Milford Health Impact Assessment

Milford, New Hampshire

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NRPC

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Healthy Kids. Healthy Places.

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Health Impact Assessment Participants

- Steve White, Oregon Public Health Institute (OPHI)
- Janet Langdell, Town of Milford Planning Board Chairperson
- Town of Milford Planning Board, Milford, NH
- Bill Parker, Town of Milford, Community Development Director
- Jodie Levandowski, Town of Milford, Town Planner
- Rita Johnson, Town of Milford, GIS Technician
- David Boucher, Milford Water Utilities Department, Director
- Susan Drew, Town of Milford Welfare Department, Director of Welfare
- Jen Czysz, Nashua Regional Planning Commission, Senior Planner
- Jennifer DiNovo, Nashua Regional Planning Commission, Regional Planner
- Mark Connors, Nashua Regional Planning Commission, Regional Planner
- Jill Longval, Nashua Regional Planning Commission, Environmental Planner
- Kerrie Diers, Nashua Regional Planning Commission, Executive Director
- Julie Chizmas, Nashua Regional Planning Commission, Senior Transportation Planner
- Sara Siskavich, Nashua Regional Planning Commission, GIS Manager
- Beverly Doolan, Nashua Division of Public Health and Community Services, Program Coordinator
- Stephen Toom, Captain, Milford Police Department, Operations Commander
- Tylor Young, New Hampshire Department of Health and Human Services, GIS Analyst
- Claire Gendron, New Hampshire Department of Health and Human Services, Executive Secretary
- Human Impact Partners

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Prepared by:
Kim Goddu, Nashua Regional Planning Commission (NRPC)

For more information about this report contact:
Kim Goddu, kimg@nashuarpc.org, 603.424.2240, x29

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EXECUTIVE SUMMARY

In 2012/2013, the Nashua Regional Planning Commission (NRPC) conducted a regulatory audit on the Town of Milford, NH Zoning Ordinance and Development Regulations as part of the Round One New Hampshire Community Planning Grant. The primary recommendation from the audit report was to modify Article 6.04.0 Open Space and Conservation District to allow flexible zoning standards for all types of housing development, by relieving development from rigid zoning requirements in exchange for high standards of open space, building design, etc. As part of a Round Two Grant in 2013, NRPC and the Milford Planning Board explored potential regulation formats to incorporate the recommendations of the audit report, including the development a Neighborhood Overlay District/comprehensive cluster residential regulation that would incorporate Master Plan goals for inclusionary, multigenerational, and affordable housing choice and design; conservation and open space; transportation and mobility; infrastructure and services; and neighborhood character and livability with criteria specific to each of the Town's eight primary zoning districts.

Given the potential impacts of the proposed comprehensive cluster regulation on vulnerable populations in Milford, NH, NRPC identified the opportunity to conduct a Health Impact Assessment on the project. The expressed goal of a Health Impact Assessment (HIA) is to recognize the health impacts of such regulations. Furthermore, "The overarching goal of an HIA is to make more explicit the health impacts of the social decisions and help shape them to improve a population's health." - SE 122ND Avenue Planning Study, Oregon Public Health Institute (OPHI).

As the project moved forward in 2013, the Milford Planning Board and NRPC made the decision to advance the regulations by modifying Article 6.04.0 Open Space and Conservation District. The changes to the section included the inclusion of "Innovative Residential Design and Development Standards," which identified density bonuses for developers which would be offered in exchange for improved neighborhood amenities. The HIA reviewed the proposed density bonuses and identified impacts on specific health determinants (see characterization table for results). Consequently, the timeframe for the HIA allowed for a rapid assessment only consisting of literature review and limited outreach. Additionally, the HIA provides recommendations to enhance section comprehensiveness and identify data gaps and limitations.

Summary of Recommendations

The effects of the recommendations have not been evaluated for positive or negative impacts; but more strictly as an opportunity to enhance the density bonuses and to identify potential areas for implementation and the parties to complete the action.

TABLE 1: RECOMMENDATIONS

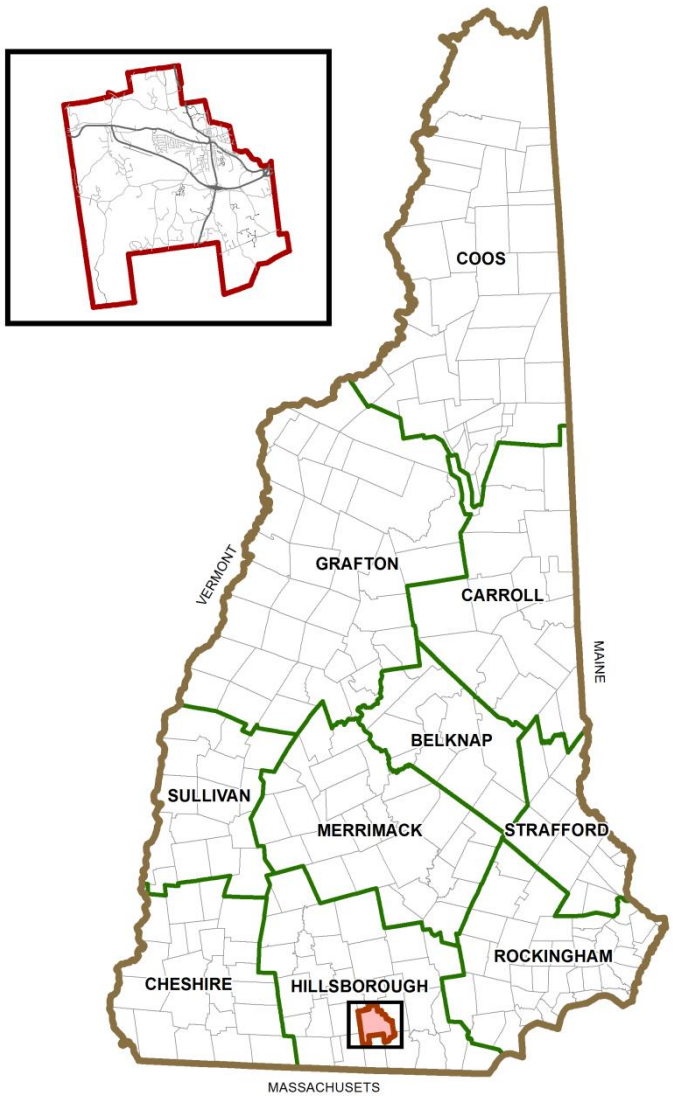
WHAT IS THE ISSUE TO ADDRESS?	WHAT NEEDS TO BE DONE?	WHO NEEDS TO DO IT?	HOW WILL WE KNOW WHEN IT GETS DONE?
Bicycle, pedestrian, and park user exposure to air pollutants	Address wood stove use in density bonuses, increased clustering can lead to increased smoke and air pollutant exposure, adopt regulations	Milford Planning Board; Community Development Staff; Milford Health Department	Wood stove guidance language in development code or environmental regulations/health ordinances
	Develop project selection criteria that prioritize bike and pedestrian infrastructure on low traffic streets or off-street locations	Milford Planning Board, Development Regulations, Conservation Commission	Adopt Town wide pedestrian/bike plan; Project prioritization criteria that prioritize infrastructure away from busy streets; Incorporation of infrastructure into new development
	Identify high traffic roadways and other local pollution sources	Department of Public Works, Community Development Office	Production of local maps with identified areas
Bicycle, pedestrian, and park user safety from crime	Include lighting elements in neighborhood design and facility to increase safety from crime; Increase neighborhood safeness perception	Milford Planning Board, Community Development Department, Milford Police Department, Department of Public Works	Site plan design includes language with lighting elements; Incorporation of lighting elements into facility construction
How to maintain water quality for private well owners	Conduct soil testing and well testing for arsenic on historical apple orchards	Local developers and Milford Water Department	Local well testing reports on historical apple orchard sites
	Require private well testing every 5 years for private well owners	Milford Selectman, Milford Health Department	Local ordinance or regulations include private well testing schedules

