



# Town of Bedford Buildout Report





CTAP BUI PROGRAM MET



BUILDOUT CO METHODS SC



COMMUNITY SCENARIOS



BUILDOUT RESULTS



INDICATORS



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This Buildout Study conducted for the town of Bedford is based on the CTAP buildout studies that are part of a five-year initiative designed to assist communities that will be affected by the rebuilding of I-93. This buildout 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.

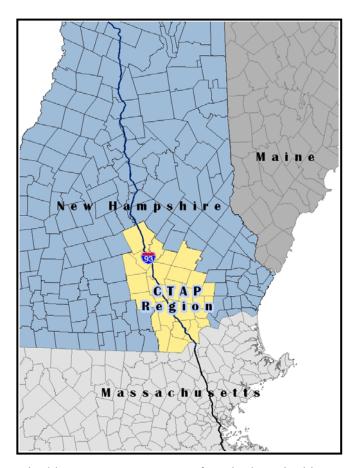
#### What is CTAP?

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.

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

The Buildout analysis shows the maximum growth that is likely to occur in a community under current land use regulations (zoning). that cover four themes: community infrastructure, environment protection, land use, and open space, downtown/village centers and community vitality and the local economy. The 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 <u>prediction</u> 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

#### **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?

exists, on current trends, and on the values and on the preferences of the town. The scenarios in this report are based on both standardized methods and a scenario where the details have been specified by members of the Master Plan Committee. 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 are preferable and most closely match the goals and values of the community.

#### Report Template

The format of this report is based upon the template used for the CTAP project. 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.



## 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.

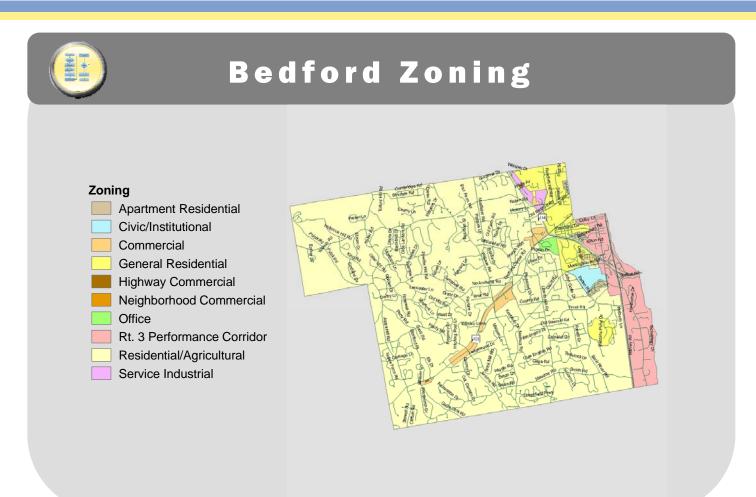
The GIS data used in this study originates from several sources. The base shapefiles (road centerlines, conservation lands, wetlands, etc.) were provided by GRANIT, the official New Hampshire GIS data provider. The land use polygons were created through a prior CTAP project, using 2005 aerial images 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

- Multi Family Residential
- Single Family Residential
- Commerical
- Industrial
- Transportation & Utilities
- Mixed Use
- Outdoor & Other Uses
- Agricultural Land
- Brush & Transitional Forest
- Forest Lands
- Water
- Wetlands
- Barren Lands





#### **Procedures**

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

#### Map layers used in the Buildout Analysis.

- 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



## Developable Lands & Constraints





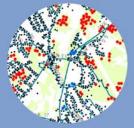


#### Buildout Scenarios

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

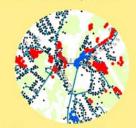
This scenario is a maximum development buildout under current regulations. It will be conducted uniformly for all communities in the region. Developable areas will be identified through CTAP land Use inputs and Zoning overlays. Density, setbacks and lot coverage will be applied from zoning regulations.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



Existing Regulations & constraints

#### Standard Alternative Buildout

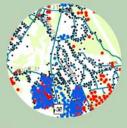
This alternative scenario is also conducted uniformly for all communities in the region It applyies the Natural Services Network (NSN) layer as an additional development constraint. However, adjustments to allowable densities are made to maintain an equal number of new housing units and non-residential 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 thro<mark>ugh Buildout Maps</mark> 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

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

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.

