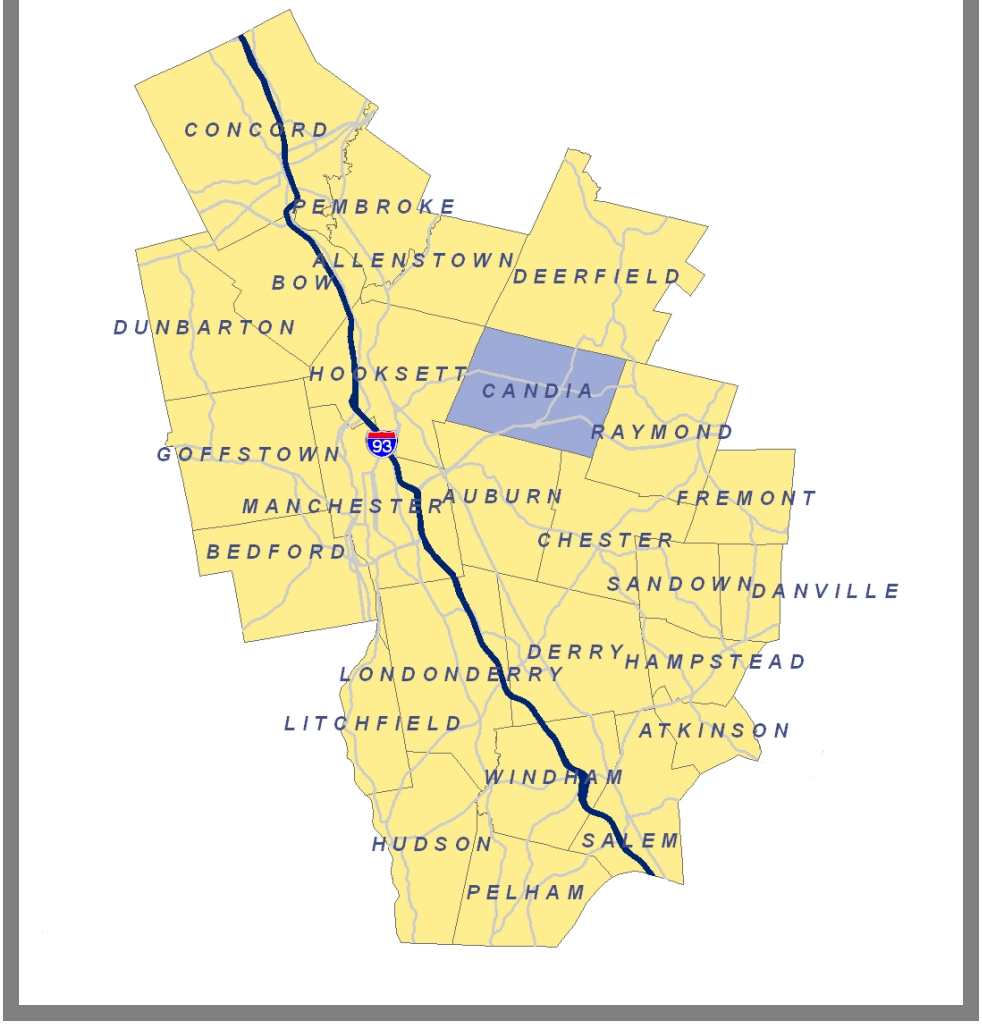

Town of Candia

CTAP Buildout Report

I-93 Community Technical Assistance Program
CTAP
New Hampshire Communities Planning Together

CTAP PROGRAM | BUILDOUT METHODS | COMMUNITY SCENARIOS | BUILDOUT RESULTS | INDICATORS

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A project of
CTAP - Community
Technical Assistance
Program

Table of Contents

Introduction 2
What is CTAP? 2
What is a Buildout? 2
What a Buildout is not? 3
Scenario Planning 3
Report Template 3
Methods 4
Tools and Data 4
Procedures 5
Buildout Scenarios 7
Standard Alternative 9
Method Adjustments Made in Base and Standard Alternative Buildouts ..... Error! Bookmark not defined.
Community Scenario 12
Indicators ..... Error! Bookmark not defined.
Indicators – BUILDOUT 17
Indicators – DEMOGRAPHICS & EMPLOYMENT 19
Indicators – ENVIRONMENTAL & OPEN SPACE 22
Indicators – LAND USE CHARACTERISTICS 23
Indicators – MUNICIPAL DEMANDS 28
Indicators – WATER AND ENERGY USE 30
Indicators – TRANSPORTATION 32
Appendices 35

Introduction

This report details the Community Technical Assistance Program (CTAP) Buildout Analysis results for the Town of Candia, New Hampshire. CTAP is a five-year initiative designed to assist communities that will be affected by the rebuilding of I-93. This buildout, one of 26, is designed to allow a community to assess their future needs and help them reduce any negative consequences from the increased development pressure caused by the widening of I-93.

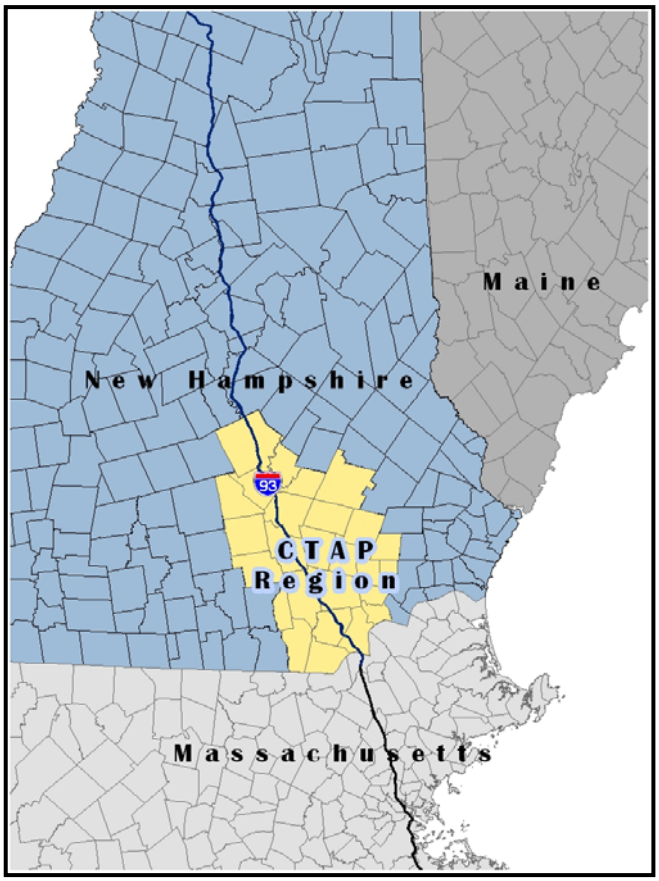
What is CTAP?

CTAP is a joint effort between the 26 communities in the corridor, state agencies, regional planning commissions, and several non-profit organizations. The purpose of CTAP is to promote beneficial growth patterns and development practices that minimize the negative effects of growth on community services, remaining open space, schools, traffic patterns, environmental quality, and existing residential and commercial development. The CTAP initiative consists of several projects, one of which is a buildout analysis. A standardized buildout analysis will be completed for each of the 26 CTAP communities.

What is a Buildout?

A buildout is a tool that allows planners to estimate future development based on different scenarios. This buildout is an analysis of existing adopted municipal policy. The buildout method allows for the potential testing of alternative land use regulation, open space planning and major development scenarios. A buildout consists of one or more scenarios. This buildout contains three scenarios: base, standard alternative, and community alternative. The process is designed with the capability for conducting future alternative scenario testing.

The Buildout analysis shows the maximum growth that is likely to occur in a community under current land use regulations (zoning).



Comparing various scenarios allows planners to test the effects and consequences of new zoning ordinances. Changing setbacks, densities, and building restrictions can significantly alter a buildout. The analysis of results allows planners to evaluate the effectiveness and viability of changes to the zoning code. Questions that can be answered by a buildout scenario testing include: Where do I want my community to be at buildout? How much open space will there be? What will the traffic patterns look like? What will the quality of our environmental resources be like? Where will people live and what will the development patterns look like? The purpose of CTAP is to promote beneficial answers to all of these

questions. The CTAP program aims to achieve goals that cover four themes: community infrastructure, environment protection, land use, and open space, downtown/village centers and community vitality and the local economy. The CTAP Buildout project is a community empowerment tool to help people make the best long-term planning decisions.

What a Buildout is not?

A Buildout is not a prediction of what will occur. It is a planning tool to allow community decision makers to understand the impacts of growth under a set of land use rules. In addition, the Community Specified scenarios in this report do not necessarily represent official policy goals or a plan for the community, but are merely a test of one alternative growth scenario.

Scenario Planning

Scenarios are an analysis about what might be. They are not predictions about what will happen but they are possible futures based on what already exists, on current trends, and on the values and on the preferences of a community. Each community is unique and may have different goals and face different challenges to how it will change over time. The scenarios in this report are based on both standardized methods, repeated for each CTAP Community, and a scenario where the details have been specified by community leaders and stakeholders. The scenarios are built as a way to compare outcomes and learn about the potential effects of government policies over a long span of time. Because the analysis is quantitative, scenarios can be compared directly utilizing charts and maps. The point is to help discover which long-term growth scenarios our preferable and most closely match the goals and values of the community.

Report Template

The format of this report is a template that will be used to uniformly present the buildout results for each of the 26 communities in the CTAP Region. Maps, charts and a few paragraphs of text will change for each community. This report presents only the results of the buildout scenarios. It does not attempt to be a planning analysis of those results. Each Community Report will contain the same Introduction and Overview sections on the process. Only maps, charts and the Community Scenario section will change for each different community.

Buildout questions:

- **Where do I want my community to be at buildout?**
- **How much open space will there be?**
- **What will the traffic patterns look like?**
- **What will the quality of our environmental resources be like?**
- **Where will people live and what will the development patterns look like?**

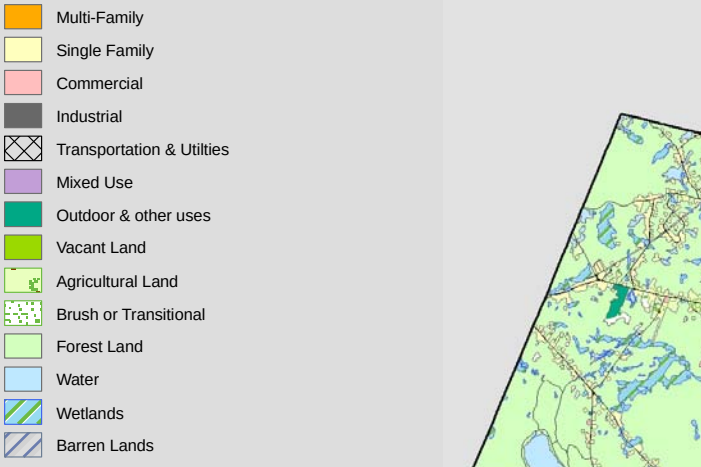
Methods

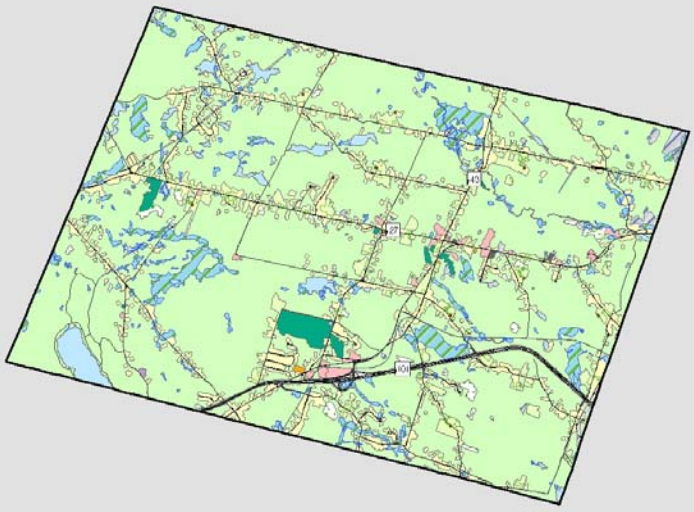
Tools and Data

Buildouts were conducted using Geographic Information systems (GIS) software. The application used for this project is developed by the mapping software company ESRI. ArcMap and CommunityViz are the core programs used in the analysis. The CommunityViz program is an extension that works with ArcMap and is used specifically to perform buildout analyses. CommunityViz was developed by the Orton Family Foundation in order to provide communities with an affordable tool to perform buildout studies.