WHAT IS THE ISSUE TO ADDRESS?	WHAT NEEDS TO BE DONE?	WHO NEEDS TO DO IT?	HOW WILL WE KNOW WHEN IT GETS DONE?
How to improve active transportation benefits for elderly	Connectivity planning for local trails and sidewalks/bike lanes	Community Development Department, Department of Public Works, Conservation Commission, Milford Planning Board	Connectivity plan is incorporated into master plan, new connections from new developments and local routes are mapped
	Increase Blue Bus transit stops; Expand public transportation/bus service	Board of Selectmen, Souhegan Valley Rides, Community Development Department, Nashua Transit	Increased route times and ridership; New developments include bus stops
Bicycle, pedestrian, and park user safety from crashes	Conduct a Safe Routes to School program to identify walkable routes to school	Town of Milford or NRPC	A safe routes to school report is finished for Milford
	Conduct a walking audit of local streets to identify areas appropriate for sidewalk construction and bike lanes	Community Development Office, Department of Public Works, NRPC, Milford Improvement Team	Checklists are completed for high volume streets and local school routes; Recommendations are included in Capital Improvement Plan or local transportation projects
Current bonuses do not include end of trip bike facilities that are known to encourage biking and park use	Add bike facilities such as safe, attractive and covered bike racks as an additional bonus for schools, parks, commercial and industrial centers to encourage biking for recreation and transportation	Milford Planning Board, Department of Public Works, Conservation Commission	Bike facilities are included in density bonuses or park design elements
Current bonuses do not specify park features that would help encourage use by all age groups	Add benches and tables for park areas to encourage all age groups to use area and create outdoor gathering space	Milford Planning Board, Community Development Office, Recreation Department, Conservation Commission, Department of Public Works	Benches and tables are included in density bonuses or park design elements
Current bonuses do not address housing design for CPTED or green building standards	Housing design requirements	Milford Planning Board, Building Department	Standards for housing design is included in development regulations or zoning requirements; Adoption of applicable building codes

INTRODUCTION

The Town of Milford is located in southern central section of New Hampshire. The town was incorporated in 1794 and is 25.41 square miles. Milford is a historic farming town with a few remaining small family farms and a historic town center, known as the "Milford Oval" for the not quite a circle round-a-bout, which defines the downtown area. Milford's geography varies between low level river land and flood plains and taller rolling hills. The Soughan River flows through the heart of Milford and offers wildlife habitat, scenic beauty and flood storage. The southwestern section of town is minimally developed with many trails and vistas.

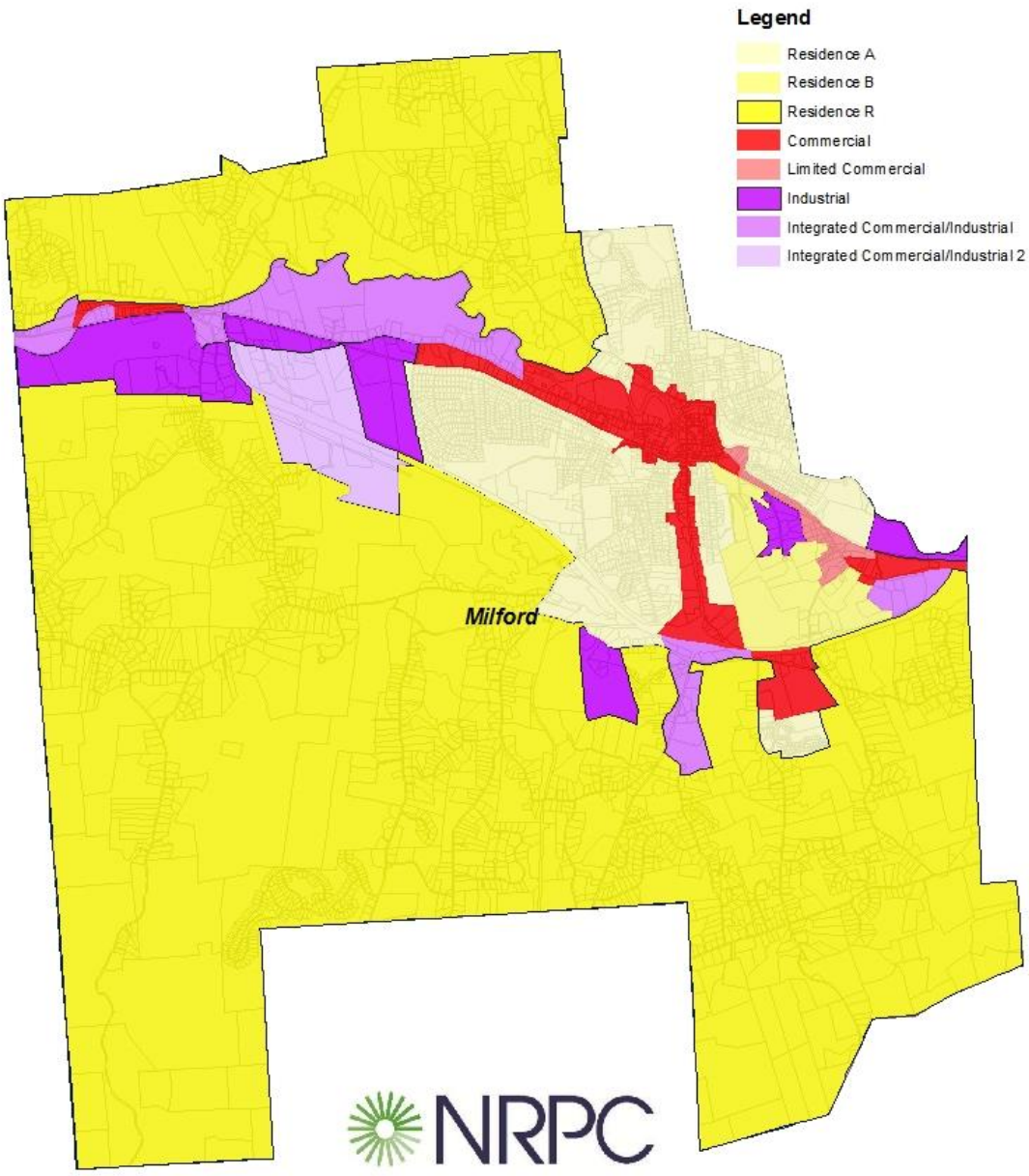
MAP 1: AREA OF INFLUENCE: MILFORD, NEW HAMPSHIRE



Source: GRANIT, 2014

Existing Conditions in Milford

MAP 2: MILFORD ZONING MAP

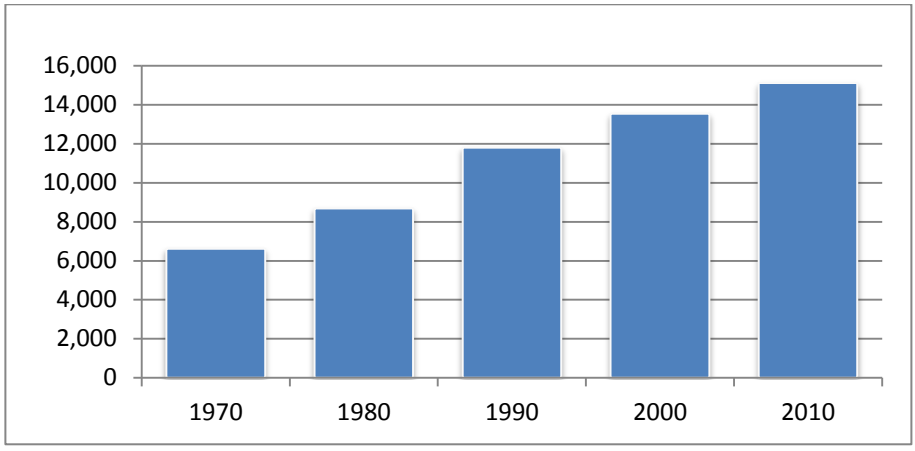


Source: Town of Milford, 2013

DEMOGRAPHICS

In 2012, the population was 15,152 residents and has been steadily rising since the 1970's as the Nashua, New Hampshire population has expanded regionally. The existing population is equally distributed by gender and well educated, 94 percent have a high school diploma and 34 percent obtained a Bachelor's Degree or higher (NHES, 2013). Milford is comparable to neighboring towns in size and demographics.

FIGURE 1: MILFORD POPULATION TRENDS SINCE 1970



Source: United States Census Bureau, 2010

The demographics below indicate a predominately white population with minimal diversity.

TABLE 2: DEMOGRAPHICS DATA

White alone	94.4%
Black or African American alone	1.4%
American Indian and Alaska Native alone	0.3%
Asian alone	1.4%
Native Hawaiian and Other Pacific Islander alone	0%
Two or More Races	1.7%
Hispanic or Latino	2.5%
White alone, not Hispanic or Latino	92.9%

Source: United States Census Bureau, 2010

INCOME AND COMMUTER HABITS

The table below indicates the average annual income levels for Milford and the current familial poverty level. Persons below poverty level for New Hampshire is 8.4 percent from 2008-2012 (United States

Census Bureau, 2010b). Milford is below the state average according to the American Community Survey (2007-2011) at 4.5 percent.