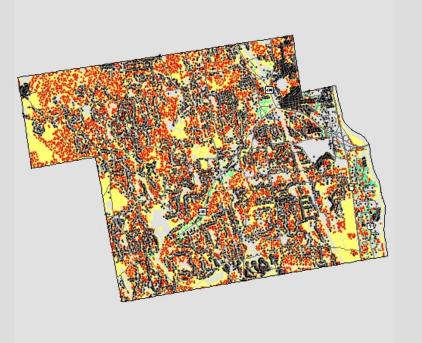


## **Base Buildout**

Existing Buildings
 Developable Lands

#### **Buildings**

- Commercial
- Single Family Residential

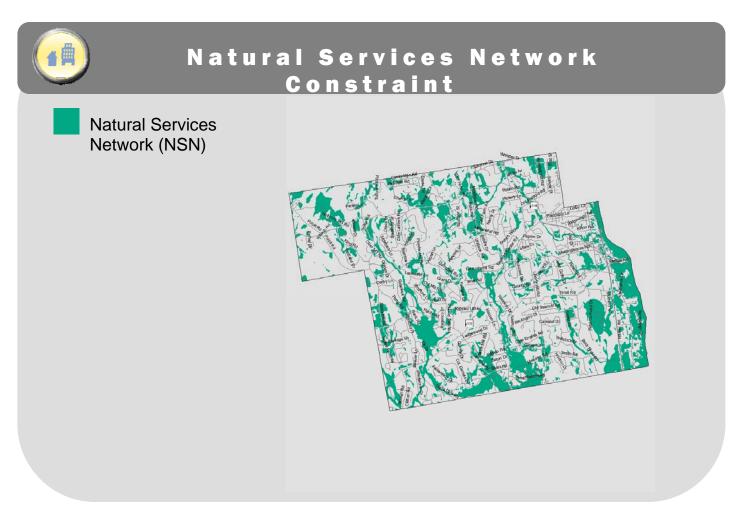


#### Standard Alternative

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.



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.

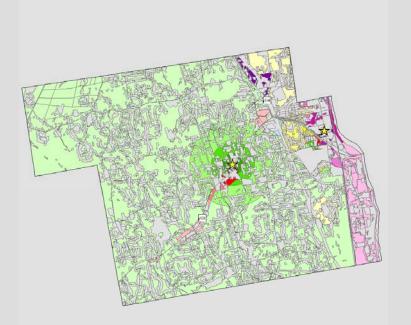
#### Standard Alternative Scenario:

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



## Standard Alternative Density Changes







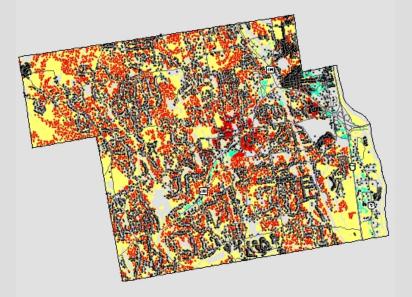
## Standard Alternative Buildout

Existing Buildings

Developable Lands

#### **Buildings**

- Commercia
- Single Family Residential



#### Community Alternative

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 alternative**. This is a

The Community Alternative 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

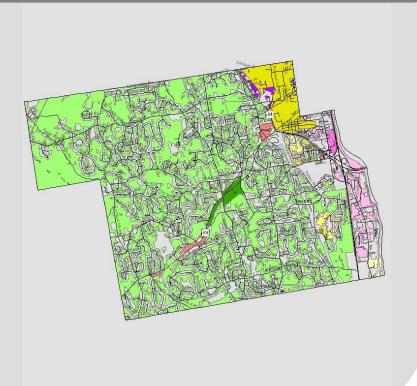
chance for certain properties to be removed or added to the developable areas list or for particular regulation changes to be implemented. In order to get the community's input for their scenario, meetings were conducted with local officials and volunteers. This was an opportunity for the community leaders 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 Alternative 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.



