇨	⇨
Provide Housing in 15-Minute Neighborhoods Percent Total Residential Units in 15 Minute Neighborhoods	⇔	⇦	⇨	⇨
Enhance Travel Options Percent within Half Mile of BRT (employees and population)	⇔	⇔	⇔	⇔
Reduce Greenhouse Gas Emissions GHGs per Functional Population (employees + residents)	⇔	⇨	⇨	⇨
Reduce Building Energy Use Energy Use per Functional Population (employees + residents)	⇔	⇨	⇨	⇨
Maintain Employment Diversity Employment Mix Index	⇔	⇔	⇔	⇔
Minimize Water and Wastewater Utility Impacts Water Use per Capita - New Residential Units	⇔	⇨	⇨	⇨

Key to Performance: Away from Goals: ⇦ Neutral/No Change: ⇔ Toward Goals: ⇨

Scenario A - Current Trends was treated as the benchmark, status quo, so alternative scenario performance was based on relative progress from Scenario A. For example, one community goal is to improve housing choice. Alternative scenarios that provided housing in a greater variety of options would score higher. Not surprisingly, Scenario C does the most to increase housing opportunities and thus does the most to achieve goals for housing choice and balance with jobs. All scenarios demonstrated some change toward goals from the Current Trends scenario. Scenario B was the only scenario showing a decrease in residential access to 15-

minute neighborhoods, which had to do with housing but little other services added to the Walnut East focus area.

Scores for the dashboard were taken from the indicator measurements within the CommunityViz Model (see Table 1). Behind each symbol in the dashboard is a numeric result which is provided in Table 3. These values were compared and normalized to a simple score, 0 to 100, with 50 being the Status Quo. This normalization is based on the range of values across scenarios on any given raw score. For simplicity, the top scoring scenario was assigned 100, and Status Quo was assigned 50. Other scores were then interpolated based on their distribution across the low to high range. Since some indicators had almost identical results, such as access to nature, we used a rule of thumb that the standard deviation of all scenario results much be greater than 2% of the maximum value for the ranking to have meaning. Those which were less were assigned 50 across all scenarios, representing the same as Status Quo.

Scenario Comparison Dashboard Normalized Priority Scores

Indicators	Scenario A	Scenario B	Scenario C	Scenario C2
Improve Neighborhood Accessibility Score	50	50	100	100
Increase Access to Nature	50	50	50	50
Better Balance Jobs and Housing	50	52	87	100
Improve Housing Choices	50	54	71	100
Provide Housing in 15-Minute Neighborhoods	50	32	88	100
Enhance Travel Options	50	50	50	50
Reduce Greenhouse Gas Emissions	50	64	97	100
Reduce Building Energy Use	50	64	96	100
Maintain Employment Diversity	50	50	50	50
Minimize Water and Wastewater Utility Impacts	50	76	91	100