TABLE 3: MILFORD 2007-2011 ANNUAL INCOME

Annual Income, 2011 (Inflation Adjusted Dollars)	
Per capita income	$31,737
Median family income	$82,443
Median household income	$66,397
Median Earnings, full-time, year-round workers	
Male	$52,649
Female	$40,608
Families below the poverty level	4.5%

Source: American Community Survey, 2007-2011

Additionally, a large majority of the working population drive to work alone, 82 percent, whereas 11 percent carpool, 0.1 percent use public transportation and 1 percent walked to work. Eighty one percent of residents work within the community and 12 percent commuting out of state with an average 28 minute commute time to Manchester, NH, Nashua, NH or Massachusetts (NHES, 2013; United States Census Bureau, 2010a). Milford's geography is ideal for residents who desire a short commute to a larger metropolitan area while residing in a rural community.

Public transportation options are limited due to lack of train and minimal bus service. The Blue Bus is the only public bus service in town and is limited to non-emergency medical appointments and scheduled shopping trips. The largest demographic using the bus service is the elderly populations going to medical appointments and accessing other amenities in Nashua, NH. Several residents have noted the long wait times between pick up and drop offs.

Alternatively, sidewalks provide a safe area to walk to a destination. Milford offers a well-connected sidewalk network in the downtown area. However, sidewalks are lacking around Hitchiner Manufacturing, the largest employer in town, significantly reducing an employee's options to get to work. The situation compounds for individuals who lack a car and rely on other modes of transportation.

SCHOOL STATUS

The Milford public school system has 2,772 students, not including Milford Christian Academy (a local private school), local child care centers and kindergartens. There are two elementary schools, one middle school and one high school. The average number of students who qualify for reduced lunch is 5 percent, plus the percent of students who qualify for free lunch programs ranges from 13-17 percent (see chart below).

TABLE 4: SCHOOL FREE AND REDUCED LUNCH STATISTICS, 2010-2011

School Name	District	Students	Free Lunch	Reduced Lunch
Heron Pond Elementary School	Milford School District	825	139	42
Jacques Memorial Elementary School	Milford School District	374	45	15
Milford High School	Milford School District	955	132	49
Milford Middle School	Milford School District	618	106	31

Source: National Center for Education Statistics, 2013

Milford High School averages 240 students per grade, which creates a sense of community for students and increased access to the necessary resources to help students graduate from high school. Currently, the 2012 high school dropout rate for Milford is .98 percent (NHDOE, 2013) which demonstrates an extremely minimal dropout rate. Students who do not receive a high school diploma pursued a GED or other opportunities.

HEALTH RATES AND FACTS

Town specific health data is difficult to obtain and limited in availability. There is no town specific data regarding health rates for obesity, cancer, or heart disease for Milford, NH due to the relatively small population size. In New Hampshire, health information is available at the county or regional level. Milford is geographically located in Hillsborough County which also contains Manchester, NH and Nashua, NH, two of the largest cities in the State. Extrapolating health data can be problematic due to the increased diversity in race and income from the neighboring cities.

The City of Nashua Public Health Department conducts a Community Health Assessments (CHA) for the Nashua region. The City of Nashua's population is 86,933 residents which create a divergence in ethnicity, income levels, varying poverty rates and public infrastructure data. The health rates that are available present possible health issues in Milford; however the rapid assessment HIA process limited further substantive research on specific health issues affecting Milford residents.

Below are a list of health statistics for New Hampshire and Hillsborough County which can be extrapolated into the Milford population.

- 38 percent of adults in NH are classified as overweight and 25 percent are classified as obese (Anderson, Ludmila, 2010).
- Nationally, New Hampshire has one of the highest rates of asthma when compared to other states (Conley, A. & Daniels, D., 2011).
- 8.3 percent of children in Hillsborough County have asthma (Conley, A. & Daniels, D., 2011).
- In 2009, high-risk NH adults who reported receiving an influenza vaccine in the previous 12 months included: 69.7 percent with diabetes, 54.0 percent with current asthma, 71.6 percent of individuals with the history of coronary heart disease, 66.7 percent with a history of heart attack, and 63.5 percent of those with the history of a stroke (Anderson, Ludmila, 2011) .
- Among NH children with reported chronic disease conditions (2006 and 2008 years combined), approximately 43.9 percent reported influenza vaccination during the previous 12 months (NH DHHS, 2011).
- Cancer rates are higher for males and females in the Greater Nashua Area than in the City of Nashua (see table below) (Conley, A. & Daniels, D., 2011).

TABLE 5: AGE-ADJUSTED RATES FOR BREAST, PROSTATE AND LUNG CANCER, 2003-2007

	Breast Cancer (95% Confidence Intervals)	Prostate Cancer (95% Confidence Intervals)	Lung Cancer (95% Confidence Intervals)
Nashua	111 (98-124)	135 (119-152)	77 (68-85)
Greater Nashua Area w/out Nashua	134 (120-147)	164 (147-182)	75 (67-83)
New Hampshire	128 (125-132)	153 (149-158)	70 (68-72)

Source: City of Nashua Public Health Department, 2011

HIA Process

A Health Impact Assessment (HIA) consists of six prescribed steps to inform regulatory and decision making processes and the impact on a population.

SCREENING

The first step in an HIA is to determine if it would add value to the decision making process (Bhatia, R, 2011). In the screening process, NRPC considered the recommendations of the Milford Zoning Ordinance and Regulation Audit, and determined that the decision that was going to be made would be the development of a comprehensive cluster regulation that would meet the housing goals of the Master Plan and include inclusionary housing. NRPC determined that the decision and the impact it would have on vulnerable populations is consistent with the goals of an HIA, which is to identify health impacts of social decisions to improve vulnerable population health. After having identified the value of an HIA on the project, NRPC applied for a grant through the HNH Foundation. HNH Foundation's goals include those that are parallel to an HIA. Furthermore, the HNH Foundation is New Hampshire's leading funder dedicated to increasing health and dental insurance coverage for children, promoting children's oral health, and preventing childhood obesity.

SCOPING

The second step in a HIA is to create an outline which defines the key issues, possible research questions and methods, and identify stakeholders to engage. It is also the time to establish roles in the HIA, develop a work plan to identify concrete, measureable HIA goals (Bhatia, R, 2011).

The original goals of the Milford HIA were as follows:

- The HIA will enhance the modification of Article 6.04.0 Open Space and Conservation District (OSCD) which allows flexible zoning standards for all types of housing development, by relieving development from rigid zoning requirements in exchange for high standards of open space, building design, etc. or influence the creation of the Milford Neighborhood Overlay District (MNOD).
- To identify populations potentially impacted by zoning changes and report recommendations to Milford Planning Board.
- Encourage walkable communities to positively impact population health through the implementation of the Complete Streets Model for new housing developments.
- The HIA will serve as a model for other communities who want to perform an HIA.

ASSESSMENT

The assessment phase of the HIA is a data gathering period to establish existing conditions and an evaluation of potential health impacts. This phase is the time for utilizing those methods established in the scoping phase such as literature review, interviewing, empirical research and conducting community surveys or focus groups on the issue (Bhatia, R, 2011).

The Milford HIA was a rapid assessment consisting of a literature review including previously published HIA's with similar health determinants. Peer-reviewed literature provided the basis for establishing the likely direction of the health impacts on the HIA topic areas discussed in the background section, vulnerable populations and health outcomes such as stress, depression, diabetes and heart disease.

RECOMMENDATIONS

The recommendations section coincides with the assessment phase. Per the literature review on existing conditions, evidence based recommendations are created to recognize potential negative impacts and strategies for mitigation while also promoting positive health impacts (Bhatia, R, 2011).

The amalgamation of the density bonuses with the health determinants, health impacts and vulnerable populations to create the characterization table identified areas where the likelihood of the density bonuses impact the HIA topic areas. The recommendations comprise of additional density bonuses or actions to be taken to mitigate potential negative health impacts.

REPORTING

The reporting of the scoping and assessment phase involves the creation the HIA to communicate the findings and recommendations (Bhatia, R, 2011). This report reviews the proposed innovative residential design and development density bonuses and the likelihood of the impacts that they have on the recognized vulnerable populations, and the effects on the health outcomes.

EVALUATION/MONITORING

The last phase in the HIA process evaluates the effectiveness of the HIA on the decision making process and the potential implementation of the decision. Refer to the monitoring section of this HIA for future evaluation efforts of the density bonuses.