## Town Alternative Scenario





The Bedford Community Scenario consists of areas of redevelopment to produce high density residential in mixed use villages of potential future development. An area of high density residential development (32 dwelling units per acre) was placed within a ½ mile buffer around the potential transit station where Macy's is currently located and near the future airport access road.

The area currently zoned general residential around Donald St. was designated for redevelopment with residential development consisting of 14 dwelling units per acre and mixed use villages with commercial and residential uses.

Another area of redevelopment was designated along Route 101 in areas currently zoned commercial that are serviced by municipal water and sewer.

Redevelopment of this area consisted of mixed use

villages with commercial development on the lower floors and residential development on the upper floors.

A mixed use village with both commercial and residential development consisting of 32 dwelling units per acre was created on the northern portion in the Route 3 performance zone between Upjohn Street and Park Drive.

A timescope is a tool used to determine the year a town will reach its buildout capacity based on growth rates. Based on housing data from the town, a linear growth rate of 45 houses built per year was chosen for this timescope. In 2020, the population is estimated to be 19,426. By 2060 the population is estimated to reach 24,034. The projected buildout dates would be 2137, 2139 and 2083 for the base, standard alternative and community alternative buildouts respectively.



## Town Alternative Buildout

- Existing Buildings
  - Developable Lands

#### **Buildout Buildings**

- Commercial
- Mixed Use
- Multi-Family Residential
- Single Family Residential





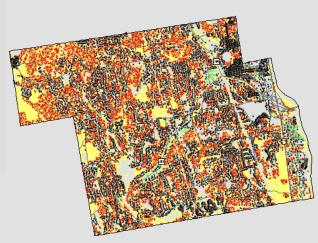
## **Buildout Scenario Comparison**

Existing Buildings
 Developable Lands

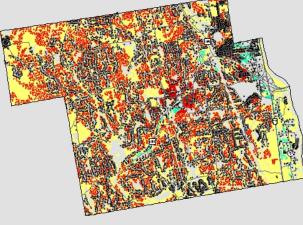
#### **Buildout Buildings**

- Commercial
- Mixed Use
- Multi-Family Residential
- Single Family Residential

## Base Buildout



### Standard Alternative



## Community Alternative





#### 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.

				Standard					
				Base	Percent	Alternative	Percent	Town	Percent
Category	Indicator	Units	Current	Buildout	Change	Scenario	Change	Scenario	Change
	Developed Residential Acres	Acres	5,831	15,364	163%	14,974	157%	15,339	163%
Buildout	Developed Non-Residential Acres	Acres	1,356	1,740	28%	1,992	47%	1,892	40%
	Residential Dwelling Units	d.u.'s	7,576	13,065	72%	13,051	72%	13,742	81%
	Commercial Floor Area	sq. ft	5,094,719	7,673,392	51%	9,671,656	90%	12,666,168	149%
Demographics & Employment	Population	Persons	18,274	32,325	77%	32,290	77%	34,059	86%
	School Kids Population	School Kids	4,424	7,080	60%	7,073	60%	7,407	67%
	Labor Force Population	Workers	7,472	13,218	77%	13,203	77%	13,927	86%
	Commercial Jobs	Jobs	6,190	9,324	51%	11,752	90%	15,390	149%
	Jobs to Housing Ratio	Jobs/d.u.	0.82	0.71	-13%	0.9	10%	1.12	37%
Environmental & Open Space	Open Space Supply	Acres	15,708	5,791	-63%	5,930	-62%	5,664	-64%
	Impervious Surfaces	Percent	6.6	14.3	117%	14.5	120%	14.6	121%