Appendix B: Full Indicator Results

	Name	Baseline	Scale (what is being measured)	Units	Scenario A	Scenario B	Scenario C1	Scenario C2
General Information: Study Area	**Study Area Size (parcels excluding right-of-way, open space and water)**	**3,157**	**Existing and Future**	**Acres**				
	Size of Area Outside Focus Areas	2,738	Existing and Future	Acres				
	Size of Focus Area 1	48	Existing and Future	Acres				
	Size of Focus Area 2	27	Existing and Future	Acres				
	Size of Focus Area 3	46	Existing and Future	Acres				
	Size of Focus Area 4	51	Existing and Future	Acres				
	Size of Focus Area 5	127	Existing and Future	Acres				
	Size of Focus Area 6	18	Existing and Future	Acres				
	Size of Focus Area 7	89	Existing and Future	Acres				
	Size of Focus Area 8	12	Existing and Future	Acres				
	Active Businesses	**1,366**	**Existing Only**	**Businesses**				
	Active Businesses: Agriculture and Mining	14	Existing Only	Businesses				
	Active Businesses: Education	17	Existing Only	Businesses				
	Active Businesses: Government	8	Existing Only	Businesses				
	Active Businesses: Health	91	Existing Only	Businesses				
	Active Businesses: Leisure and Hospitality	148	Existing Only	Businesses				
	Active Businesses: Light Industrial	162	Existing Only	Businesses				
	Active Businesses: Office	291	Existing Only	Businesses				
	Active Businesses: Other Services	189	Existing Only	Businesses				
	Active Businesses: Retail	419	Existing Only	Businesses				
	Dwelling Units	**2,593**	**Existing Only**	**Dwelling Units**				
	Dwelling Units: Single Family-Detached	433	Existing Only	Dwelling Units				
	Dwelling Units: Duplex/Triplex	60	Existing Only	Dwelling Units				
	Dwelling Units: Townhouses	131	Existing Only	Dwelling Units				
	Dwelling Units: Condominiums	685	Existing Only	Dwelling Units				
	Dwelling Units: Multifamily (4 to 8 units)	82	Existing Only	Dwelling Units				
	Dwelling Units: Multifamily (9+ units)	949	Existing Only	Dwelling Units				
	Dwelling Units: Married Student Housing	228	Existing Only	Dwelling Units				
	Dwelling Units: Mobile Home	25	Existing Only	Dwelling Units				
	Employees in Study Area	**35,399**	**Existing Only**	**Employees**				
	Employees in Study Area: Agriculture and Mining	38	Existing Only	Employees				
	Employees in Study Area: Education	1,141	Existing Only	Employees				
	Employees in Study Area: Government	543	Existing Only	Employees				
	Employees in Study Area: Health	1,455	Existing Only	Employees				
	Employees in Study Area: Leisure and Hospitality	3,884	Existing Only	Employees				
	Employees in Study Area: Light Industrial	8,281	Existing Only	Employees				
	Employees in Study Area: Office	9,624	Existing Only	Employees				
	Employees in Study Area: Other Services	2,317	Existing Only	Employees				
	Employees in Study Area: Retail	8,117	Existing Only	Employees				
	Employees Outside Focus Areas	24,325	Existing Only	Employees				
	Employees in Focus Area 1	1,672	Existing Only	Employees				
	Employees in Focus Area 2	1,352	Existing Only	Employees				
	Employees in Focus Area 3	1,682	Existing Only	Employees				
	Employees in Focus Area 4	1,651	Existing Only	Employees				
	Employees in Focus Area 5	4,413	Existing Only	Employees				
	Employees in Focus Area 6	0	Existing Only	Employees				
	Employees in Focus Area 7	274	Existing Only	Employees				
	Employees in Focus Area 8	30	Existing Only	Employees				