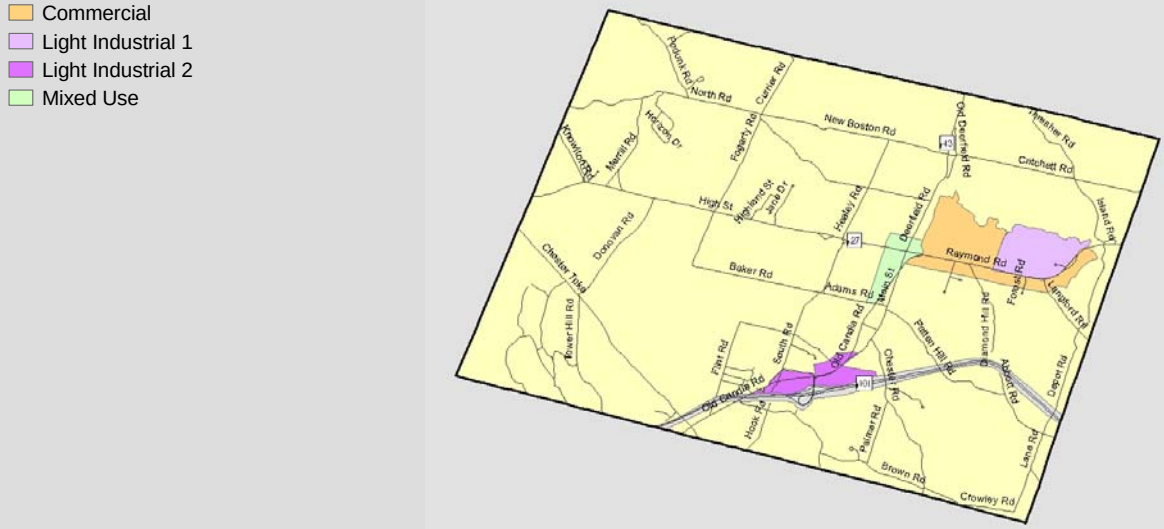
The GIS data used in this study originates from several sources. The base shapefiles (road centerlines, conservation lands, wetlands, etc.) were provided by GRANIT, the official New Hampshire GIS data provider. The land use polygons were created through a prior CTAP project, using 2005 aerial images provided by the NH Department of Transportation. The classification applied to the land use polygons is very detailed, using over 50 land uses. The current building points were also determined using the 2005 aerial images.

CTAP Existing Land Use





Candia Zoning



Procedures

To complete the buildouts a CTAP Buildout Working Group was established. Members of the group consisted of the Four Regional Planning Commissions, who would be performing the analysis: Central New Hampshire Regional Planning Commission, Nashua Regional Planning Commission, Rockingham Regional Planning Commission & Southern New Hampshire Regional Planning Commission. This group was responsible for defining the tools, methods and procedures for performing the buildouts. The group is also responsible for the format of the presentation of results. Staff from each Regional Planning Commission conducted the buildout for communities in their region.

All CTAP buildouts follow the same basic procedures allowing them to be combined upon completion. The existing data used for each municipality is obtained from statewide layers, and clipped for each town. The data created for the buildout follows a strict set of guidelines in order to produce a uniform set for the CTAP region.

CommunityViz software uses the land use and zoning inputs with the constraint layers to create a buildable area GIS layer. First a numeric buildout is calculated using lot size and allowable density information. Next a spatial buildout is conducted. This process takes into account spatial restrictions (i.e. Setbacks from roads, distance between buildings). The spatial restrictions for the base buildout are determined using the current zoning ordinances. This produces a layer of new estimated buildings and places them as points

Map layers used in the Buildout Analysis.

Land use inputs:

- CTAP Land Use - based on 2005 Aerial Imagery
- Zoning
- Current Building points - based on 2005 Aerial Imagery
- Community Centers - NHDES Sprawl Indicators data, NH GRANIT
- Road Centerlines - NHDOT, NH GRANIT
- Transit Stops - Derived from local data
- Sewer Service Areas - NHDES, NH GRANIT

Constraint layers:

- Wetlands, National Wetland Inventory (NWI) - NH GRANIT
- 100-Year Floodplain - FEMA, NH GRANIT
- Conservation Lands - Local data & NH GRANIT
- Natural Services Network (NSN) - Jordan Institute, NH GRANIT

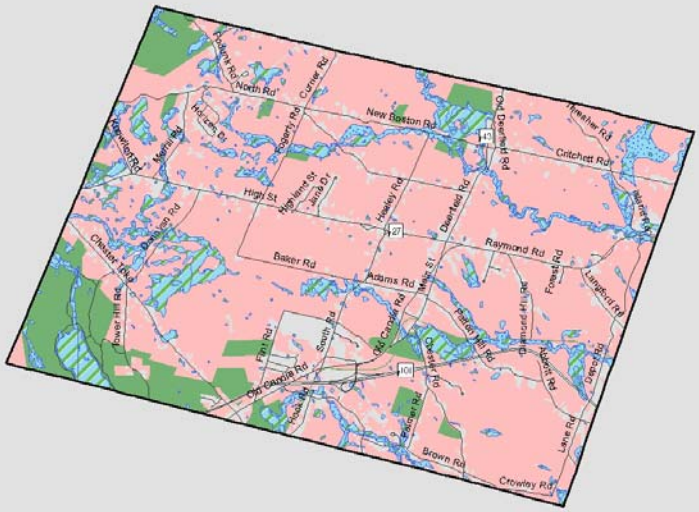
on the map. Standard Alternative and Community Alternative Buildouts using the same process with adjustments to the land use rules (Zoning changes, allowable uses & allowable densities) that are specified in those scenarios.

Once the buildout is complete, a template, containing all assumptions, indicators and charts is applied. All indicators are calculated from the basic buildout results. The standard template ensures that the calculations and charts are the same for all of the region's buildouts.

Detailed input and output reports, produced directly from the CommunityViz software, are available in Appendix A.

Developable Lands & Constraints

- National Wetlands Inventory (NWI)
- 100yr Floodplain
- Conservation Land
- Developable Land

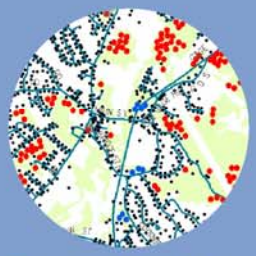


Buildout Scenarios

This report tests and compares three alternative scenarios for growth. Each scenario produces different land use patterns, different densities and different development totals. The mix of jobs and housing, available open space, traffic, schools, water and air quality and community character are all imopacted in differnt ways. By comparing the maps and charts produced by each scenario, a community can analyze how that growth pattern will affect their city of town.

Base Buildout

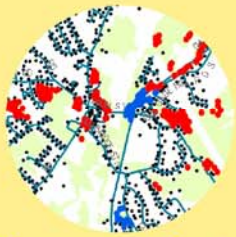
This scenario is a maximum development buildout under current regulations. It will be conducted uniformly for all communities in the region. Developable areas will be identified through CTAP land Use inputs and Zoning overlays. Density, setbacks and lot coverage will be applied from zoning regulations. The standard constraints of wetlands, 100-year floodplain and conservation lands will be applied.



Existing Regulations & constraints

Standard Alternative Buildout

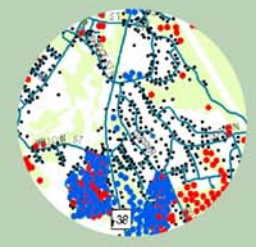
This alternative scenario is also conducted uniformly for all communities in the region. It applyies the Natural Services Network (NSN) layer as an additional development constraint. However, adjustments to allowable densities are made to maintain an equal number of new housing units and non-residential square feet. This growth neutral method is conducted by increasing density in concentric rings based on distance from one or more community centers



Community Center clustering & additional ecological constraints

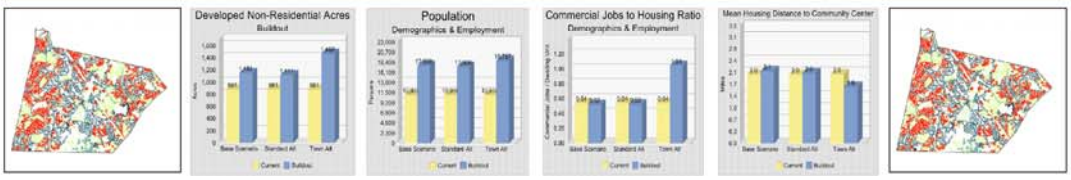
Community Scenario Buildout

A third scenario is an opportunity for each community to specify factors or issues unique to the municipality and to test their own alternatives. This is a chance for to test some of the issues identified in the CTAP Community Assessments



Community specified changes

Comparison of Scenarios through Buildout Maps and Indicators



Base Scenario

The first scenario, conducted for all communities, is the Base Scenario. This scenario represents what buildout would look like following the current land use regulations. Density, setbacks and lot coverage is applied from the current zoning regulations. The standard development constraints of wetlands, 100-year floodplain and conservation lands are applied.

If current zoning is a blueprint for how the community should grow then this scenario is the culmination of the existing regulations. The indicators in this report are meant to portray a wide range of conditions at buildout. Development growth means more than additional persons, houses or commercial buildings. It can have impacts on finances, traffic, municipal services, environmental quality and sense of community or place. The land use pattern for how a community grows, where development will take place and in what densities, can also have a significant impact.

If current zoning is a blueprint for how the community should grow then the Base Buildout Scenario is the culmination of the existing regulations.

Base Buildout

• Current Buildings

Buildout Buildings

• Multi-Family Residential
• Non-Residential
• Single Family Residential

Standard Alternative

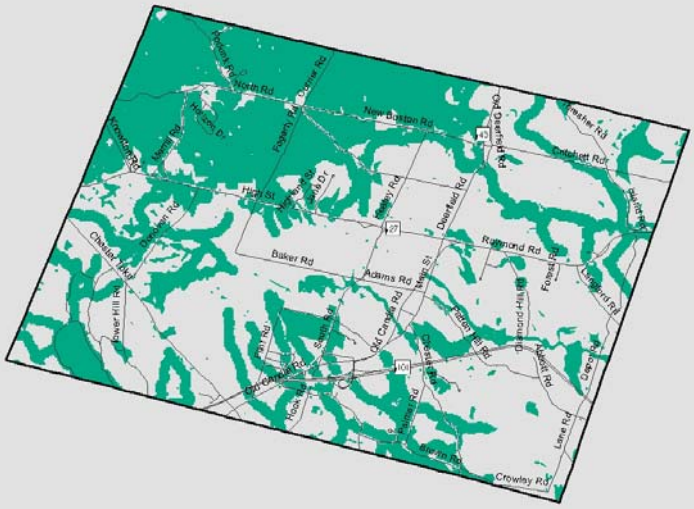
The standard alternative scenario will also be conducted uniformly for all communities in the region. The scenario is different from the Base Scenario in a couple of key ways. First, it applies the Natural Services Network (NSN) layer as an additional development constraint. Second, adjustments to allowable densities will be made to maintain an equal number of new housing units and non-residential square feet. This growth neutral method will be conducted by increasing density in concentric rings based on distance from one or more community centers.