BACKGROUND/SCOPE

Stakeholders were identified to participate in the scoping process and participation in the Milford HIA Subcommittee. The basics of a HIA were discussed with stakeholders at a scoping workshop. The workshop included an emphasis on the proposed MNOD format. Ideas were generated on health impacts that may evolve from the adoption of the proposed ordinance. A number of stakeholders participated including the Milford Welfare Department, Milford Recreation Department and Milford Conservation Commission. Six areas of health were identified, which included:

- Opportunities for Social Cohesion
- Safety from Crime
- Housing Affordability
- Traffic Safety
- Maintaining Water Quality
- Exposure to Air Pollutants

Stakeholders narrowed down the most vulnerable populations to be impacted, which included the youth, elderly and lower income groups. The stakeholders named other groups who could be impacted, which included future residents, developers and area families with children. Quantifying the impacts to these populations was beyond the scope of this project.

Milford Housing Audit

The Milford Housing Audit is summed up on the Milford Town website as such:

"The Milford Planning Board completed a regulatory audit of the Town's Zoning Ordinance and Development Regulations. The purpose of the audit, made possible by New Hampshire Community Grant Round 1 funding and conducted by the Nashua Regional Planning Commission with Community Development Office staff, was to assess how consistent existing regulations are with implementing the vision and action program identified in the 2010 Housing Chapter of the Milford Master Plan, and to provide recommendations for regulatory changes for Town consideration in addressing inconsistencies and conflicts between the regulations and achieving housing goals. These housing goals are predicated on this vision statement:

In accordance with the vision statements of Milford's Master Plan and the Community Character chapter in particular, Milford shall promote and maintain a diverse and sufficient housing stock that meets the needs of a multigenerational community, while creating functional neighborhoods, interconnected with the greater community and natural resources that support and advance our sense of community character and place.

The audit identified an opportunity that the Planning Board believes bears additional study, analysis, and possible implementation. This opportunity is the development of a new comprehensive 'Neighborhood Overlay' that would enhance the idea behind the existing Open Space and Conservation District (OSCD) that governs developments of five or more dwelling units." (Town of Milford, 2013)

Section 6: Density Bonuses for Innovative Residential Development and Design

Initially, the Milford Planning Board conducted an open house to collect community input to what resident's value in neighborhood development. Options for neighborhood features were provided to solicit resident feedback.

The resulting design elements were incorporated into what is known as Section 6.04 of the Milford OSCD. The design elements are predominately architectural and landscape elements for added neighborhood benefit and improved aesthetic. Examples of design features include: bike lanes and trails, pedestrian walkways, stormwater mitigation elements, sidewalks, playgrounds and pocket parks. The characterization table demonstrates the likelihood of impact from the density bonus on health.

Open Space and Conservation Subdivision

The purpose of the existing Article 6.04.0 Open Space and Conservation District (OSCD) is:

"The Open Space and Conservation District is intended to encourage environmentally sound planning to conserve open space, retain and protect important natural and cultural features, and provide for efficient use of land and community services to advance the goals stated in the master plan." (Town of Milford, 2011a)

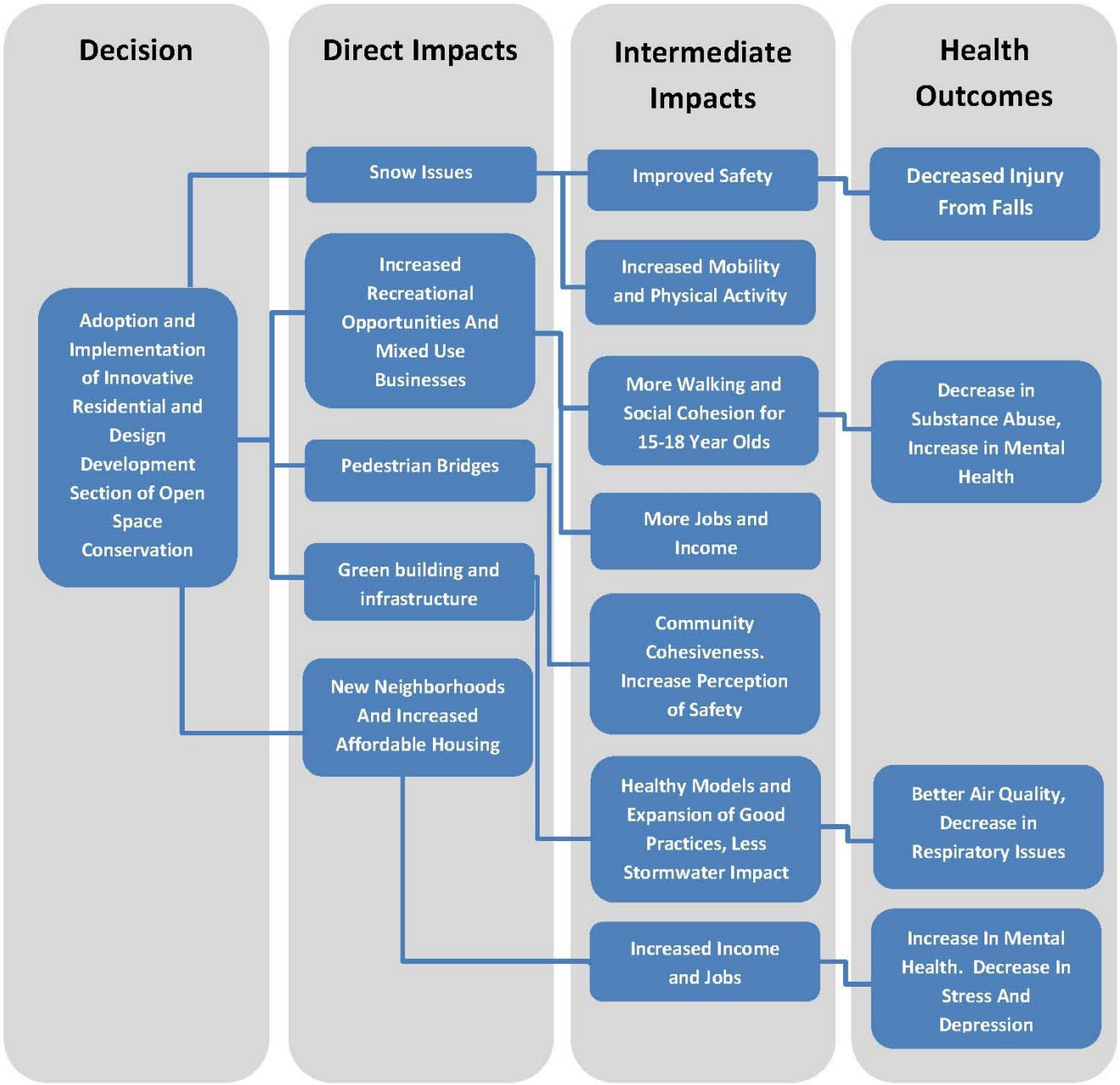
Currently, the district applies to those subdivisions with five or more residential lots or five or more dwelling units in zoning district A, B and R with a permanent open space requirement to prevent future subdivision development and reinforce the purpose, as stated above. The ordinance focuses on resource and open space protection; however it lacks the ability to develop a variety of housing types to meet the housing goals of the master plan and includes rigid zoning requirements, which was also identified as being a potential disincentive to applicants.

Maintaining open space, trails and low impact recreation areas demonstrate how existing language in the ordinance can sustain present opportunities for social cohesion and will continue walkability in and around town.

Pathway Diagram

The pathway diagram (Figure 2 below) comprises a combination of input from the stakeholder participants that were present at the scoping workshop. The pathway diagram brought to light additional health related outcomes such as diabetes, stress, depression and heart disease. The health outcomes and density bonuses were characterized into a table for likelihood of impact.

FIGURE 2: PATHWAY DIAGRAM



ASSESSMENT FINDINGS

Opportunities for Social Cohesion

SOCIAL COHESION AND HEALTH

A growing body of evidence exists to support that design elements in the built environment may affect opportunities for social interaction and overall health of the individuals who reside in the neighborhood thus effecting community social cohesion (De Jesus, Puleo, Shelton, & Emmons, 2010; McNeill, Kreuter, & Subramanian, 2006). Social cohesion can be described as social support or social networks. Social cohesion can also be recognized as, " the degree to which an individual is interconnected and embedded with in a community-is vital to an individual's health and well-being…" (McNeill et al., 2006). Neighborhoods can help establish social networks to help citizens become integrated into surrounding social structures (Stronegger, Titze, & Oja, 2010). One example, as children age, parents can establish social networks to provide child services such as physical activity and resources to help relieve poverty and parental stress (McNeill et al., 2006).

Physical activity in childhood establishes health lifestyle choices and prevents childhood diseases such as obesity (Franzini et al., 2009). Being overweight or obese increases the risk for chronic disease such as heart disease, stroke, hypertension, type 2 diabetes, osteoarthritis and cancer. Neighborhood design features, such as sidewalks and bike trails, provide opportunities for safe play. Children use these amenities as modes of transportation to and from destinations (Franzini et al., 2009).