Land Use Characteristics	Total Density	Persons/mi <sup>2</sup>	484	857	77%	856	77%	903	87%
	Residential Housing Density	d.u./Acre	1.3	0.85	-35%	0.87	-33%	0.9	-31%
	Residential Development Footprint	Acres/d.u.	0.77	1.18	53%	1.15	49%	1.12	45%
	Recreation Density	Ft²/person	521	295	-43%	295	-43%	280	-46%
	Housing Proximity to Recreation	Miles	0.78	0.87	12%	0.86	10%	0.64	-18%
	Housing Proximity to Community Centers	Miles	2.2	2.2	0%	2.1	-5%	2.2	0%
	Housing Proximity to Amenities	Miles	0.86	0.93	8%	0.91	6%	0.9	5%
	Walkability	Percent	3.86	3.31	-14%	6.63	72%	8.78	127%
	Housing Proximity to Transit	Miles	2.71	2.94	8%	2.94	8%	2.79	3%
	Employment Proximity to Transit	Miles	2.71	2.94	8%	2.94	8%	2.79	3%
Municipal Demands	Fire & Ambulance Service	Calls/Years	1,462	2,586	77%	2,583	77%	2,725	86%
	Police Service	Calls/Years	23,027	41,053	78%	41,008	78%	43,254	88%
	Solid Waste Demand	Annual Tons	9,868	17,456	77%	17,436	77%	18,392	86%
Water & Energy Use	Total Energy Use	mbtu/hh/yr	1,376,693	2,259,387	64%	2,392,110	74%	2,414,576	75%
	Residential Energy Use	mbtu/hh/yr	871,240	1,493,583	71%	1,426,879	64%	1,150,492	32%
	Commercial Energy Use	mbtu/hh/yr	508,453	765,804	51%	965,231	90%	1,264,084	149%
	Residential Water Use	mgals	892	1,670	87%	1,629	83%	1,534	72%
Transportation	Vehicles	Vehicles	13,940	24,040	72%	24,014	72%	25,285	81%
	Vehicle Trips per Day	Trips/Day	67,587	119,827	77%	117,575	74%	114,262	69%
	Annual CO Auto Emissions	Grams/Yr	10,079,400	18,217,585	81%	17,655,799	75%	15,886,496	58%
	Annual CO2 Auto Emissions	Tons/Yr	208	376	81%	365	75%	328	58%
	Annual NOx Auto Emissions	Grams/Yr	631,918	1,142,134	81%	1,106,918	75%	995,988	58%
ŀ	Annual Hydrocarbon Auto Emissions	Grams/Yr	1.273.138	2,301,080	81%	2,230,120	75%	2.006.638	58%

#### <u>Indicators - BUILDOUT</u>



#### Indicator: DEVELOPED RESIDENTIAL ACRES

#### 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 5,831 15,364 +163%

STANDARD ALTERNATIVE
14,974
+157%

16,000

14,000 12,000

10,000

8,000

6,000 4,000 2,000 5,831

1: Base Scenario

**15,339** +163%

2: StandardAlternative 3: Community Scenario

Current Buildout

5,831

**Developed Residential Acres** 

Buildout



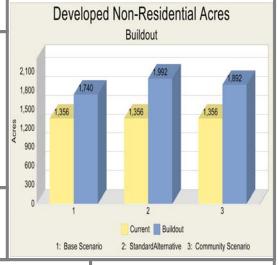
#### Indicator: DEVELOPED NON-RESIDENTIAL ACRES

#### 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

1,356

1,740 +28% 1,992
+47%

1,892 +40%

#### Indicators - BUILDOUT cont.



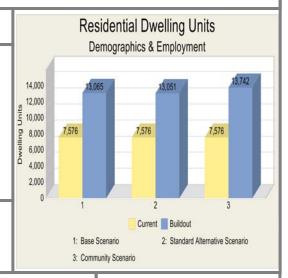
#### Indicator: RESIDENTIAL DWELLING UNITS

#### 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

7,576

BASE BUILDOUT

13,065

+72%

STANDARD ALTERNATIVE

**13,051** 

**13,742**+81%

INDIGATORS

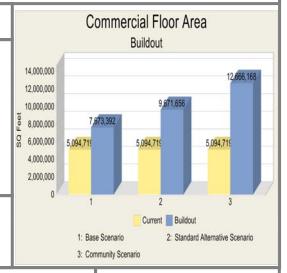
#### Indicator: COMMERCIAL FLOOR AREA

#### 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

5,094,719

**7,673,392** 

+51%

standard alternative 9,671,656

+90%

community scenario 12,666,168

+149%

#### Indicators - DEMOGRAPHICS & EMPLOYMENT



#### Indicator: POPULATION

#### **DEMOGRAPHICS & EMPLOYMENT**

Description: Total population living in the municipality

The population was determined by the New Hampshire Office of Energy and Planning data provided by the town of Bedford.