This scenario is focused on creating densely developed downtown areas, sparing important ecological areas identified in the Natural Services network (NSN). The NSN is a co-occurrence analysis and includes four components: water supply lands, flood storage lands, productive soils, and important wildlife habitat.

The Standard Alternative Scenario does not represent a policy proposal for the community. It is a standardized method to analyze an alternative growth scenario that can be applied uniformly to all CTAP communities.

Natural Services Network Constraint

Natural Services Network (NSN)



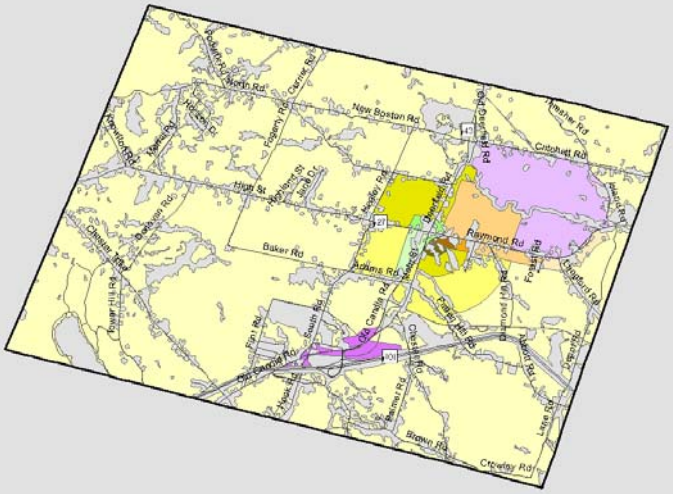
The key to the Standard Alternative Scenario is to adjust allowable development densities so that an approximately equal amount of growth occurs as the Base Buildout despite the fact that more land has been set aside as un-buildable. This scenario is applying a standardized, uniform growth alternative to all communities in the CTAP region. It is not limiting the amount of commercial and residential growth that might occur in the community, but it is managing it differently.

Standard Alternative Scenario:

- NSN added as additional development constraint.
- Greater density around community centers.
- Same amount of growth as base scenario

Standard Alternative Density Changes

- Commercial-outside 1 mile
- Commercial-within 1 mile
- Commercial-within 1/2 mile
- Commercial-within 1/4 mile
- Light Industrial 1-outside 1 mile
- Light Industrial 2-outside 1 mile
- Mixed Use-within 1/2 mile
- Mixed Use-within 1/4 mile
- Residential-outside 1 mile
- Residential-within 1 mile
- Residential-within 1/2 mile
- Residential-within 1/4 mile

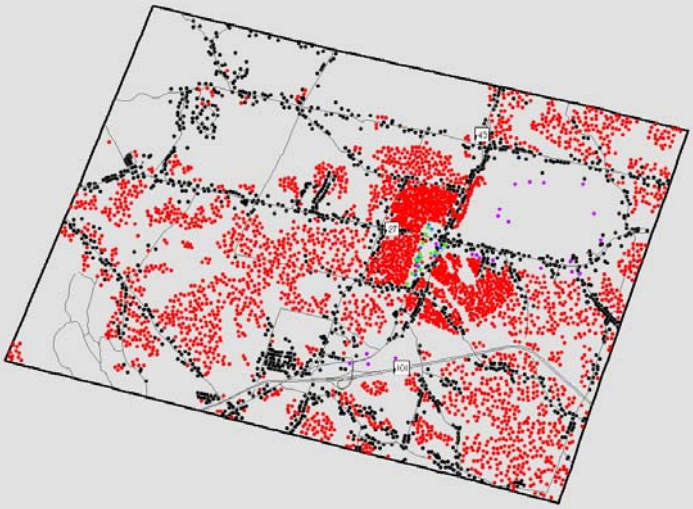


Standard Alternative Buildout

- Current Buildings

Buildout Buildings

- Mixed Use
- Multi-Family Residential
- Non-Residential
- Single Family Residential



Community Scenario

A third scenario was provided for each community to specify factors or issues unique to the municipality and to test their own alternatives. This scenario is known as the **community scenario**. This is a chance for certain properties to be removed or added to the developable areas list or for particular regulation changes to be implemented. In order to get the community's input for their scenario, meetings were conducted with local officials and volunteers. This was an opportunity for the community leaders to test what would occur if their Town or City were to grow in a different way. This is a chance to apply goals specified in Master Plan or other planning document, or to test the affects of purchasing large tracts of land for conservation.

> The Community scenario is only a test of an alternative growth pattern. It is a planning tool conducted to see what changes might occur. It doe not necessarily represent a policy plan for the community

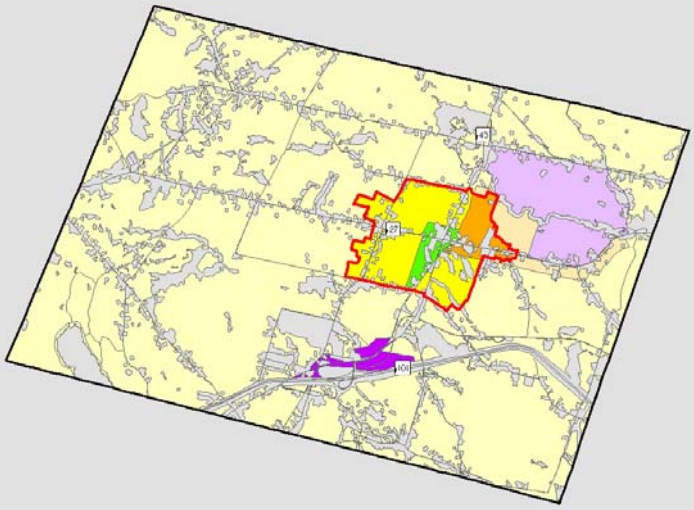
The Community Scenario is only a test of an alternative growth pattern. It is a planning tool conducted to see what changes might occur. It does not necessarily represent a policy plan for the community. Unlike the Standard Alternative Scenario, the Community Scenario does not require growth to be the equal to the Base Buildout. Significantly lower or greater amounts of development are possible.

Community Scenario

Village Plan Study Area

Buildable Lands

- Commercial
- Commercial Village
- Light Industrial 1
- Light Industrial 2
- Mixed Use Village
- Residential
- Residential Village



The Candia Community Scenario consists of two buildouts focusing on a high density village zone in the center of town. This study was conducted during the same time period as the Candia Village Plan and input from the planning board was necessary to determine the village zone boundaries. Community Scenario A consisted of ½ acre zoning in the residential and mixed use areas within the village zone. Zoning densities outside the village zone remained at their current values. Residential and mixed use areas within the village zone were given 1 acre zoning for Community Scenario B. Zoning densities outside the village area remained at their current values for this buildout as well.

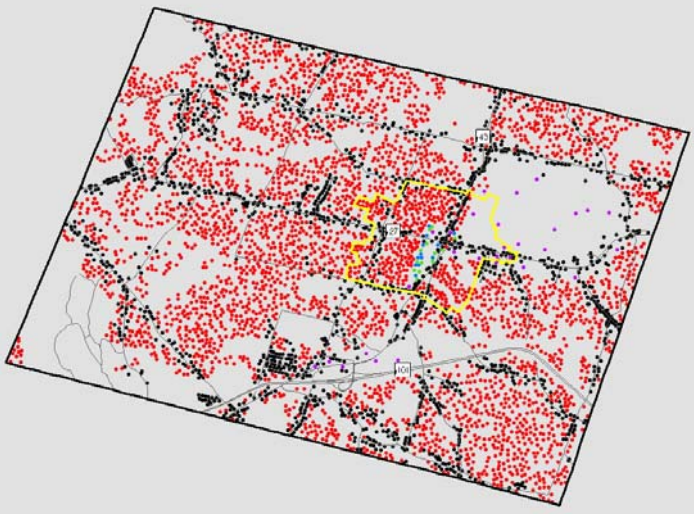
Community Scenario A

Legend

- Village Plan Study Area
- Current Buildings

Buildout Buildings

- Mixed Use
- Multi-Family Residential
- Non-Residential
- Single Family Residential



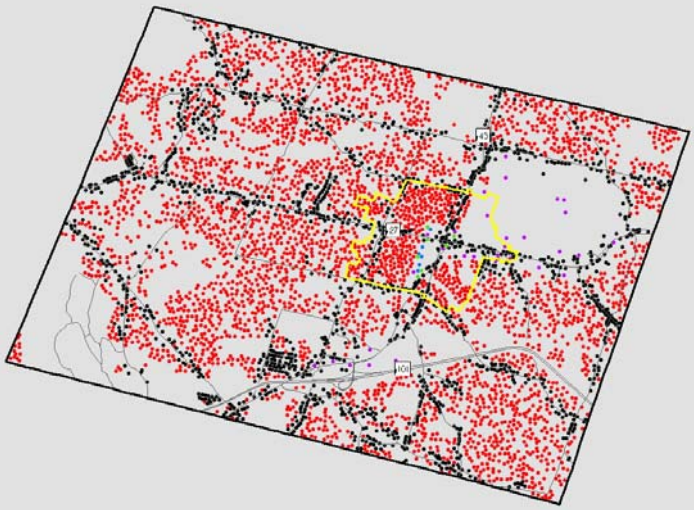
Community Scenario B

Legend

- Village Plan Study Area
- Current Buildings

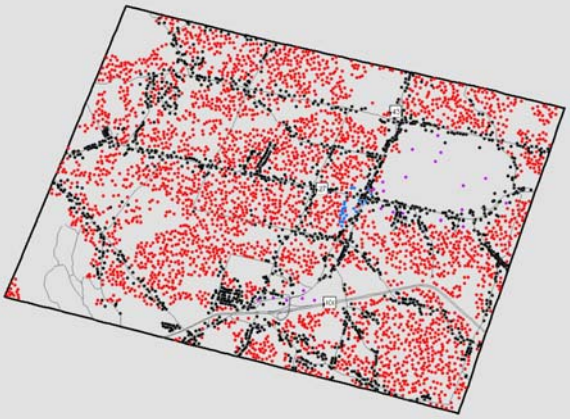
Buildout Buildings

- Mixed Use
- Multi-Family Residential
- Non-Residential
- Single Family Residential