Older adults have seen a rise in health concerns related to the built environment. Social support is increased for seniors in areas with sidewalks and paths. As the ability to drive deteriorates, proximity to amenities becomes vital to maintain social interactions and decrease health issues such as obesity (Berke, Koepsell, Moudon, Hoskins, & Larson, 2007).

INFLUENCE OF NEIGHBORHOOD DESIGN AND LAND USE

Upgrading neighborhood design elements can significantly impact access to healthy choices. Historical planning designs discouraged innovative design elements and prevented physical activity opportunities (Cutts, Darby, Boone, & Brewis, 2009). Density bonuses, such as those proposed to be offered in the OSCD, can entice developers to increase housing density likely reducing infrastructure and generating more densely developed neighborhoods, and as a result may reduce crime and increase personal safety (Rifaat, Tay, Perez, & De Barros, 2009).

Direct physical impacts to neighborhood design can include:

- Increased walking and biking for all neighborhood residents
- Increased options for alternative modes of transportation through walking, biking and ride sharing
- Increased sense of security
- Increased sense of well-being and contentment
- Decreased stress and depression
- Improved building design quality
- Improved neighborhood design aesthetic

(Tacoma-Pierce County Health Dept., 2010)

EXISTING SOCIAL COHESION AND COMMUNITY IDENTITY IN MILFORD

Milford hosts a number of opportunities for community interaction. Eight churches exist in Milford; six are located directly in downtown which limits access for living out of the town center area. Those who live out of the immediate downtown area must drive to access amenities and events as Milford's sidewalk system is incomplete in between neighborhoods and there is minimal public transportation.

The Town of Milford hosts a number of events throughout the year for citizens interact with other community members:

TABLE 6: MILFORD EVENTS

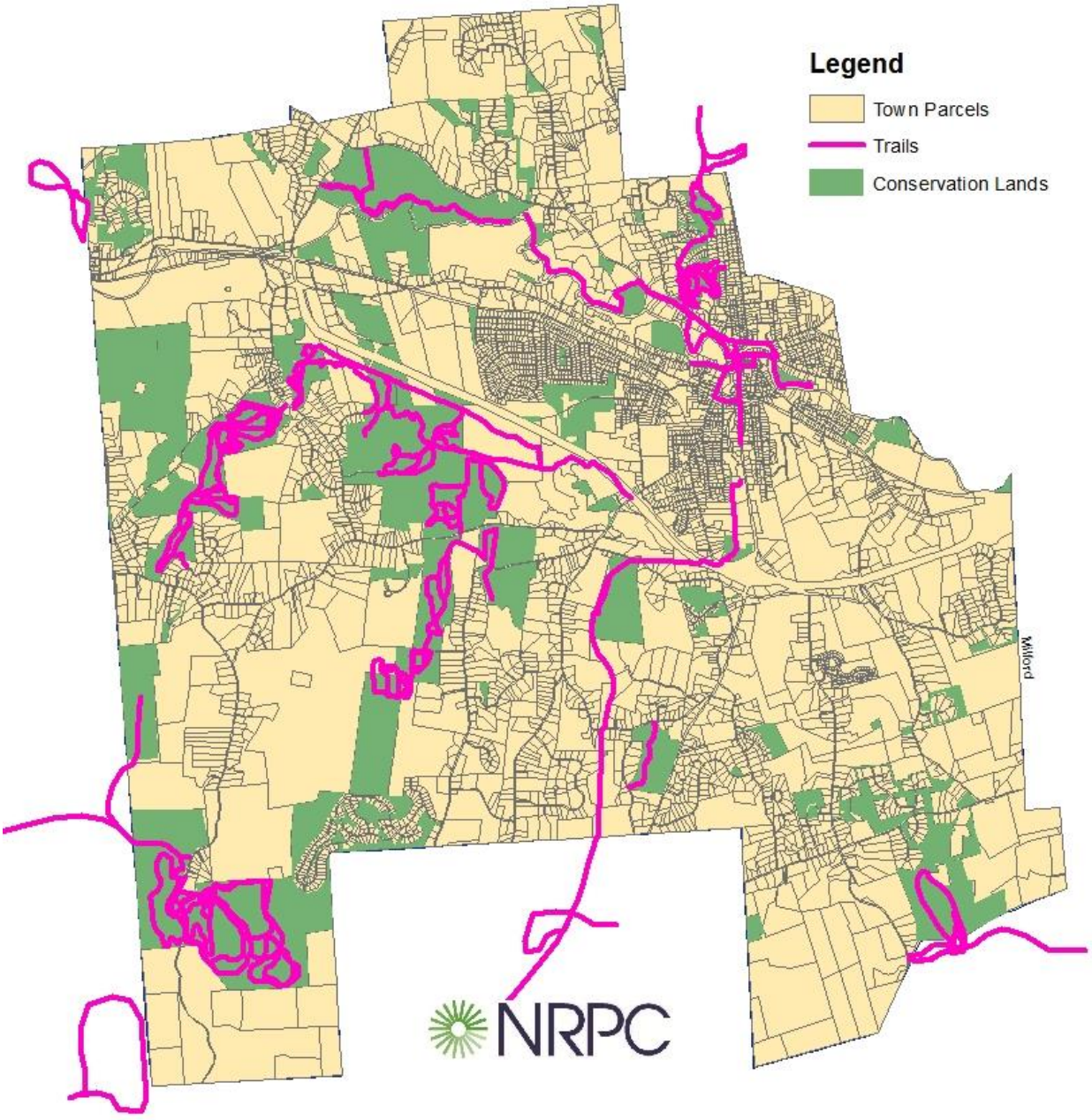
Event	Season	Participants
Winter Festival	Winter	Open to public
Contra Dances	Winter	Public, no young children
Father Daughter Dance	Winter	Fathers and daughters
Ghost Trail Ultramarathon	Fall	Open to public
Milford Pumpkin Festival	Fall	Open to public
Independence Day Fireworks	Summer	Open to public

Source: Town of Milford, 2013

Table 6 shown above is a sample offering by the Milford Parks and Recreation Department and is not meant to be a comprehensive list of all community events. However, there are a number of opportunities for community cohesion and interaction for all age groups and income levels beyond the Milford Recreation Department events through the use of parks and trails.

The Milford Conservation Commission maintains significant amounts of trails and parks for residential and public use. Large tracts of undeveloped land in the southwest corner offer open vistas which preserve the rural character of Milford. Trails and conservation areas protect wildlife and provide opportunities for social interaction through physical activities such as walking, running, biking and hiking which can reduce chronic disease such as obesity, type 2 diabetes, cancer and heart disease (Fuzhong Li, Fisher, Brownson, & Bosworth, 2005; Panter, Jones, & van Sluijs, 2008).

MAP 3: CONSERVED LAND AND TRAIL AREAS



Source: Town of Milford, 2013

VULNERABLE POPULATIONS

Children, seniors and lower income individuals all benefit from increased social interactions and maintaining supportive social networks for obesity prevention, creating positive mental and social wellbeing and relieving poverty. The proposed density bonuses offer a number of options to increase neighborhood interaction such as: bike lands, walkways, parks, playgrounds and cottage housing. All populations could potentially utilize these features further enhancing the social experience between age groups and income levels.

SOCIAL COHESION POLICY ANALYSIS

The density bonuses are a menu of options for developers to choose from in exchange for density bonuses. There are multiple choices potentially affecting social cohesion, therefore, it is difficult to discern the magnitude of impact the bonuses will have on the residents in the newly developed neighborhood due to the ultimate decision resting with the developer to include extra amenities.

The majority of social cohesion opportunities exist in the recreation section of the density bonuses. A developer may choose to forgo the recreation section to include other density bonuses more heavily focused on other areas such as low impact development. Contrary, an alternate developer may focus on the Complete Streets concept which accommodates all modes of transportation. The Board could guide a developer to a more balanced plan with multiple density bonus options rather than a narrowly focused site design.

Personal Safety

COMMUNITY DESIGN AND CRIME SAFETY

As architecture and technology have evolved, neighborhood design elements are a viable solution to deterring crime. “Community policing through environmental design (CPTED),” has gained support as effects of the built environment on health become more thoroughly researched. CPTED provides alternatives to typical crime situations through design alterations. Examples include neighborhoods with windows directly facing the sidewalk or street that offer a certain amount of safety by creating, “eyes on the street.” The concept of “eyes on the street” deters crime and encourages neighbor social interaction (Fleissner, D. & Heinzelmann, F., 1996).