Source: NH Office of Energy and Planning, Town of Bedford

Value: Persons CURRENT 18,274

BASE BUILDOUT 32,325 +77%

STANDARD ALTERNATIVE 32,290 +77%

35.000 30.000

25,000

20,000

15,000 10,000 5,000

> 8,000 7,000

6,000

4,424

1: Base Scenario

3: Community Scenario

S 5,000

8 4,000 S 3,000 2,000 1,000 18,274

1: Base Scenario

3: Community Scenario

COMMUNITY SCENARIO 34,059 +86%

Current Buildout

School Kids Population

Demographics & Employment

18,274

2: Standard Alternative Scenario

**Population** 

Demographics & Employment

18,274



#### Indicator: SCHOOL KIDS POPULATION

#### **DEMOGRAPHICS & EMPLOYMENT**

Description: Total number of school aged children

The total school kids population was determined from enrollment data from the Bedford School District.

Source: Vanasse Hangen Brustlin Inc.

Value: Persons CURRENT 4,424

BASE BUILDOUT 7,080 ÷60%

STANDARD ALTERNATIVE 7,073 +60%

**COMMUNITY SCENARIO** 7,407 +67%

2: Standard Alternative Scenario

Current Buildout

**Buildout Report - Town of Bedford** 

#### Indicators - DEMOGRAPHICS & EMPLOYMENT cont.



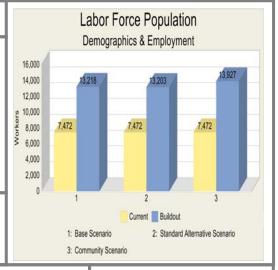
#### Indicator: LABOR FORCE POPULATION

#### **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

7,472

BASE BUILDOUT

**13,218** +77%

STANDARD ALTERNATIVE 13,203

+77%

13,927 +86%



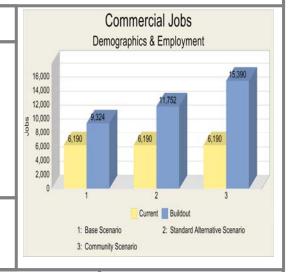
#### Indicator: COMMERCIAL JOBS

#### **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

6,190

9,324

+51%

STANDARD ALTERNATIVE
11,752

+90%

15,390 +149%

#### Indicators - DEMOGRAPHICS & EMPLOYMENT cont.



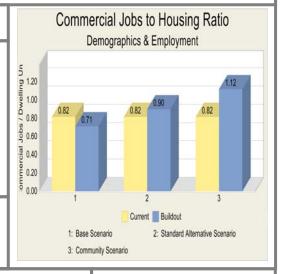
#### Indicator: JOBS TO HOUSING RATIO

#### **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

0.82

0.71
-13%

STANDARD ALTERNATIVE
0.9
+10%

COMMUNITY SCENARIO
1.12
+37%

#### Indicators - ENVIRONMENTAL & OPEN SPACE



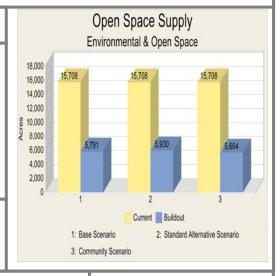
#### Indicator: OPEN SPACE SUPPLY

#### 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

15,708

BASE BUILDOUT

5,791 -63% STANDARD ALTERNATIVE

5,930 -62% 5,664