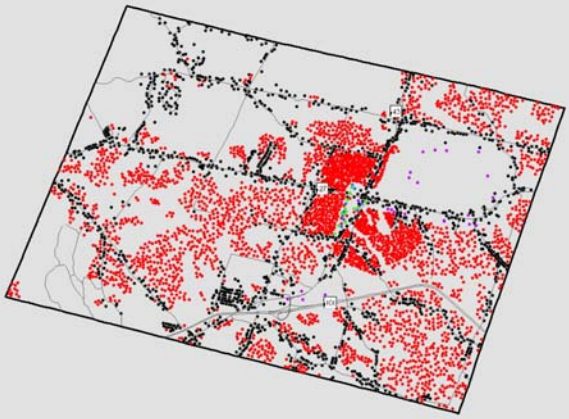


Buildout Scenario Comparison

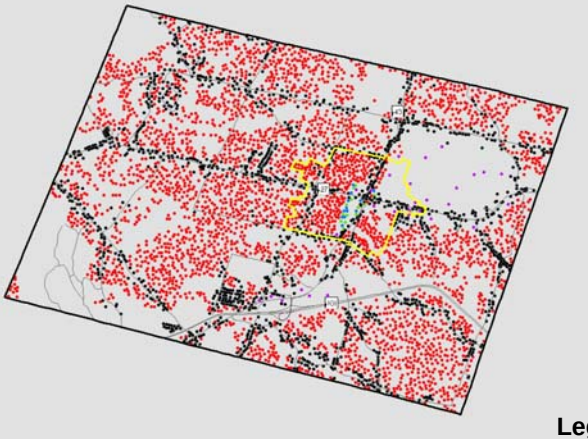
Base Buildout



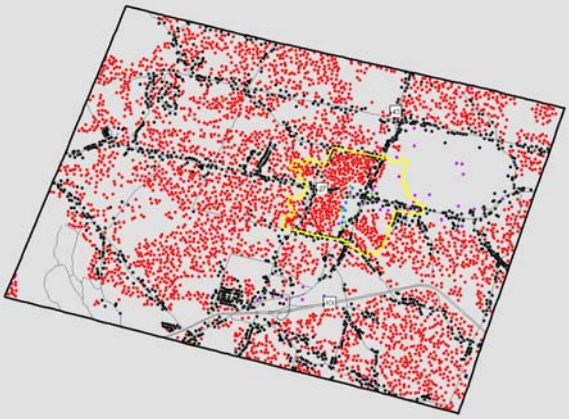
Standard Alternative



Community Scenario A



Community Scenario B



Legend

- Village Plan Study Area
- Current Buildings

Buildout Buildings

- Mixed Use
- Multi-Family Residential
- Non-Residential
- Single Family Residential

Indicators

Indicators are impact or performance measures that help people choose alternatives that best match their objectives or desired outcomes. An indicator is a calculated value that represents the impacts or outcomes of a scenario. An indicator might be used to evaluate costs, revenues, average household size, or total daily auto trips. The buildout indicators in this report are meant to provide a macro, overall picture of how a community could look at buildout.

Comparing indicators by the different buildout scenarios provides an assessment of the effects different development patterns may have. There are 40 indicators arranged in seven categories: Buildout, Demographics & Employment, Environmental & Open Space, Land Use Characteristics, Municipal Demands, Water & Energy Use & Transportation. The following pages explain what each indicator means and chart the differences by scenario.

Category	Indicator	Units	Current	Base Buildout	Percent Change	Standard Alternative Scenario	Percent Change	Town Scenario A	Percent Change	Town Scenario B	Percent Change
Buildout	Developed Residential Acres	Acres	1,827	13,360	631%	13,224	624%	13,362	631%	13,359	631%
	Developed Non-Residential Acres	Acres	537	1,867	248%	1,834	242%	1,864	247%	1,866	247%
	Residential Dwelling Units	d.u.'s	1466	4,707	221%	4,289	193%	4,895	234%	4,880	233%
	Commercial Floor Area	sq. ft	619,166	765,277	24%	838,371	35%	774,319	25%	770,150	24%
Demographics & Employment	Population	Persons	3,753	12,050	221%	10,980	193%	12,531	234%	12,493	233%
	School Kids Population	School Kids	709	2,277	221%	2,075	193%	2,368	234%	2,361	233%
	Labor Force Population	Workers	1,535	4,927	221%	4,490	193%	5,124	234%	5,108	233%
	Commercial Jobs	Jobs	752	930	24%	1,019	36%	941	25%	936	24%
	Jobs to Housing Ratio	Jobs/d.u.	0.51	0.2	-61%	0.24	-53%	0.19	-63%	0.19	-63%
Environmental & Open Space	Open Space Supply	Acres	32,403	19,539	-40%	19,709	-39%	19,541	-40%	19,541	-40%
	Impervious Surfaces	Percent	1.5	8.6	473%	8.5	467%	8.6	473%	8.6	473%
Land Use Characteristics	Total Density	Persons/mi²	65	210	223%	191	194%	218	235%	218	235%
	Residential Housing Density	d.u./Acre	0.8	0.35	-56%	0.32	-60%	0.37	-54%	0.37	-54%
	Residential Development Footprint	Acres/d.u.	1.25	2.84	127%	3.08	146%	2.73	118%	2.74	119%
	Recreation Density	Ft^2/person	2,677	834	-69%	915	-66%	802	-70%	804	-70%
	Housing Proximity to Recreation	Miles	0.82	0.94	15%	0.8	-2%	0.92	12%	0.92	12%
	Housing Proximity to Community Centers	Miles	2.2	2.3	5%	2	-9%	2.2	0%	2.2	0%
	Housing Proximity to Amenities	Miles	0.8	0.87	9%	0.85	6%	0.85	6%	0.86	7%
	Walkability	Percent	3.48	2.44	-30%	6.6	90%	4.41	27%	3.75	8%
	Housing Proximity to Transit	Miles	0	0	0%	0	0%	0	0%	0	0%
	Employment Proximity to Transit	Miles	0	0	0%	0	0%	0	0%	0	0%
Municipal Demands	Fire & Ambulance Service	Calls/Years	300	964	221%	878	193%	1,002	234%	999	233%
	Police Service	Calls/Years	4,766	15,303	221%	13,944	193%	15,915	234%	15,866	233%
	Solid Waste Demand	Annual Tons	2,027	6,507	221%	5,959	194%	6,767	234%	6,746	233%
Water & Energy Use	Total Energy Use	mbtu/hh/yr	230,383	617,680	168%	567,442	146%	640,202	178%	638,061	177%
	Residential Energy Use	mbtu/hh/yr	168,590	541,305	221%	483,773	187%	562,925	234%	561,200	233%
	Commercial Energy Use	mbtu/hh/yr	61,793	78,375	27%	83,669	35%	77,277	25%	76,861	24%
	Residential Water Use	mgals/yr	199	463	133%	397	99%	489	146%	487	145%
Transportation	Vehicles	Vehicles	2,697	8,661	221%	7,892	193%	9,007	234%	8,979	233%
	Vehicle Trips per Day	Trips/Day	13,759	44,775	225%	40,467	194%	46,574	238%	46,431	237%
	Annual CO Auto Emissions	Grams/Yr	2,124,131	6,972,975	228%	6,268,991	195%	7,254,241	242%	7,231,799	240%
	Annual CO2 Auto Emissions	Tons/Yr	44	144	227%	130	195%	150	241%	149	239%
	Annual NOx Auto Emissions	lbs	133,170	438,477	229%	401,530	202%	455,829	242%	451,890	239%
	Annual Hydrocarbon Auto Emissions	Grams/Yr	268,301	880,763	228%	791,842	195%	916,290	242%	913,455	240%

Indicators – BUILDOUT

Indicator: DEVELOPED RESIDENTIAL ACRES

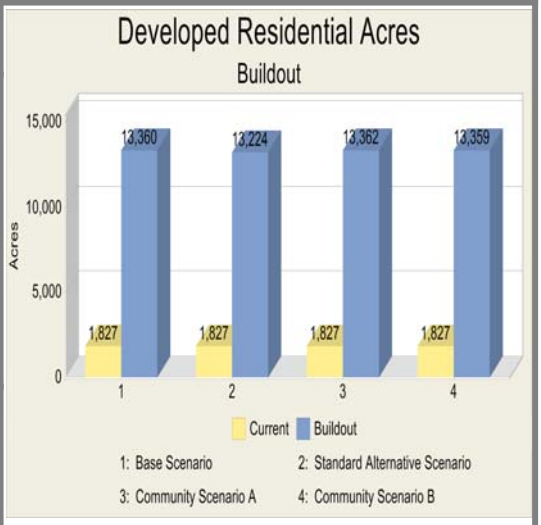
INDICATORS

BUILDOUT

Description: *Total number developed residential acres*

The total number of developed acres was calculated using the CTAP land use polygons. The polygons were then classified as residential based upon the land use classification.

Source: *CTAP land use polygons*



Value: Acres CURRENT	BASE BUILDOUT	STANDARD ALTERNATIVE	COMMUNITY SCENARIO A/B
1,827	13,360 +631%	13,224 +624%	13,362/13,359 +631%/+631%

Indicator: DEVELOPED NON-RESIDENTIAL ACRES

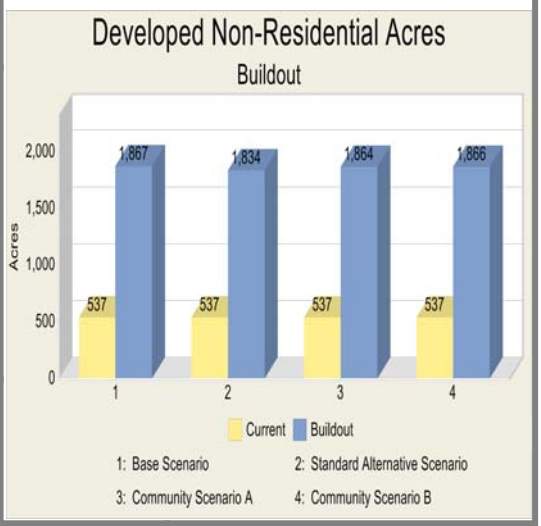
INDICATORS

BUILDOUT

Description: *Total number of developed non-residential acres*

The total number of developed acres was calculated using the CTAP land use polygons. The polygons were then classified as non-residential based upon the land use classification.

Source: *CTAP land use polygons*



Value: Acres CURRENT	BASE BUILDOUT	STANDARD ALTERNATIVE	COMMUNITY SCENARIO A/B
537	1,867 +248%	1,834 +242%	1,864/1,866 +247%/+247%

Indicators – BUILDOUT cont.

Indicator: RESIDENTIAL DWELLING UNITS

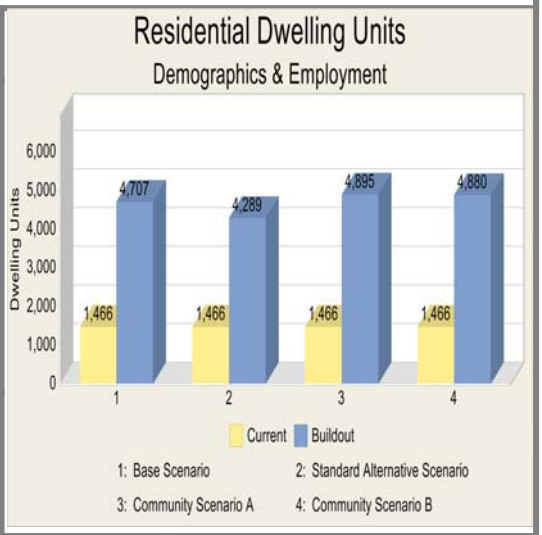
INDICATORS

BUILDOUT

Description: *Total number of dwelling units*

This indicator represents the total number of dwelling units located within the municipality. This indicator represents the number of current dwelling units combined with the additional number of dwelling units. The number of dwelling units is at the base of many other indicators including population.

Source: *CTAP buildout analysis, 2005 DOT aerial photography*



Value: d.u. CURRENT	BASE BUILDOUT	STANDARD ALTERNATIVE	COMMUNITY SCENARIO A/B
1,466	4,707 +221%	4,289 +193%	4,895/4,880 +234%/+233%

Indicator: COMMERCIAL FLOOR AREA

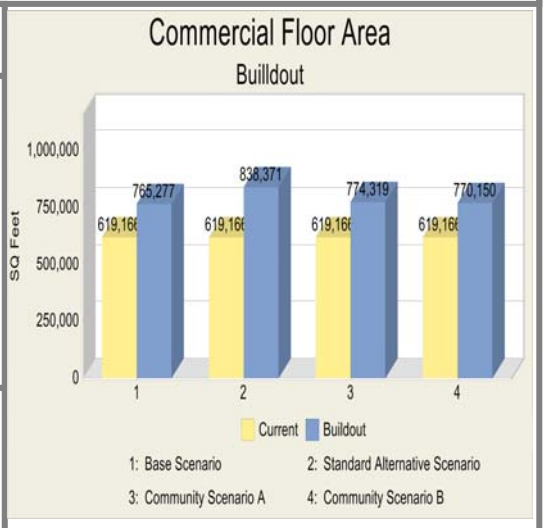
INDICATORS

BUILDOUT

Description: *Total commercial floor area*

The commercial floor area is the amount of floor area in non-residential buildings. The floor area for commercial buildings was calculated from assessing data and the 2005 aerial photos. The median floor area for commercial and industrial buildings was then used for the new buildings created by the software. The commercial floor area is used to calculate several indicators and is an integral part of the buildout.