	Name	Baseline	Scale (what is being measured)	Units	Scenario A	Scenario B	Scenario C1	Scenario C2
	Existing Building Square Feet (from Assessor)	**15,891,379**	**Existing Only**	**Square Feet**				
	Finished Floor Above Grade	15,516,717	Existing Only	Square Feet				
	Finished Floor Below Grade	374,662	Existing Only	Square Feet				
	Population in Study Area - Existing	**4,476**	**Existing Only**	**People**				
	Population: Single Family-Detached	1,048	Existing Only	People				
	Population: Duplex/Triplex	124	Existing Only	People				
	Population: Townhouses	271	Existing Only	People				
	Population: Condominiums	760	Existing Only	People				
	Population: Multifamily (4 to 8 units)	154	Existing Only	People				
	Population: Multifamily (9+ units)	1,566	Existing Only	People				
	Population: Married Student Housing	481	Existing Only	People				
	Population: Mobile Homes	72	Existing Only	People				
	Total Scenario Dwelling Units	2,593	Future Total	Dwelling Units	3,441	3,905	4,742	5,805
	Total Scenario Employees	35,399	Future Total	Employees	52,944	52,537	51,114	52,759
	Total Scenario Population	4,476	Future Total	People	5,867	6,818	8,075	9,810
Maintain Emergency Response Times								
Reduce Bicycle and Pedestrian Conflict Points								
Improve Neighborhood Accessibility Score	Land Area in 15 Minute Neighborhoods	637	Future Total	Acres	707	707	996	996
	Percent of Land Area in 15 Minute Neighborhoods	20.2%	Future Total	Percent	22.4%	22.4%	31.5%	31.5%
Increase Access to Nature	Percent of Study Area in Open Space	33.0%	Existing and Future	Percent				
	Open Space Area within Study	1,168	Existing and Future	Acres				
	Weighted Average Employment Distance to Parks and Open Space	0.086	Total	Miles	0.084	0.085	0.083	0.081
	Weighted Average Population Distance to Parks and Open Space	0.085	Total	Miles	0.071	0.067	0.078	0.082
	Weighted Average Residential Unit Distance to Parks and Open Space	0.087	Total	Miles	0.072	0.069	0.081	0.085
	Weighted Average Distance to Parks and Open Space (employees + population)	-0.086	Total	Miles	-0.083	-0.083	-0.082	-0.081
Maintain Commercial and Industrial Affordability								
Better Balance Jobs and Housing	Number of Employees at MFI (80-99% of MFI)		Future New	Employees	4,381	4,911	4,434	5,791
	Ratio of Employees at MFI to Housing Affordable to MFI		Future New	Jobs to Housing	-5.25	-5.10	-3.08	-2.32
Improve Housing Choices	New Dwelling Units - Focus Areas		Focus New	Dwelling Units	0	464	1,301	2,364
	New Dwelling units - Outside of Focus Areas		Focus New	Dwelling Units	848	848	848	848
	New Population in Study Area		Future New	People	1,391	2,342	3,599	5,334
	New Dwelling Units in Scenario		**Future New**	**Dwelling Units**	**848**	**1,312**	**2,149**	**3,212**
	New Dwelling Units: Single Family-Detached		Future New	Dwelling Units	0	0	0	0
	New Dwelling Units: Duplex/Triplex		Future New	Dwelling Units	0	0	0	0
	New Dwelling Units: Townhouses		Future New	Dwelling Units	0	421	532	507
	New Dwelling Units: Condominiums		Future New	Dwelling Units	16	16	353	386
	New Dwelling Units: Multifamily (4 to 8 units)		Future New	Dwelling Units	0	42	89	131
	New Dwelling Units: Multifamily (9+ units)		Future New	Dwelling Units	832	832	1,175	2,188
	New Dwelling Units: Married Student Housing		Future New	Dwelling Units	0	0	0	0
	New Dwelling Units: Mobile Homes		Future New	Dwelling Units	0	0	0	0
	Housing Mix Index		Future New	Score (0 to 1)	0.05	0.39	0.53	0.45
	New Units Affordable to MFI (including permanently affordable)		Future New	Dwelling Units	835	962	1,441	2,498
	Percent of New Units Affordable to Median Income		Future New	Percent	98.5%	73.3%	67.1%	77.8%
	New Permanently Affordable Units		Future New	Dwelling Units	170	262	430	642
	Percent of New Units Permanently Affordable		Future New	Percent	20.0%	20.0%	20.0%	20.0%
	Housing Choice Index (blend of above calculations)		Future New	Score (0 to 1)	0.00	0.09	0.42	1.00
Provide Housing in 15-minute Neighborhoods	New Residential Units in 15 Minute Neighborhoods		Future New	Employees	848	956	2,122	3,144
	Percent New Homes in 15 min		Future New	Percent	100.0%	72.9%	98.8%	97.9%
	Total Residential Units in 15 Minute Neighborhoods	1,054	Future Total	Dwelling Units	2,292	2,400	3,678	4,700
	Percent Total Residential Units in 15 Minute Neighborhoods	40.6%	Future Total	Percent	66.6%	61.5%	77.6%	81.0%