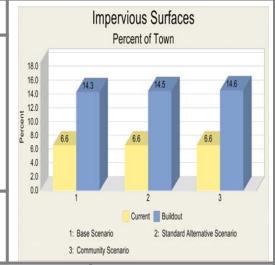
#### Indicator: IMPERVIOUS SURFACES

#### 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

6.6%

BASE BUILDOUT

**14.3**% +117%

STANDARD ALTERNATIVE

**14.5**% +120%

COMMUNITY SCENARIO

**14.6**% +121%

#### Indicators - LAND USE CHARACTERISTICS



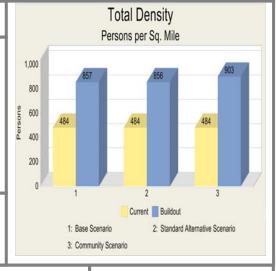
#### Indicator: TOTAL DENSITY

#### 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

484

BASE BUILDOUT

**857** +77%

STANDARD ALTERNATIVE

**856** +77%

COMMUNITY SCENARIO

903 +87%



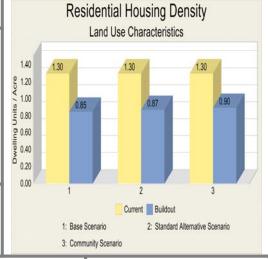
## Indicator: RESIDENTIAL HOUSING DENSITY

#### 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

1.30

BASE BUILDOUT

0.85

STANDARD ALTERNATIVE

0.87

COMMUNITY SCENARIO

**0.90** 

#### Indicators - LAND USE CHARACTERISTICS cont.



#### 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

Res. Development Footprint
Developed Res. Acres per DU

1.80
1.50
1.20
0.77
0.77
0.77
0.77
0.77
0.77
1.18
Buildout
1: Base Scenario
3: Community Scenario
3: Community Scenario

Value: Acres/d.u. CURRENT

0.77

BASE BUILDOUT

**1.18** +53%

STANDARD ALTERNATIVE

**1.15** +49%

COMMUNITY SCENARIO

**1.12** +45%



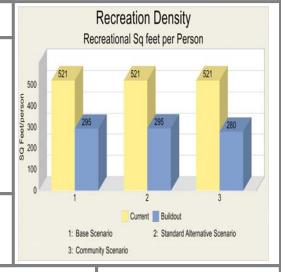
#### Indicator: RECREATION DENSITY

#### 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

521

295

STANDARD ALTERNATIVE 295

-43%

community scenario
280

-46%

#### Indicators - LAND USE CHARACTERISTICS cont.



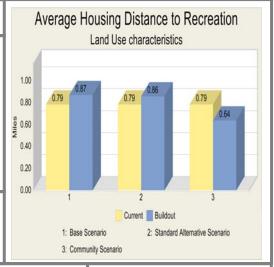
#### Indicator: HOUSING PROXIMITY TO RECREATION

#### 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

0.78

BASE BUILDOUT

0.87 +12% STANDARD ALTERNATIVE

**0.86** +10%

COMMUNITY SCENARIO

0.64 -22%



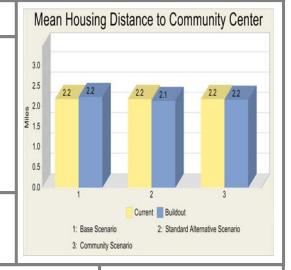
#### Indicator: HOUSING PROXIMITY TO COMMUNITY CENTERS

#### 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
2.2

BASE BUILDOUT

2.2

0%

STANDARD ALTERNATIVE
2.1
-5%

COMMUNITY SCENARIO
2.2
0%

#### CHARACTERISTICS



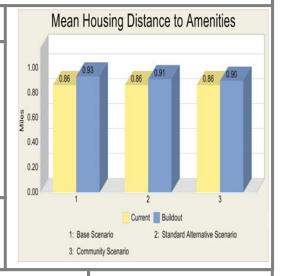
#### Indicator: HOUSING PROXIMITY TO AMENITIES