Source: *2005 DOT aerial photography*



Value: Sq ft. CURRENT	BASE BUILDOUT	STANDARD ALTERNATIVE	COMMUNITY SCENARIO A/B
619,166	765,277 +24%	838,371 +35%	774,319/770,150 +25%/+24%

Indicators – DEMOGRAPHICS & EMPLOYMENT

INDICATORS

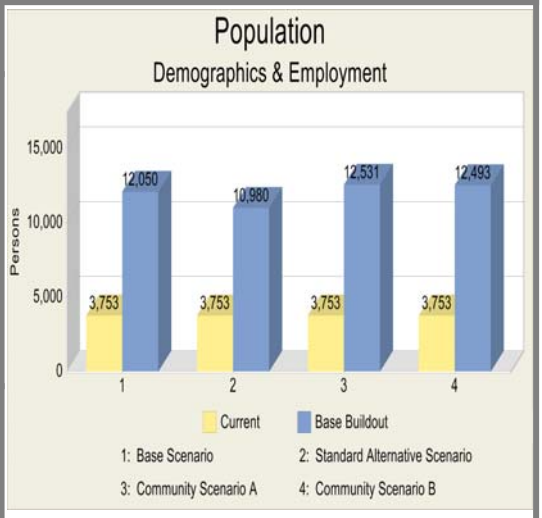
Indicator: POPULATION

DEMOGRAPHICS & EMPLOYMENT

Description: *Total population living in the municipality*

The population was calculated using the number of dwelling units and the average people per dwelling unit. The dwelling units were determined using the current buildings data layer and the CTAP land use -polygons. The 2000 census states that the average dwelling unit contains 2.56 people.

Source: *CTAP land use polygons, U.S. Census Bureau 2000*



Value: Persons CURRENT	BASE BUILDOUT	STANDARD ALTERNATIVE	COMMUNITY SCENARIO A/B
3,753	12,050 +221%	10,980 +193%	12,531/12,493 +234%/+233%

INDICATORS

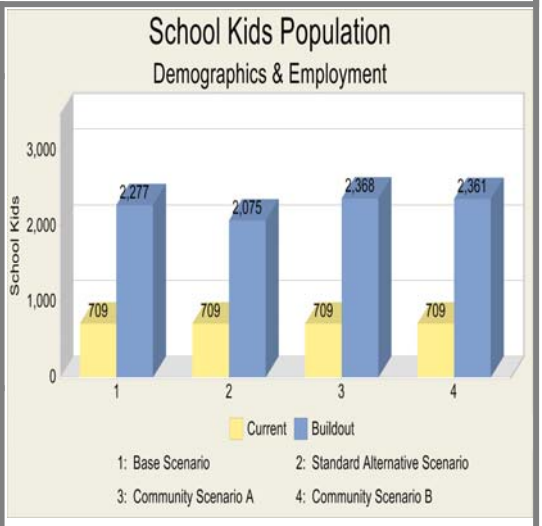
Indicator: SCHOOL KIDS POPULATION

DEMOGRAPHICS & EMPLOYMENT

Description: *Total number of school aged children*

The total population is used to calculate the number of school aged children. The 2000 census states that 18.9% of the total population is of school age. This is an important indicator because it is an example of how population growth can lead to an increased demand in the educational system.

Source: *U.S. Census Bureau 2000*



Value: Persons CURRENT	BASE BUILDOUT	STANDARD ALTERNATIVE	COMMUNITY SCENARIO A/B
709	2,277 +221%	2,075 +193%	2,368/2,361 +234%/+233%

Indicators – DEMOGRAPHICS & EMPLOYMENT cont.

Indicator: LABOR FORCE POPULATION

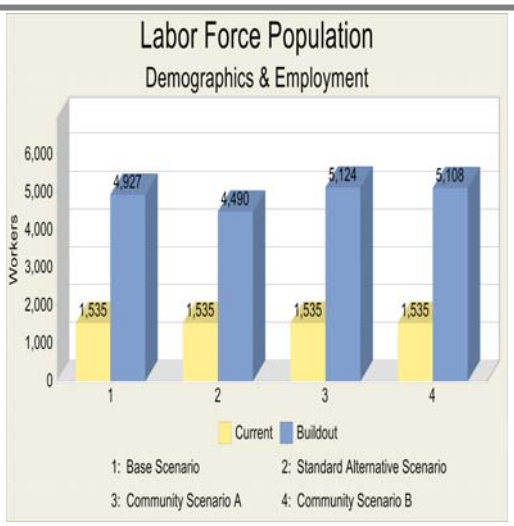
INDICATORS

DEMOGRAPHICS & EMPLOYMENT

Description: *Total number of jobholders living in the municipality*

The labor force is the total number of jobholders living in the municipality. The labor force was calculated using the projected population and US census data. According to the 2000 census, 40.89% of the population is employed. This is applied to the total population and the resulting number represents the labor force.

Source: *US averages from Private nonfarm employment (2001), U.S. Census Bureau 2000*



Value: Persons CURRENT	BASE BUILDOUT	STANDARD ALTERNATIVE	COMMUNITY SCENARIO A/B
1,535	4,927 +221%	4,490 +193%	5,124/5,108 +234%/+233%

Indicator: COMMERCIAL JOBS

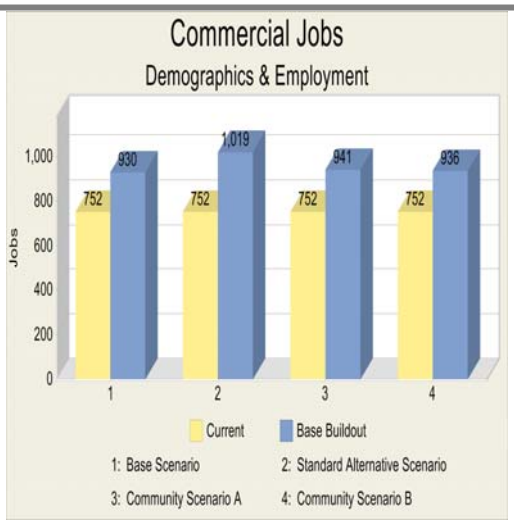
INDICATORS

DEMOGRAPHICS & EMPLOYMENT

Description: *The total number of jobs within the municipality*

This indicator uses the floor area of a building to determine the number of employees. According to the Energy Information Administration, for every one employee there is an average of 823 feet of floor area. The total floor area for the municipality is then used to determine the number of employees at buildout.

Source: *2005 DOT aerial photography, CTAP buildout analysis*



Value: Jobs CURRENT	BASE BUILDOUT	STANDARD ALTERNATIVE	COMMUNITY SCENARIO A/B
752	930 +24%	1,019 +36%	941/936 +25%/+24%

Indicators – DEMOGRAPHICS & EMPLOYMENT cont.

INDICATORS

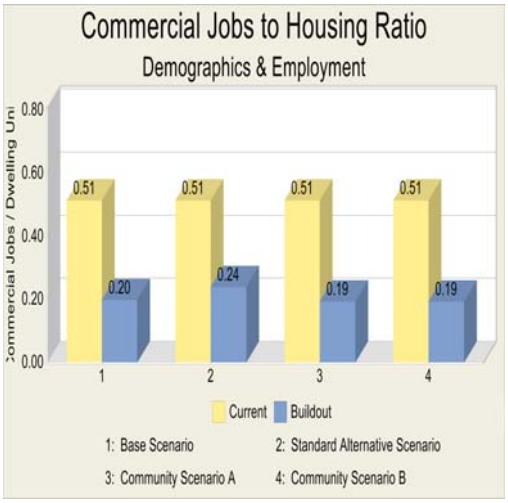
Indicator: JOBS TO HOUSING RATIO

DEMOGRAPHICS & EMPLOYMENT

Description: *Number of commercial jobs per dwelling unit*

The commercial jobs to housing ratio is the number of jobs per dwelling unit. This indicator is a representation how many jobs are located in the municipality relative to the population.

Source: *CTAP buildout analysis*



Value: Pers/job **CURRENT**	**BASE BUILDOUT**	**STANDARD ALTERNATIVE**	**COMMUNITY SCENARIO A/B**
0.51	**0.2** **-61%**	**0.24** **-53%**	**0.19/0.19** **-63%/-63%**

Indicators – ENVIRONMENTAL & OPEN SPACE

Indicator: OPEN SPACE SUPPLY

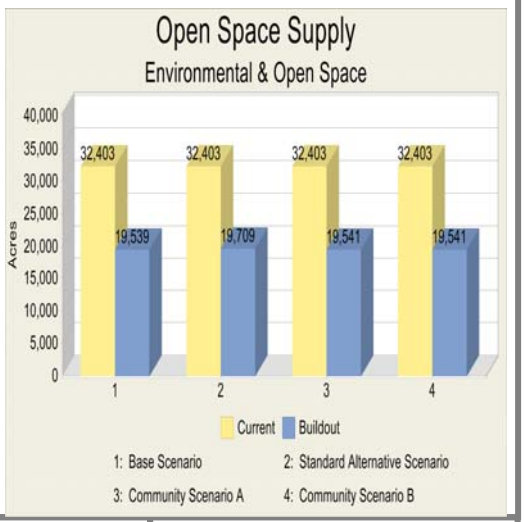
INDICATORS

ENVIRONMENTAL & OPEN SPACE

Description: *Total amount of open space available to the town*

The open space supply is the total open space acres in the town. The number of acres is determined from the CTAP land use. (including conserved lands, parks & undeveloped areas)

Source: *CTAP Buildout, CTAP land use polygons*



Value: acres **CURRENT**	**BASE BUILDOUT**	**STANDARD ALTERNATIVE**	**COMMUNITY SCENARIO A/B**
32,403	**19,539** **-40%**	**19,709** **-39%**	**19,541/19,541** **-40%/-40%**

Indicator: IMPERVIOUS SURFACES

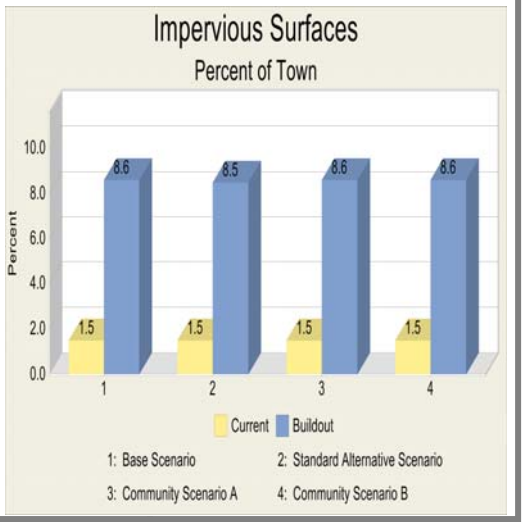
INDICATORS

ENVIRONMENTAL & OPEN SPACE

Description: *Percent impervious surfaces.*

The percent of the community covered by impervious surfaces. These would include, pavement, buildings, and other human-made structures. Derived from average impervious coefficients for land use types.