Neighborhoods where residents perceive the area to be unsafe have demonstrated lower physical activity rates in children which can forward into higher obesity and type 2 diabetes rates (Franzini et al., 2009). Similar findings are suggested for park safety. Park safety has been shown to disproportionately decrease in lower income neighborhoods due to lack of maintenance and the perception of increased crime prospects (McNeill et al., 2006). It is perceived that mixed housing types that include lower income populations can alleviate poverty and the deterioration of park infrastructure associated with illicit drug use and increased crime opportunities (McNeill et al., 2006).

OTHER FACTORS THAT AFFECT CRIME AND SAFETY

Residential density, land use mix and street connectivity is positively correlated with reduced crime rates (Christian et al., 2013). Conversely, loop and lollipop streets with minimal lighting can provide opportunities for illegal activity. Adequate lighting in and around neighborhood areas can hypothetically escalates a resident’s perception of neighborhood safety.

Appropriate street lighting can deter nefarious activities. Maintenance of properties, landscaping and vegetation decrease dark corners and secluded areas. Reducing unkempt areas through vegetation maintenance and infrastructure upkeep can increase perceived neighborhood safety (Tacoma-Pierce County Health Department, 2010).

Existing Crime and Safety Conditions in Milford

In 2012, the Milford Police Department reported an increase in drug violations, sexual assaults and thefts. In an effort to deter further crime, the Police Department is working to establish relationships with residents and create neighborhood watch groups to increase the reporting of crime and prevent its occurrence beforehand (Viola, Michael J., 2012). See Arrests by Street map in Appendix B.

The Arrests by Street Map demonstrates the streets where the most arrests occur in Milford. The Milford Police Department tracks street names of occurrences but lack street addresses or location coordinates. Route 101, a major East-West route connecting southwestern NH with the Nashua-Manchester, NH areas, one of the most highly trafficked areas in Milford, contains the highest levels of arrests.

Vulnerable Populations

The density bonuses in Milford can potentially affect all three identified vulnerable populations: children, elderly and lower income. Lower income areas are associated with increased crime and safety concerns. Lower income areas can be relieved, by including affordable housing in mixed use neighborhoods. Neighborhood safety will increase and access to areas for recreation and play significantly increases the opportunities for children and seniors to engage in physical activity and social cohesion (McNeill et al., 2006).

Crime and Safety Policy Analysis

The current OSCD and density bonuses do not directly address crime. The purpose of the OSCD is the preservation of open space with an option to increase density at the Planning Board's discretion (Town of Milford, 2011). A board decision to increase density could positively influence crime or disreputable activities such as drug use. Cottage housing, green building design and sidewalks are design elements which positively reduce crime rates and increase a positive neighborhood perception.

Quantifying the effects of the density bonuses on the overall crime rates in Milford will occur with development and redevelopment. Addressing crime and nullifying crime prone areas can be addressed through proposed site and architecture design standards.

Housing Affordability

Housing Affordability and Health

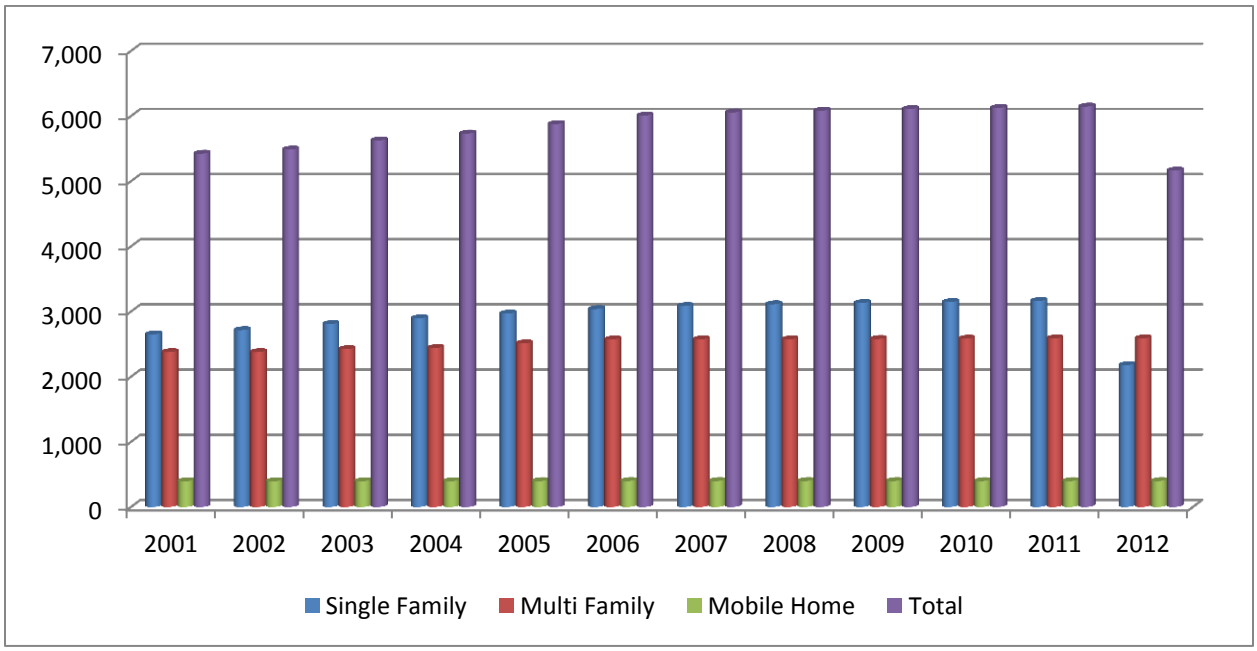
Long term homelessness can manifest physical and mental health issues such as long term depression, anxiety and an exacerbation of severe mental issues due to limited health care access. Access to health care and support services is especially vital for vulnerable populations such as children and seniors and is deterred by eviction and foreclosure, frequent moves and overcrowding (Henwood, Cabassa, Craig, & Padgett, 2013; Ito, Kate, Sportiche, Noemie, Keppard, Barry, & James, Peter, 2013). Affordable, quality housing has been linked to a reduction in risk to diseases such as obesity, diabetes, anxiety and depression (Stronegger et al., 2010).

"Families who can only find affordable housing in very high-poverty areas may be prone to greater psychological distress and exposure to violent or traumatic events" (Ito, K., Sportiche, N., Keppard, B., & James, P., 2013). Once housing stability is attained, stress reduction can occur. Historically, high poverty areas have a decreased housing stock quality, potentially exposing already vulnerable populations to environmental toxins such as lead, mold, and vermin. Furthermore, poor indoor air quality due to a deteriorating building infrastructure increases the likelihood of asthma and other respiratory illness (Ito, Kate et al., 2013; Jacobs, Kelly, & Sobolewski, 2007).

EXISTING HOUSING CONDITIONS IN MILFORD

Milford has a significant amount of rental units compared to other towns in the Nashua region. The current 15,152 residents of Milford, of those 3,816 residents are children under 19, occupy the 6,298 housing units in Milford (United States Census Bureau, 2010a). Below (Figure 3) is the 10 year housing unit count for Milford. The table demonstrates single and multi-family units have increased over time as the population grew incrementally.

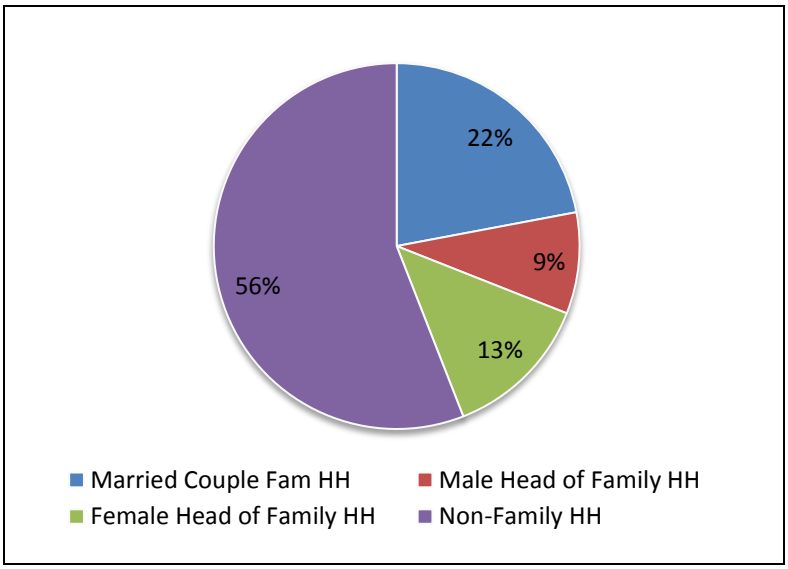
FIGURE 3: TOTAL HOUSING UNITS IN MILFORD



Source: NHHFA, 2013

The Zoning Ordinance and Development Regulation Audit recommend incorporating diverse housing types. Mixed housing types have the potential to desegregate poverty areas and disperse resources such as increasing social cohesion and neighborhood activities. Below, the historical poverty rate for Milford by housing type suggests the largest percent of households in poverty are non-family households.