	Name	Baseline	Scale (what is being measured)	Units	Scenario A	Scenario B	Scenario C1	Scenario C2
Increase Street Connectivity								
Enhance Travel Options	Percent of Employees within Half Mile of BRT	77.4%	Future Total	Percent	76.0%	76.1%	75.4%	76.5%
	Percent of Population within Half Mile of BRT	93.6%	Future Total	Percent	77.2%	78.5%	81.5%	77.2%
	Percent within Half Mile of BRT (employees and population)	79.2%	Future Total	Percent	76.1%	76.4%	76.2%	76.6%
	Employees within 1/2 Mile of BRT Stops	27,395	Future Total	Employees	40,255	39,979	38,526	40,338
	Population within 1/2 Mile of BRT Stops	4,189	Future Total	People	4,529	5,350	6,584	7,576
	Residential Units within 1/2 Mile of BRT Stops	2,461	Future Total	Dwelling Units	2,668	3,068	3,894	4,575
	Existing Residential Units less than 1/4 Mile of Transit	1,944	Existing Only	Dwelling Units				
	Existing Residential Units in 1/4 to 1/2 Mile of Transit	821	Existing Only	Dwelling Units				
	Existing Residential Units in 1/2 to 3/4 Mile of Transit	130	Existing Only	Dwelling Units				
	Existing Residential Units more than 3/4 Mile of Transit	265	Existing Only	Dwelling Units				
	Existing Employees less than 1/4 Mile of Transit	18,281	Existing Only	Employees				
	Existing Employees in 1/4 to 1/2 Mile of Transit	10,755	Existing Only	Employees				
	Existing Employees in 1/2 to 3/4 Mile of Transit	5,088	Existing Only	Employees				
	Existing Employees more than 3/4 Mile of Transit	1,302	Existing Only	Employees				
Manage Traffic Congestion								
TDM and Managed Parking								
Reduce Greenhouse Gas Emissions	GHGs - New Non-Residential Structures		Future New	Metric Tons CO2eq	218,797	215,949	197,193	225,094
	GHGs - New Residential Structures		Future New	Metric Tons CO2eq	7,279	12,660	20,504	29,555
	Estimated New Greenhouse Gas Emissions		Future New	Metric Tons CO2eq	226,076	228,609	217,698	254,649
	GHGs per Functional Population (employees + residents)		Future New	Metric Tons CO2eq	-11.94	-11.74	-11.27	-11.22
Reduce Building Energy Use	Estimated New Energy Use: Non-Residential Structures		Future New	Million BTU per Yea	863,264	852,026	778,026	888,107
	Energy Use per Employee		Future New	Million BTU per Yea	49.20	49.72	49.51	51.16
	Estimated New Energy Use: Residential Structures		Future New	Million BTU per Yea	28,718	49,950	80,899	116,609
	Energy Use per Resident		Future New	Million BTU per Yea	20.65	21.33	22.48	21.86
	Estimated New Energy Use: TOTAL		Future New	Million BTU per Yea	891,983	901,975	858,925	1,004,716
	Energy Use per Functional Population (employees + residents)		Future New	Million BTU per Yea	-47.11	-46.30	-44.47	-44.27
Maintain Employment Diversity	New Employees - Focus Areas		Focus New	Employees	4,300	3,892	2,470	4,114
	New Employees - Outside of Focus Areas		Focus New	Employees	13,245	13,245	13,245	13,245
	New Employees in Study Area		**Future New**	**Employees**	**17,545**	**17,138**	**15,715**	**17,360**
	New Employees Outside of Focus Areas		Focus New	Employees	13,245	13,245	13,245	13,245
	New Employees in Focus Area 1		Focus New	Employees	714	851	962	702
	New Employees in Focus Area 2		Focus New	Employees	327	185	327	327
	New Employees in Focus Area 3		Focus New	Employees	524	748	-579	-161
	New Employees in Focus Area 4		Focus New	Employees	164	122	36	1,229
	New Employees in Focus Area 5		Focus New	Employees	1,912	1,665	1,404	1,648
	New Employees in Focus Area 6		Focus New	Employees	592	252	252	301
	New Employees in Focus Area 7		Focus New	Employees	67	67	67	67
	New Employees in Focus Area 8		Focus New	Employees	0	0	0	0
	New Employees: Agriculture and Mining		Future New	Employees	28	28	28	28
	New Employees: Education		Future New	Employees	1,381	1,381	1,381	1,381
	New Employees: Government		Future New	Employees	326	326	326	326
	New Employees: Health		Future New	Employees	687	1,136	793	793
	New Employees: Leisure and Hospitality		Future New	Employees	1,918	2,506	2,082	3,490
	New Employees: Light Industrial		Future New	Employees	4,545	3,150	2,920	1,878
	New Employees: Office		Future New	Employees	4,765	4,430	4,284	4,206
	New Employees: Other Services		Future New	Employees	896	849	849	849
	New Employees: Retail		Future New	Employees	3,000	3,333	3,053	4,410
	Employment Mix Index		Future New	Score (0 to 1)	0.82	0.85	0.85	0.83