Source: *CTAP buildout analysis*



Value: % **CURRENT**	**BASE BUILDOUT**	**STANDARD ALTERNATIVE**	**COMMUNITY SCENARIO A/B**
1.5%	**8.6%** **+473%**	**8.5%** **+467%**	**8.6%/8.6%** **+118%/+119%**

Indicators – LAND USE CHARACTERISTICS

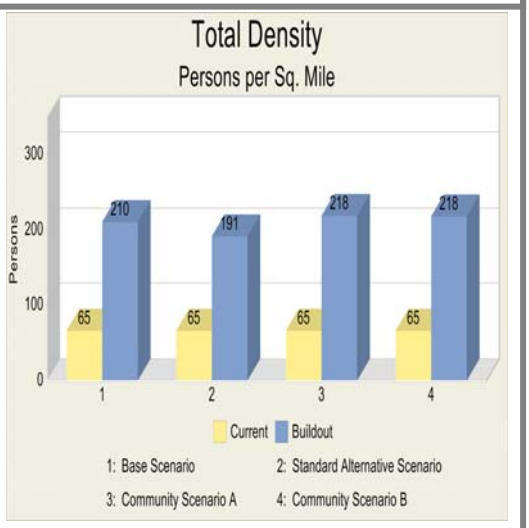
Indicator: TOTAL DENSITY

LAND USE CHARACTERISTICS

Description: *Persons per Square Mile*

The total density is the number of people in the municipality divided by the land area in square miles.

Source: *CTAP buildout analysis*



Value: Pers/sq mi CURRENT	BASE BUILDOUT	STANDARD ALTERNATIVE	COMMUNITY SCENARIO A/B
65	210 +223%	191 +194%	218/218 +235%/+235%

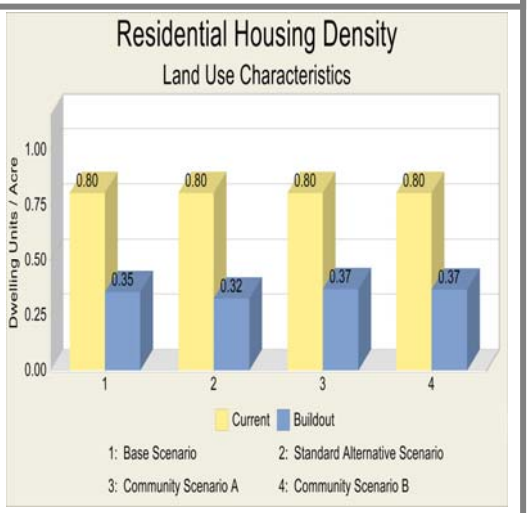
Indicator: RESIDENTIAL HOUSING DENSITY

LAND USE CHARACTERISTICS

Description: *Dwelling Units per Acre*

The residential housing density is the number of residential dwelling units in the municipality divided by the land area in acres.

Source: *CTAP buildout analysis*



Value: d.u/acre CURRENT	BASE BUILDOUT	STANDARD ALTERNATIVE	COMMUNITY SCENARIO A/B
0.8	0.35 -56%	0.32 -60%	0.37/0.37 -54%/-54%

Indicators – LAND USE CHARACTERISTICS cont.

INDICATORS

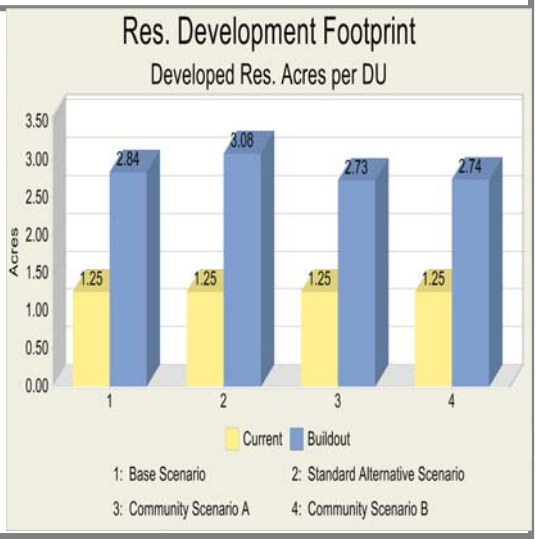
Indicator: RESIDENTIAL DEVELOPMENT FOOTPRINT

LAND USE CHARACTERISTICS

Description: *Developed Residential Acres per Dwelling Unit*

The residential development footprint is the developed residential acres per residential dwelling unit. This indicator is helpful in showing how different zoning districts and ordinances can influence the land use patterns and reduce the number of developed acres.

Source: *CTAP buildout analysis*



Value: Acres/d.u. CURRENT	BASE BUILDOUT	STANDARD ALTERNATIVE	COMMUNITY SCENARIO A/B
1.25	2.84 +127%	3.08 +146%	2.73/2.74 +118%/+119%

INDICATORS

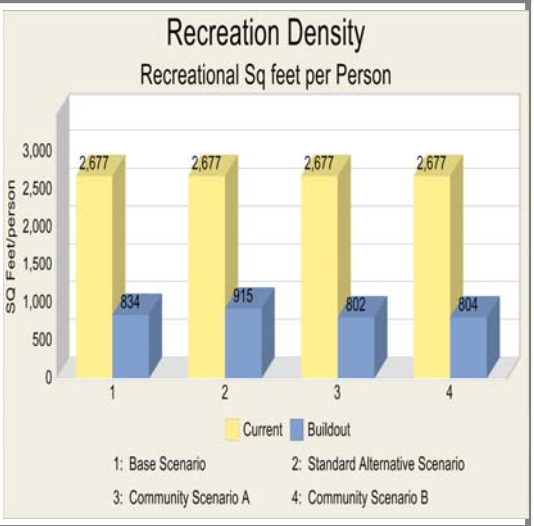
Indicator: RECREATION DENSITY

LAND USE CHARACTERISTICS

Description: *Recreational Square feet per Person*

The recreational density is a measure of the recreational space available to each person in the community. It includes only land designated as recreational or park, not open space or forested land.

Source: *CTAP buildout analysis*



Value: sq ft/pers CURRENT	BASE BUILDOUT	STANDARD ALTERNATIVE	COMMUNITY SCENARIO A/B
2,677	834 -69%	915 -66%	802/804 -70%/-70%

Indicators – LAND USE CHARACTERISTICS cont.

Indicator: HOUSING PROXIMITY TO RECREATION

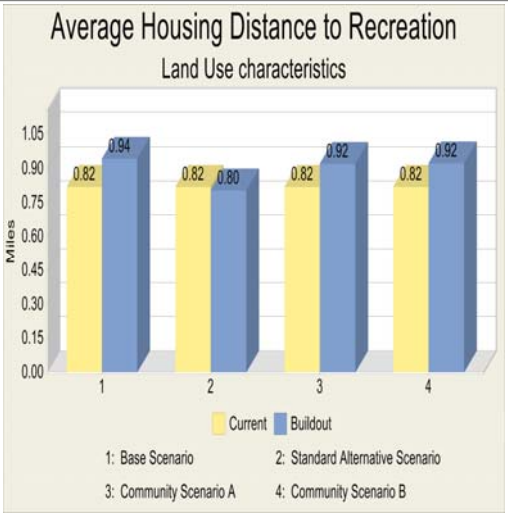
INDICATORS

LAND USE CHARACTERISTICS

Description: *The average distance from dwelling units to the closest recreational area*

The average distance to recreation is the average distance from a residential building point to the closest recreation area. The recreational areas are determined using the land use polygons

Source: *CTAP land use polygons, CTAP buildout analysis*



Value: Miles. CURRENT	BASE BUILDOUT	STANDARD ALTERNATIVE	COMMUNITY SCENARIO A/B
0.82	0.94 +15%	0.8 -2%	0.92/0.92 +12%/+12%

Indicator: HOUSING PROXIMITY TO COMMUNITY CENTERS

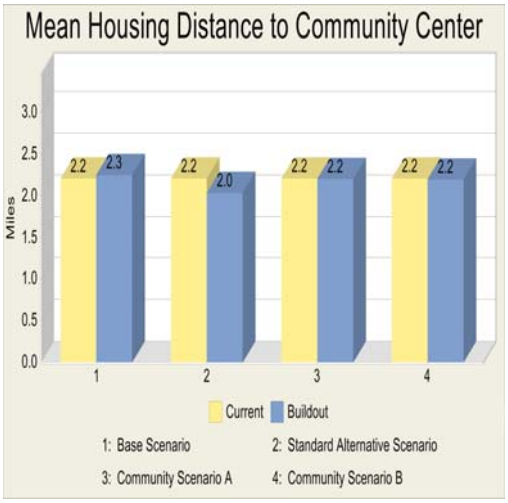
INDICATORS

LAND USE CHARACTERISTICS

Description: *The average distance from a residential building to the nearest community center*

The housing proximity to community centers is the average distance from a residence to the nearest community center. The distance from every residential building point to the nearest community center was calculated and then the average was determined.

Source: *CTAP buildout analysis*



Value: miles CURRENT	BASE BUILDOUT	STANDARD ALTERNATIVE	COMMUNITY SCENARIO A/B
2.2	2.3 +5%	2.0 -9%	2.2/2.2 0%/0%

Indicators – LAND USE CHARACTERISTICS cont.

Indicator: HOUSING PROXIMITY TO AMENITIES

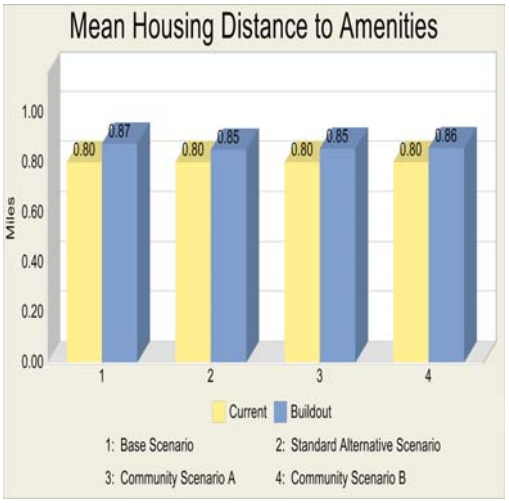
INDICATORS

LAND USE CHARACTERISTICS

Description: *The average distance from a residential building to the nearest amenities point*

The housing proximity to amenities is the average distance from a residence to the nearest amenities point. The distance from every residential building to the nearest amenities point was calculated and then the average was determined.

Source: *CTAP land use polygons, CTAP buildout analysis*



Value: Miles. CURRENT	BASE BUILDOUT	STANDARD ALTERNATIVE	COMMUNITY SCENARIO A/B
0.8	0.87 +9%	0.85 +6%	0.85/0.86 +6%/+7%

Indicator: WALKABILITY

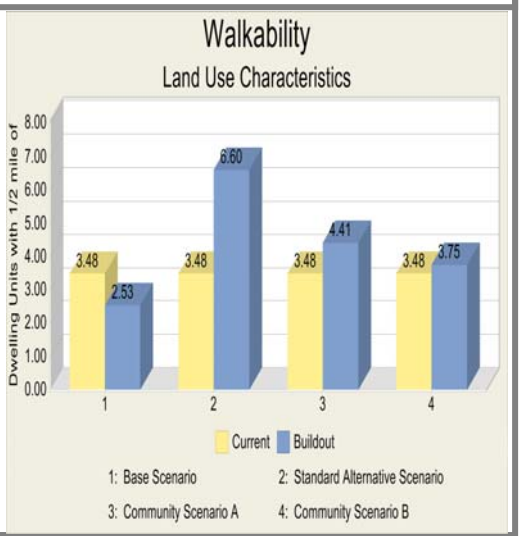
INDICATORS

LAND USE CHARACTERISTICS

Description: *Percent of dwelling units located within ½ mile of a community center*

Walkability is the percentage of dwelling units located within ½ mile of a community center. A ½ mile is the maximum that the average person is willing to walk. This indicates how pedestrian friendly the community center is.