#### 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

0.86

BASE BUILDOUT

0.93 +8%

STANDARD ALTERNATIVE 0.91

+6%

COMMUNITY SCENARIO 0.90



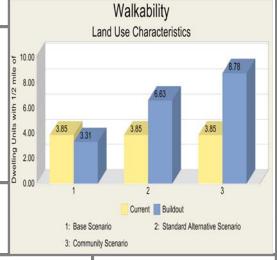
#### Indicator: WALKABILITY

#### 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

3.86%

BASE BUILDOUT

3.31% -14%

STANDARD ALTERNATIVE

6.63%

+72%

**COMMUNITY SCENARIO** 

8.78% +127%

#### Indicators - LAND USE CHARACTERISTICS cont.



#### Indicator: HOUSING PROXIMITY TO TRANSIT

#### 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.

Source: CTAP land use polygons, CTAP buildout analysis

Value: Miles. CURRENT

2.71

BASE BUILDOUT

2.94

+8%

STANDARD ALTERNATIVE

2.94

+8%

COMMUNITY SCENARIO

2.79

INDICATORS

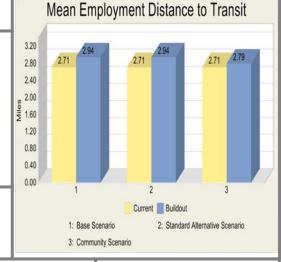
#### Indicator: EMPLOYMENT PROXIMITY TO TRANSIT

#### 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.

Source: CTAP buildout analysis



Value: miles CURRENT

2.71

2.94 +8% STANDARD ALTERNATIVE
2.94

+8%

COMMUNITY SCENARIO
2.79
+3%

#### <u>Indicators - MUNICIPAL DEMANDS</u>



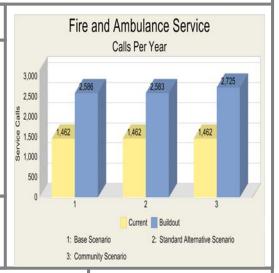
#### Indicator: FIRE & AMBULANCE SERVICE