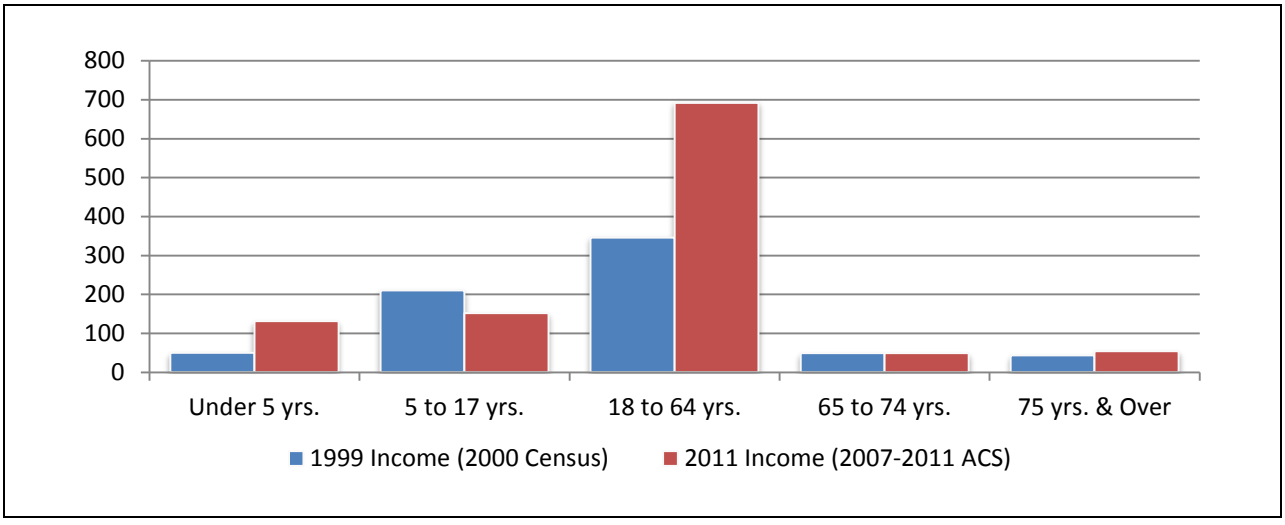
FIGURE 4: 2007-2011 HOUSEHOLDS IN POVERTY



Source: American Community Survey Data, 2010

According to the New Hampshire Housing Finance Authority (NHHFA), the population by age group that is classified in poverty is 18-64 and increased over the last ten years as the population has grown marginally. As this age group continues to age, new resources will be required to accommodate Milford's working poor or seniors living in poverty should residents chose to age in place.

FIGURE 5: POPULATION BY AGE WITH INCOME BELOW POVERTY



Source: United States Census Bureau, 2010

The Milford Welfare Department provides housing subsidies for individuals and families in the form of vouchers which only become available after surrender. The current waitlist for a voucher in Milford is 9 years (Drew, Susan, 2013). Therefore, there are a number of working individuals that qualify for housing assistance for which the town cannot provide services.

VULNERABLE POPULATIONS

All the vulnerable populations identified in this HIA would be positively affected by housing type choices. Seniors can be particularly affected as the inability to maintain a large residence becomes a burden. Security, family and legacy are valued elements of aging in place (Guillory & Moschis, 2008). As health deteriorates, housing developments close to amenities and health care facilities can increase social cohesion and support services. Cottage housing and accessory housing units are density bonuses options which offer a variety of housing choices and reduce the burden of owning a home and associated costs (Luis, M., 2000).

Children and lower income populations can benefit greatly from higher quality housing and neighborhood amenities. Affordable, high quality housing relieves parental stress and increases disposable income providing opportunities to purchase higher quality foods and access necessary health care (Tacoma-Pierce County Health Department, 2010).

HOUSING AFFORDABILITY POLICY ANALYSIS

The Zoning Ordinance and Development Regulation Audit reviewed existing policies in Milford and demonstrated the need for diversity in housing types. The addition of the density bonuses into the OSCD would enhance future housing developments by encouraging creative, affordable housing and diversity of housing type choices.

Traffic Safety

INJURY AND DEATH FROM MOTOR VEHICLE ACCIDENTS

In the United States, over 30,000 people die every year from vehicle crashes and these crashes are the leading killer for youth, teens and young adults age 5-34 (CDC, 2011). In New Hampshire, the cost of crash related deaths are $143 million per year, $2 million in medical costs and $141 million in work loss costs. New Hampshire rates fourth for crash related death costs in New England, leading Vermont and Rhode Island by approximately double (CDC, 2011). In the NRPC region, 25 percent of all car trips are commuting trips, furthermore, 14 percent of all trips are under 1 mile in length (NRPC Travel Demand Model, 2013).

Community and neighborhood design can have a significant impact on modes of transportation and traffic injury. Planning for pedestrians and bicyclists is gaining in popularity with many communities working to incorporate alternative modes of transportation. Additionally, commercial and residential development has the potential to generate new trips using all forms of transportation and increasing the number of traffic related injuries (Ito, Kate et al., 2013). Poorly designed areas can limit transportation options and increase crash rates. Other factors affecting crashes can include: vehicular speed, number of vehicles travelling, number of trips and discontinuous street networks.

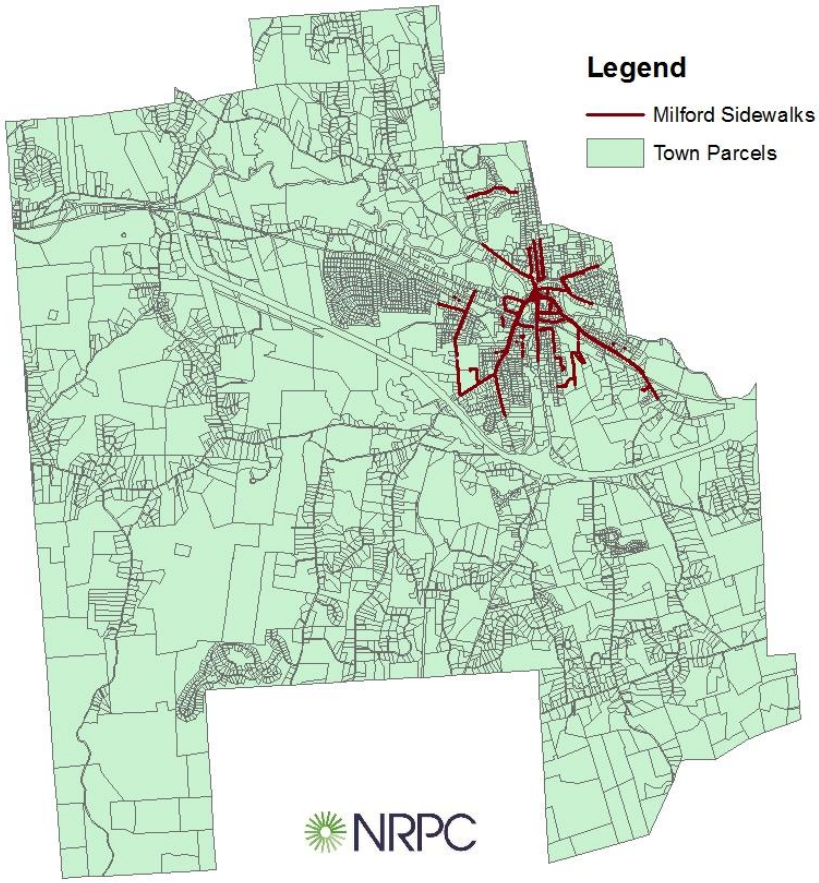
Vehicular speed at the time of crash can significantly alter impact on the pedestrian. A pedestrian hit by a car travelling 20 mph has a 5 percent chance of being killed when compared to an 85 percent chance of death at 40 mph. A Boston study revealed that chances increase for a pedestrian to be injured by the number of car trips taken. Injury rates increased 3 to 5 times for every 1,000 vehicles that were added (Tacoma-Pierce County Health Department, 2010). Discontinuous street networks including sidewalk connectivity have an impact on the walkability to local destinations. Numerous street connections are associated with decreased risk of collisions and automobile accidents when compared to, “loop and lollipop” road configurations (Tacoma-Pierce County Health Department, 2010).