Source: *CTAP buildout analysis*



Value: % CURRENT	BASE BUILDOUT	STANDARD ALTERNATIVE	COMMUNITY SCENARIO A/B
3.48%	2.44% -30%	6.6% +90%	4.41%/3.75% +27%/+8%

Indicators – LAND USE CHARACTERISTICS cont.

Indicator: HOUSING PROXIMITY TO TRANSIT

INDICATORS

LAND USE CHARACTERISTICS

Description: *The average distance from a residential building to the nearest transit stop.*

The housing proximity to transit is the average distance from a residence to the nearest transit stop.

Not Applicable

Source: *CTAP land use polygons, CTAP buildout analysis*

Value: Miles. CURRENT	BASE BUILDOUT	STANDARD ALTERNATIVE	COMMUNITY SCENARIO
XXX	XXX +xx%	XXX +xx%	XXX +xx%

Indicator: EMPLOYMENT PROXIMITY TO TRANSIT

INDICATORS

LAND USE CHARACTERISTICS

Description: *Average distance from each job to the nearest transit stop.*

The employment proximity to transit is the average distance from each commercial job to the nearest transit stop in miles. Because this indicator is based on jobs and not employer or building, large places of business, with more employees will have a greater effect than small businesses with fewer employees.

Not Applicable

Source: *CTAP buildout analysis*

Value: miles CURRENT	BASE BUILDOUT	STANDARD ALTERNATIVE	COMMUNITY SCENARIO
XXX	XXX +xx%	XXX +xx%	XXX +xx%

Indicators – MUNICIPAL DEMANDS

Indicator: FIRE & AMBULANCE SERVICE

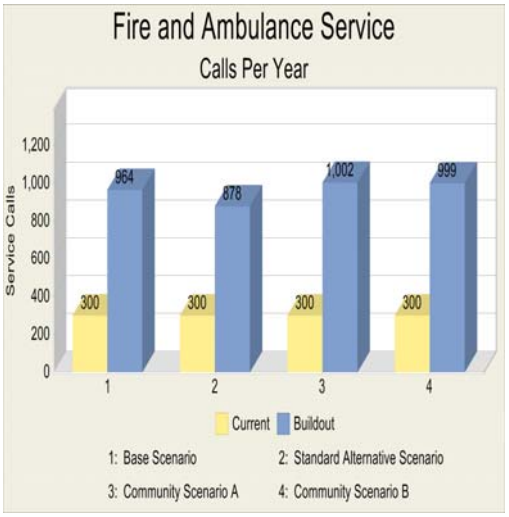
INDICATORS

MUNICIPAL DEMANDS

Description: *Total emergency fire and ambulance service calls per year*

The number of fire and ambulance service calls is based on the population and the average number of emergency calls per person per year. This indicator demonstrates how population growth increases the demand for emergency services. The number of emergency service calls per person was derived from a sample of CTAP municipalities and average of NRPC Region-Wide Buildout Impact Analysis, 2005.

Source: *Sample of CTAP municipalities and average of NRPC Region-wide Buildout Impact Analysis, 2005*



Value: Calls/year CURRENT	BASE BUILDOUT	STANDARD ALTERNATIVE	COMMUNITY SCENARIO A/B
300	964 +221%	878 +193%	1,002/999 +234%/+233%

Indicator: POLICE SERVICE

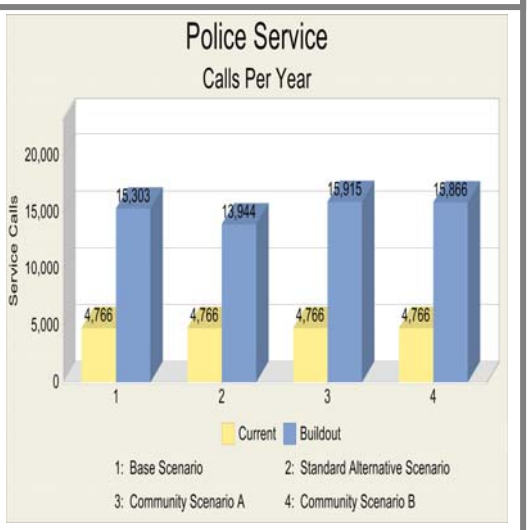
INDICATORS

MUNICIPAL DEMANDS

Description: *Total number of emergency police service calls*

The number of police service calls is based on the population and the average number of emergency calls per person per year. The number of emergency service calls per person was derived from a sample of CTAP municipalities and average of NRPC Region-Wide Buildout Impact Analysis, 2005. This indicator demonstrates how population growth increases the demand for emergency services.

Source: *Sample of CTAP municipalities and average of NRPC Region-wide Buildout Impact Analysis, 2005*



Value: Calls/year CURRENT	BASE BUILDOUT	STANDARD ALTERNATIVE	COMMUNITY SCENARIO A/B
4,766	15,303 +221%	13,944 +193%	15,915/15,866 +234%/+233%

Indicators – MUNICIPAL DEMANDS cont.

INDICATORS

Indicator: SOLID WASTE DEMAND

MUNICIPAL DEMANDS

Description: *Total amount of solid waste produced*

The solid waste demand represents the total amount of solid waste produced by the town's population in a year. In 2005 the EPA stated that the average person in the US produces 54 tons of solid waste per year. This number is combined with the total population to determine the yearly solid waste demand for the municipality

Source: *US average from the EPA, 2005*

Value: annual tons **CURRENT**	**BASE BUILDOUT**	**STANDARD ALTERNATIVE**	**COMMUNITY SCENARIO A/B**
2,027	**6,507** +221%	**5,959** +194%	**6,767/6,746** +234%/+233%

Indicators – WATER AND ENERGY USE

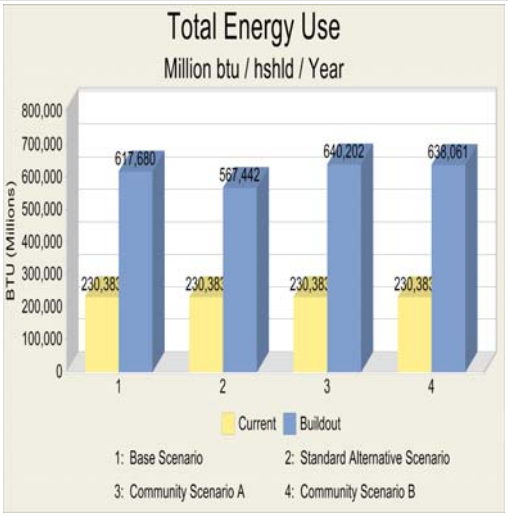
Indicator: TOTAL ENERGY USE

WATER AND ENERGY USE

Description: *Total annual energy used by all buildings for all applications, including electricity and heating.*

This indicator is the sum of residential and commercial energy use.

Source: *Energy Information Administration, 2003 Northeast Commercial Buildings Energy Consumption Survey of 2003*



Value: mbtu/hh/yr CURRENT	BASE BUILDOUT	STANDARD ALTERNATIVE	COMMUNITY SCENARIO A/B
230,383	617,680 +168%	567,442 +146%	640,202/638,061 +178%/+177%

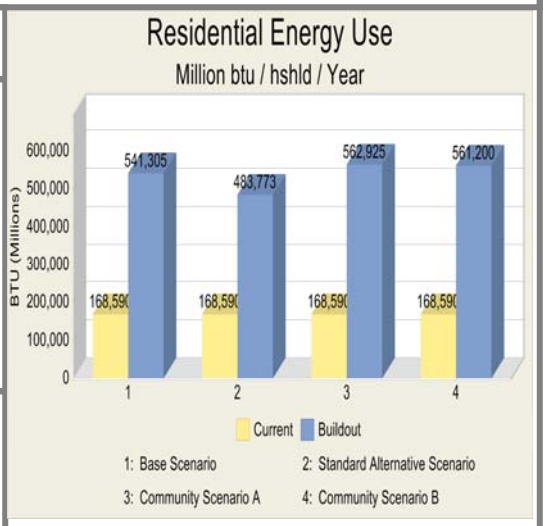
Indicator: RESIDENTIAL ENERGY USE

WATER AND ENERGY USE

Description: *Total annual energy used by residential buildings for all applications, including electricity and heating.*

Residential energy use is the total amount of energy used by multi family and single family residential homes. Annually, the average single family home uses 115 million btu/h and the average multifamily home uses 60 million btu/h according to the Energy Information Administration. These numbers are then multiplied by the number of multi and single family dwelling units to get the residential energy use for the entire municipality.

Source: *Energy Information Administration, 2003*



Value: mbtu/hh/yr CURRENT	BASE BUILDOUT	STANDARD ALTERNATIVE	COMMUNITY SCENARIO A/B
168,590	541,305 +221%	483,773 +187%	562,925/561,200 +234%/+233%

Indicators – WATER AND ENERGY USE cont.

INDICATORS

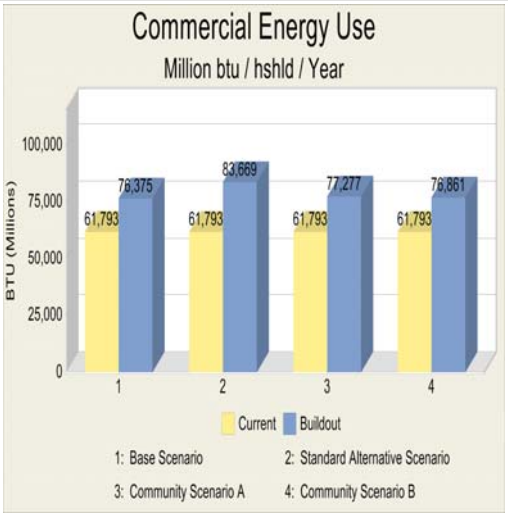
Indicator: COMMERCIAL ENERGY USE

WATER AND ENERGY USE

Description: *Total annual energy used by non-residential buildings for all applications, including electricity and heating.*

This indicator was calculated using the square footage of commercial buildings. The average commercial building uses 99.8 thousand btu/sq ft. The new buildings created by the software have a standard size based upon the median square feet of the existing commercial and industrial buildings. The square footages for the commercial buildings created by the buildout are based on the median of the existing commercial and industrial building sizes in the municipality.

Source: *Energy Information Administration, 2003 Northeast Commercial Buildings Energy Consumption Survey of 2003*



Value: mbtu/hh/yr CURRENT	BASE BUILDOUT	STANDARD ALTERNATIVE	COMMUNITY SCENARIO A/B
61,793	78,375 +27%	83,669 +35%	77,277/76,861 +25%/+24%

INDICATORS

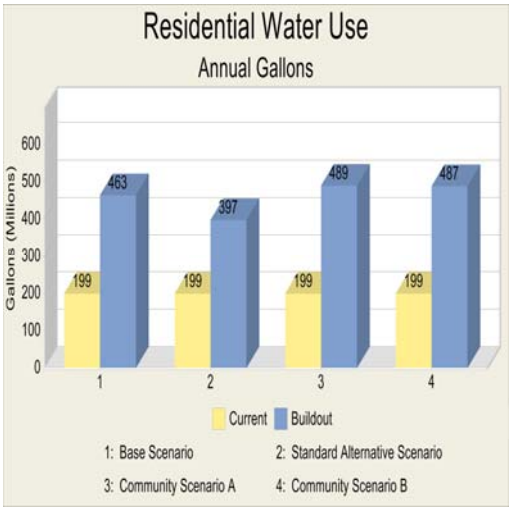
Indicator: RESIDENTIAL WATER USE

WATER AND ENERGY USE

Description: *Total annual water used by residential buildings*

Residential water use is the total amount of water used by residential buildings. According to the US Geological Survey the average dwelling unit uses 391 gallons of water per day. This number was then multiplied by 365 and the number of dwelling units resulting in the annual residential water consumption. This indicator is especially significant for urbanized areas that offer municipal water service.