	Name	Baseline	Scale (what is being measured)	Units	Scenario A	Scenario B	Scenario C1	Scenario C2
	New Building Square Feet: Non-Residential		**Future New**	**Square Feet**	**7,786,895**	**7,628,399**	**7,124,123**	**7,713,160**
	New Building Square Feet: Non-Residential Outside of Focus Areas		Focus New	Square Feet	5,963,462	5,963,462	5,963,462	5,963,462
	New Building Square Feet: Non-Residential in Focus Area 1		Focus New	Square Feet	276,159	336,323	372,664	278,786
	New Building Square Feet: Non-Residential in Focus Area 2		Focus New	Square Feet	179,441	111,661	179,441	179,441
	New Building Square Feet: Non-Residential in Focus Area 3		Focus New	Square Feet	243,432	320,175	-164,292	-33,707
	New Building Square Feet: Non-Residential in Focus Area 4		Focus New	Square Feet	77,860	64,745	37,029	510,729
	New Building Square Feet: Non-Residential in Focus Area 5		Focus New	Square Feet	765,596	665,787	569,573	628,197
	New Building Square Feet: Non-Residential in Focus Area 6		Focus New	Square Feet	205,424	90,725	90,725	110,732
	New Building Square Feet: Non-Residential in Focus Area 7		Focus New	Square Feet	70,748	70,748	70,748	70,748
	New Building Square Feet: Non-Residential in Focus Area 8		Focus New	Square Feet	4,773	4,773	4,773	4,773
	Total Employees	**35,399**	**Future Total**	**Employees**	**52,944**	**52,537**	**51,114**	**52,759**
	Total Employees: Agriculture and Mining	38	Future Total	Employees	66	66	66	66
	Total Employees: Education	1,141	Future Total	Employees	2,522	2,522	2,522	2,522
	Total Employees: Government	543	Future Total	Employees	868	868	868	868
	Total Employees: Health	1,455	Future Total	Employees	2,143	2,591	2,249	2,249
	Total Employees: Leisure and Hospitality	3,884	Future Total	Employees	5,802	6,390	5,966	7,374
	Total Employees: Light Industrial	8,281	Future Total	Employees	12,825	11,431	11,201	10,158
	Total Employees: Office	9,624	Future Total	Employees	14,389	14,054	13,908	13,830
	Total Employees: Other Services	2,317	Future Total	Employees	3,213	3,165	3,165	3,165
	Total Employees: Retail	8,117	Future Total	Employees	11,117	11,450	11,171	12,527
	Employment Mix Index Overall Study Area	0.80	Future Total	Score (0 to 1)	0.81	0.82	0.82	0.82
	Total Employees	35,399	Future Total	Employees	**52,944**	**52,537**	**51,114**	**52,759**
	Total Employees: Service Related	14,318	Future Total	Employees	20,132	21,005	20,302	23,066
	Total Employees: Industry and Office	17,905	Future Total	Employees	27,214	25,485	25,108	23,989
	Total Employees: Health	1,455	Future Total	Employees	2,143	2,591	2,249	2,249
	Total Employees: Other	1,721	Future Total	Employees	3,456	3,456	3,456	3,456
	Employment Mix Index Overall Study Area: Less Categories	0.71	Future Total	Score (0 to 1)	0.73	0.75	0.75	0.75
	Total Employees + Dwelling Units	**37,992**	**Future Total**	**Employees + Dwelli**	**56,385**	**56,441**	**55,856**	**58,564**
	Total Employees: Service Related	14,318	Future Total	Employees	20,132	21,005	20,302	23,066
	Total Employees: Industry and Office	17,905	Future Total	Employees	27,214	25,485	25,108	23,989
	Total Employees: Health	1,455	Future Total	Employees	2,143	2,591	2,249	2,249
	Total Employees: Other	1,721	Future Total	Employees	3,456	3,456	3,456	3,456
	Total Dwelling Units	2,593	Future Total	Dwelling Units	3,441	3,905	4,742	5,805
	Employment Mix Index Overall Study Area: Plus Residential	0.73	Future Total	Score (0 to 1)	0.74	0.76	0.77	0.78
Minimize Water and Wastewater Utility Impacts	Estimated New Water Use: Residential Structures		Future New	Gallons per Day	1,073,502	1,211,226	1,361,868	1,551,298
	Water Use per Capita - New Residential Units		Future New	Gallons per Day per	-772	-517	-378	-291
Minimize Fiscal Impacts								