#### 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

1.462

BASE BUILDOUT

**2,586** +77%

STANDARD ALTERNATIVE

**2,583** +77%

COMMUNITY SCENARIO

**2,725** +86%



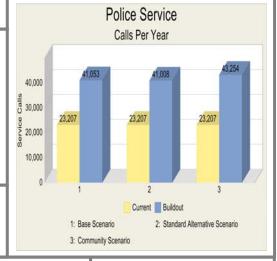
#### Indicator: POLICE SERVICE

#### 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

23,027

BASE BUILDOUT

**41,053** +78%

STANDARD ALTERNATIVE

**41,008** +72%

COMMUNITY SCENARIO

43,254 +88%

#### Indicators - MUNICIPAL DEMANDS cont.



#### 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

9,868

BASE BUILDOUT

**17,456** +77%

STANDARD ALTERNATIVE

**17,436** +77%

**18,392**+86%

#### Indicators - WATER AND ENERGY USE



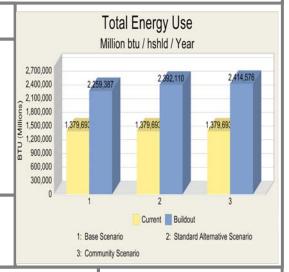
#### Indicator: TOTAL ENERGY USE

#### 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

1,379,693

BASE BUILDOUT

2,259,387

STANDARD ALTERNATIVE

2,392,110

COMMUNITY SCENARIO

2,414,576 +75%



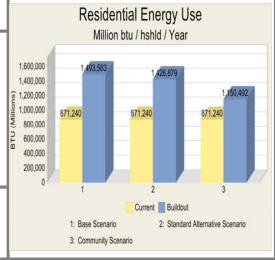
#### Indicator: RESIDENTIAL ENERGY USE

#### 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

871,240

BASE BUILDOUT

1,493,583

STANDARD ALTERNATIVE

1,423,894

COMMUNITY SCENARIO

1,150,053

#### Indicators - WATER AND ENERGY USE cont.



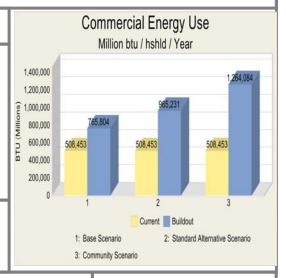
#### Indicator: COMMERCIAL ENERGY USE

#### 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

508,453

BASE BUILDOUT

765,804 +51% STANDARD ALTERNATIVE 965,231

+90%

1,264,084

+149%

## INDICATORS

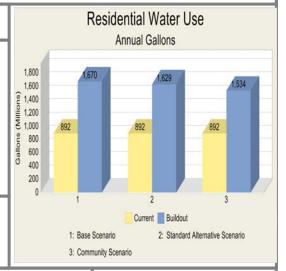
#### Indicator: RESIDENTIAL WATER USE

#### 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

892

1,670

+87%

STANDARD ALTERNATIVE
1,629

+83%

COMMUNITY SCENARIO

**1,534** 

#### Indicators - TRANSPORTATION



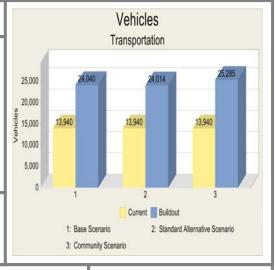
Indicator: VEHICLES

#### 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

13,940

BASE BUILDOUT

24,040

STANDARD ALTERNATIVE 24,014

+72%

25,285 +81%



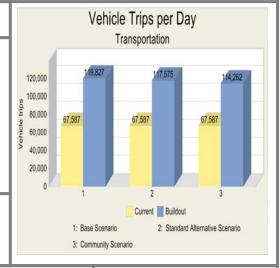
#### Indicator: VEHICLE TRIPS PER DAY

#### 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

67,587

**119,827** 

+77%

STANDARD ALTERNATIVE

117,575 +74% COMMUNITY SCENARIO
114,262

+69%

#### Indicators TRANSPORTATION



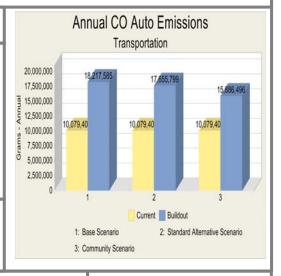
#### Indicator: ANNUAL CO AUTO EMISSIONS

#### 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

10,079,400

**BASE BUILDOUT** 

18,217,585 +81%

STANDARD ALTERNATIVE 17.655.799

+75%

**COMMUNITY SCENARIO** 15.886.496 +58%



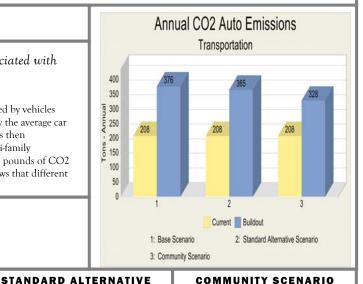
#### Indicator: ANNUAL CO2 AUTO EMISSIONS

#### 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 376

365 +75% **COMMUNITY SCENARIO** 328

208

+81%

+58%

#### Indicators - TRANSPORTATION cont.



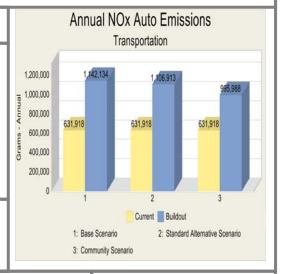
#### Indicator: ANNUAL NOX AUTO EMISSIONS

#### 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

631,918

BASE BUILDOUT

1,142,134

+81%

STANDARD ALTERNATIVE 1,106,918

+75%

995,988 +59%



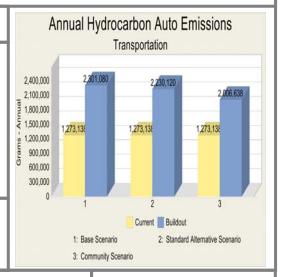
#### Indicator: ANNUAL HYDROCARBON AUTO EMISSIONS

#### 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 amount of greenhouse gases released.

Source: US Bureau of Transportation Statistics, 2001



Value: lbs/yr CURRENT

1,237,138

BASE BUILDOUT

2,301,080 +81% STANDARD ALTERNATIVE 2,230,120

+75%

2,006,638 +58%

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#### **Appendices**

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