Source: *US Geological Survey,*



Value: mgals CURRENT	BASE BUILDOUT	STANDARD ALTERNATIVE	COMMUNITY SCENARIO A/B
199	463 +133%	397 +99%	489/487 +146%/+145%

Indicators – TRANSPORTATION

INDICATORS

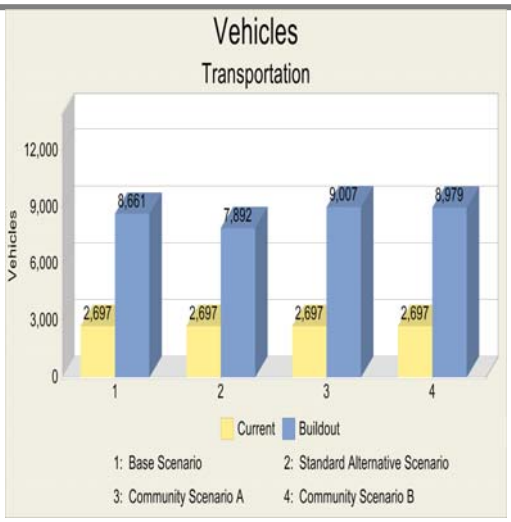
Indicator: VEHICLES

TRANSPORTATION

Description: *Total number vehicles owned by residents*

Number of vehicles is the total number of vehicles owned by residents in the municipality. In 2000, the US census states that the average household has 1.84 vehicles. The number of vehicles was calculated using the number of dwelling units and the average vehicles per dwelling unit.

Source: *CTAP buildout analysis ,U.S. Census Bureau 2000*



Value: vehicles CURRENT	BASE BUILDOUT	STANDARD ALTERNATIVE	COMMUNITY SCENARIO A/B
2,697	8,661 +221%	7,892 +193%	9,007/8,979 +234%/+233%

INDICATORS

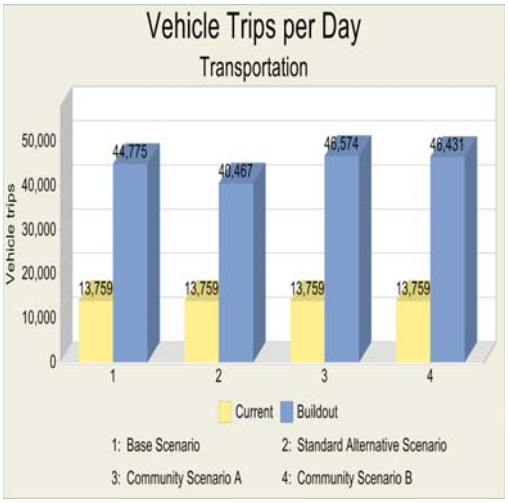
Indicator: VEHICLE TRIPS PER DAY

TRANSPORTATION

Description: *Total number of motorized trips taken each day, on average, by residential buildings*

The number of vehicle trips taken each day by drivers from residential buildings. The average number of daily trips for a single family household is 9.57 while multi-family is 5.86 according to the Institute of Transportation Engineers. This indicator is important for calculating many of the other transportation indicators.

Source: *The Institute of Transportation Engineers*



Value: trips/day CURRENT	BASE BUILDOUT	STANDARD ALTERNATIVE	COMMUNITY SCENARIO A/B
13,759	44,775 +225%	40,467 +194%	46,574/46,431 +238%/+237

Indicators – TRANSPORTATION cont.

Indicator: ANNUAL CO AUTO EMISSIONS

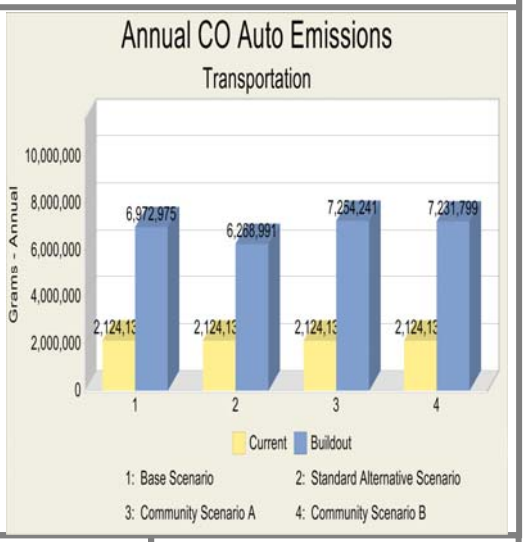
INDICATORS

TRANSPORTATION

Description: *Total carbon monoxide emissions generated by vehicles associated with residential buildings*

The annual CO auto emissions is the yearly total of carbon monoxide emissions generated by vehicles associated with residential buildings. The average trip length of 9.78 miles is divided by the average car efficiency of 24 mpg to determine the number of gallons of gas per trip. This number is then multiplied by the average number of trips per day. The number of trips is 5.86 for multi-family residences and 9.57 for single family residences. This number is then multiplied by the pounds of CO released from the burning of a gallon of gas. This indicator is important because it shows that different land uses can greatly reduce the amount of greenhouse gases released.

Source: *US Bureau of Transportation Statistics, 2001*



Value: grams/yr **CURRENT**	**BASE BUILDOUT**	**STANDARD ALTERNATIVE**	**COMMUNITY SCENARIO A/B**
2,124,131	**6,972,975**	**7,254,241**	**7,254,241/7,231,799**
	+228%	**+242%**	**+242%/+240%**

Indicator: ANNUAL CO2 AUTO EMISSIONS

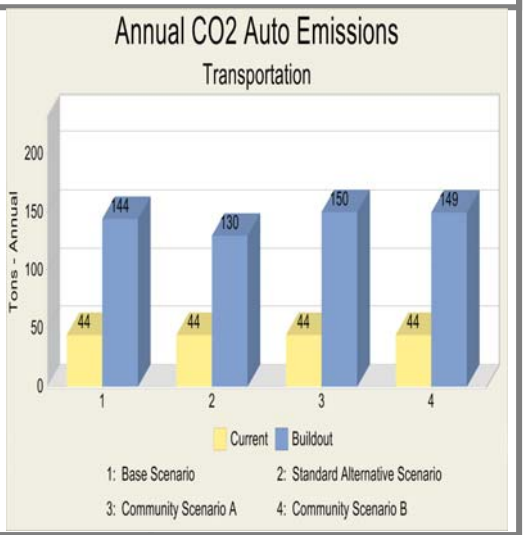
INDICATORS

TRANSPORTATION

Description: *Total carbon dioxide emissions generated by vehicles associated with residential buildings*

The annual CO2 auto emissions is the yearly total of carbon dioxide emissions generated by vehicles associated with residential buildings. The average trip length of 9.78 miles is divided by the average car efficiency of 24 mpg to determine the number of gallons of gas per trip. This number is then multiplied by the average number of trips per day. The number of trips is 5.86 for multi-family residences and 9.57 for single family residences. This number is then multiplied by the pounds of CO2 released from the burning of a gallon of gas. This indicator is important because it shows that different land uses can greatly reduce the amount of greenhouse gases released.

Source: *US Bureau of Transportation Statistics, 2001*



Value: tons/yr **CURRENT**	**BASE BUILDOUT**	**STANDARD ALTERNATIVE**	**COMMUNITY SCENARIO A/B**
44	**144**	**130**	**150/149**
	+227%	**+195%**	**+241%/+239%**

Indicators – TRANSPORTATION cont.

Indicator: ANNUAL NOx AUTO EMISSIONS

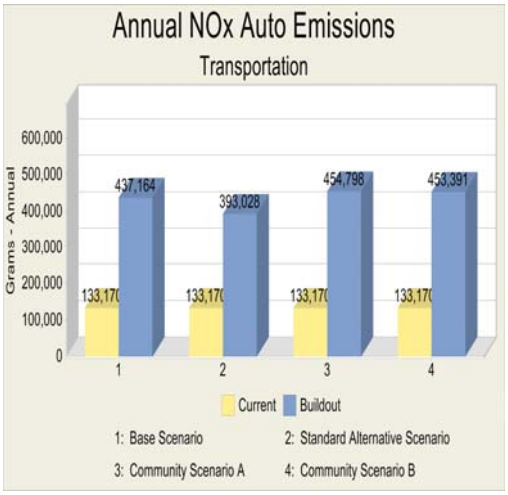
INDICATORS

TRANSPORTATION

Description: *Total oxides of nitrogen emissions generated by vehicles associated with residential buildings*

The annual NOx auto emissions is the yearly total of nitrogen oxide emissions generated by vehicles associated with residential buildings. The average trip length of 9.78 miles is divided by the average car efficiency of 24 mpg to determine the number of gallons of gas per trip. This number is then multiplied by the average number of trips per day. The number of trips is 5.86 for multi-family residences and 9.57 for single family residences. This number is then multiplied by the pounds of NOx released from the burning of a gallon of gas. This indicator is important because it shows that different land uses can greatly reduce the amount of greenhouse gases released.

Source: *US Bureau of Transportation Statistics, 2001*



Value: grams/yr **CURRENT**	**BASE BUILDOUT**	**STANDARD ALTERNATIVE**	**COMMUNITY SCENARIO A/B**
133,170	**438,477**	**401,530**	**455,829/451,890**
	+229%	**+202%**	**+242%/+239%**

Indicator: ANNUAL HYDROCARBON AUTO EMISSIONS

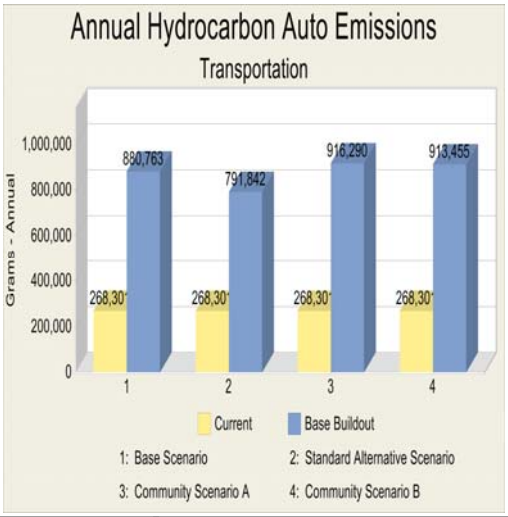
INDICATORS

TRANSPORTATION

Description: *Total hydrocarbon emissions generated by vehicles associated with residential buildings*

The annual hydrocarbon auto emissions is the yearly total of hydrocarbon emissions generated by vehicles associated with residential buildings. The average trip length of 9.78 miles is divided by the average car efficiency of 24 mpg to determine the number of gallons of gas per trip. This number is then multiplied by the average number of trips per day. The number of trips is 5.86 for multi-family residences and 9.57 for single family residences. This number is then multiplied by the pounds of hydrocarbon released from the burning of a gallon of gas. This indicator is important because it shows that different land uses can greatly reduce the afmount of greenhouse gases released.

Source: *US Bureau of Transportation Statistics, 2001*



Value: lbs/yr **CURRENT**	**BASE BUILDOUT**	**STANDARD ALTERNATIVE**	**COMMUNITY SCENARIO A/B**
268,301	**880,763**	**791,842**	**916,290/913,455**
	+228%	**+195%**	**+242%/+240%**

Appendices

A. Buildout Reports - Base & Standard Alternative & Community Scenarios

B. Additional Maps

C. CTAP Buildout FAQ