EXISTING INJURY AND SIDEWALK CONDITIONS IN MILFORD

The Milford Reportable Crashes Map (Appendix B) demonstrates fatal crashes, pedestrian crashes and bicycle crashes in downtown Milford and Town schools within a half and one mile radii. During the 2009-2011 time periods, there were three pedestrian, six cyclist and two fatal vehicle crashes. It should be noted that the map is limited to the northern section of Milford and does not address the other high traffic areas; Route 13, in southern Milford or the western section of Route 101.

According to the Milford Planning Department, there has not been a walking audit or sidewalk analysis completed in town, therefore the sidewalks conditions are unknown. The map below demonstrates the location of sidewalks in town, which are heavily concentrated in downtown, thus increasing the potential for future pedestrian and bicyclist crashes in outlaying neighborhoods.

MAP 4: MILFORD SIDEWALKS



Source: Town of Milford, 2013

The development of a sidewalk analysis could highlight incomplete sidewalk areas as highlighted below on Highland Street.

FIGURE 6: HIGHLAND STREET, MILFORD, NH

Source: Google Earth, 2013

Incomplete sidewalks force residents to use streets or private property to access their destination, which is compounded when snow is present. New Hampshire receives an average of 60 inches of snow per year. Residents forced to access amenities by foot, risk collisions with traffic from unplowed sidewalks and lack of sidewalks.

A walk score or walkability determines the ease of access to a destination by foot. Milford's sidewalks exist in downtown with a walk score of 78, very walkable by foot. Grocery stores and other destination stores such as book stores are located along the Route 101A (Nashua Street) corridor southeast of downtown. A brief analysis of the Nashua Street sidewalk revealed the intersections lack crosswalks creating an issue accessing the west side of the street, reducing the walk score to 46, making it a car dependent area. Neighborhoods on Route 101 lack access to the businesses and contain no sidewalks, reducing the walk score to a low of 25.

VULNERABLE POPULATIONS

Traffic safety affects all the vulnerable populations identified in this HIA. Children use walking and cycling as "active travel" to access a specific destination like a friend's house, school and parks. Active travel significantly increases chances for physical activity. According to Panter et al., children who live within walking or biking distance of school were five times more likely to use an active travel mode to school when parents felt the streets were safe and provided sidewalk infrastructure.

Seniors and lower income populations use active travel to acquire amenities and participate in social opportunities. As the ability to drive deteriorates due to age or income, safe, reliable transportation or adequate infrastructure can determine access to local amenities and mental wellbeing (Cutts et al., 2009; Fuzhong Li et al., 2005; Saelens, Sallis, & Frank, 2003).

TRAFFIC POLICY ANALYSIS

The density bonuses provide opportunities to increase pedestrian and cyclist safety coupled with low impact design elements reducing stormwater runoff. The bonuses include alternative parking design elements, which can reduce exposure to collisions thru diverting play and gathering spaces away from

roadways. Bonuses including sidewalks and trail ways provide alternative transportation away from roadways and high traffic areas.

Water Quality

The Built Environment and Water Quality

The importance of safe drinking water is widely accepted throughout the United States. Water quality standards emerged from public health issues dating back to the Industrial Revolution; most notably the Cuyohoga River Fire in 1969. Since that time, the interrelationship between public health and water quality has grown exponentially. State and federal standards regulate water quality to protect the public and reduce exposure to harmful contaminants: bacteria, metals, sewage and water borne diseases (NHDES, 2008a).

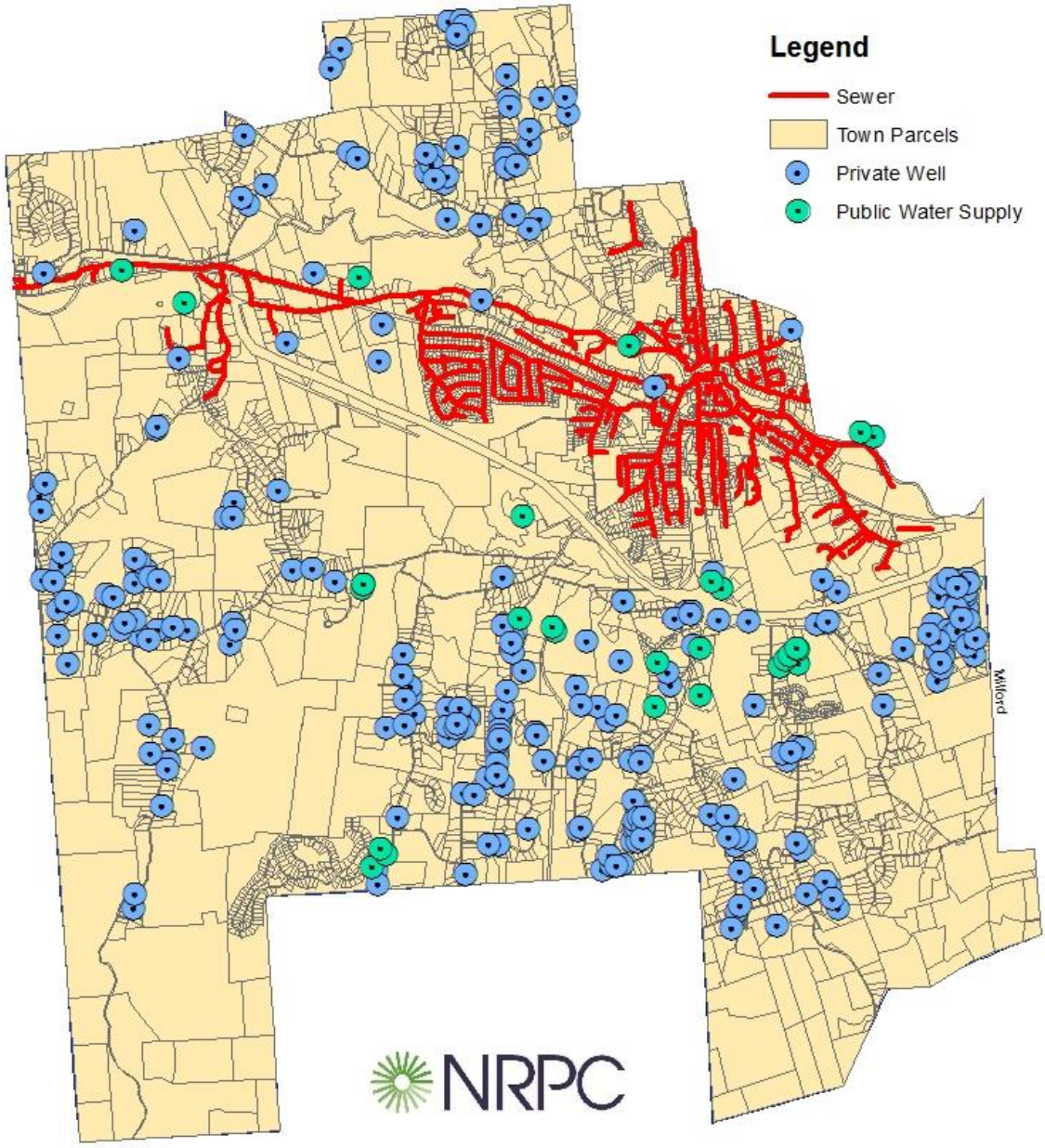
As the study of water quality and the built environment have evolved, stormwater and its effects on drinking water quality have emerged as a threat to public health. Impervious areas eliminate groundwater infiltration forcing water into storm drains, depriving residents downstream of clean, accessible ground water (NHDES, 2008a, 2008b). Transportation poses a large threat to water quality in the form of stormwater runoff. Salts, deicers, car fluids and the like are deposited onto streets and sidewalks then transported during the next rain or snow event directly into storm drains and released into neighboring rivers, lakes and streams. The construction of new roads and impervious cover has expanded and the threat to water supplies has increased. Through the proposed IRDD, creating infiltration areas for stormwater with in the built environment can mitigate potential contaminants from accumulating in street run off.

Built environments store heat in addition to contaminants, therefore, stormwater moves over an impervious area storing heat and warming bodies of water when dispersed causing significant effects on wildlife and polluting drinking water sources (NHDES, 2008b).

Existing Water Quality Conditions in Milford

The Town of Milford maintains public water and sewer for 3,559 residential, industrial and commercial customers. The waste water treatment facility is a 2.15 million gallons per day (MGD) facility and operates at 1.2 MGD (Boucher, D., 2013). Consequently, the remaining households operate on private well and septic systems. The Town of Milford does not maintain private well data. The New Hampshire Department of Environmental Services (NH DES) has collected private well locations since 1984. The status of any wells drilled before 1984 is unknown including dug (shallow) and abandoned wells. New Hampshire does not require well testing for private systems but NH DES strongly encourages well water testing schedules for private homeowners (NHDES, 2011). The map below indicates the location of active and inactive public and private wells in Milford recorded since 1984.

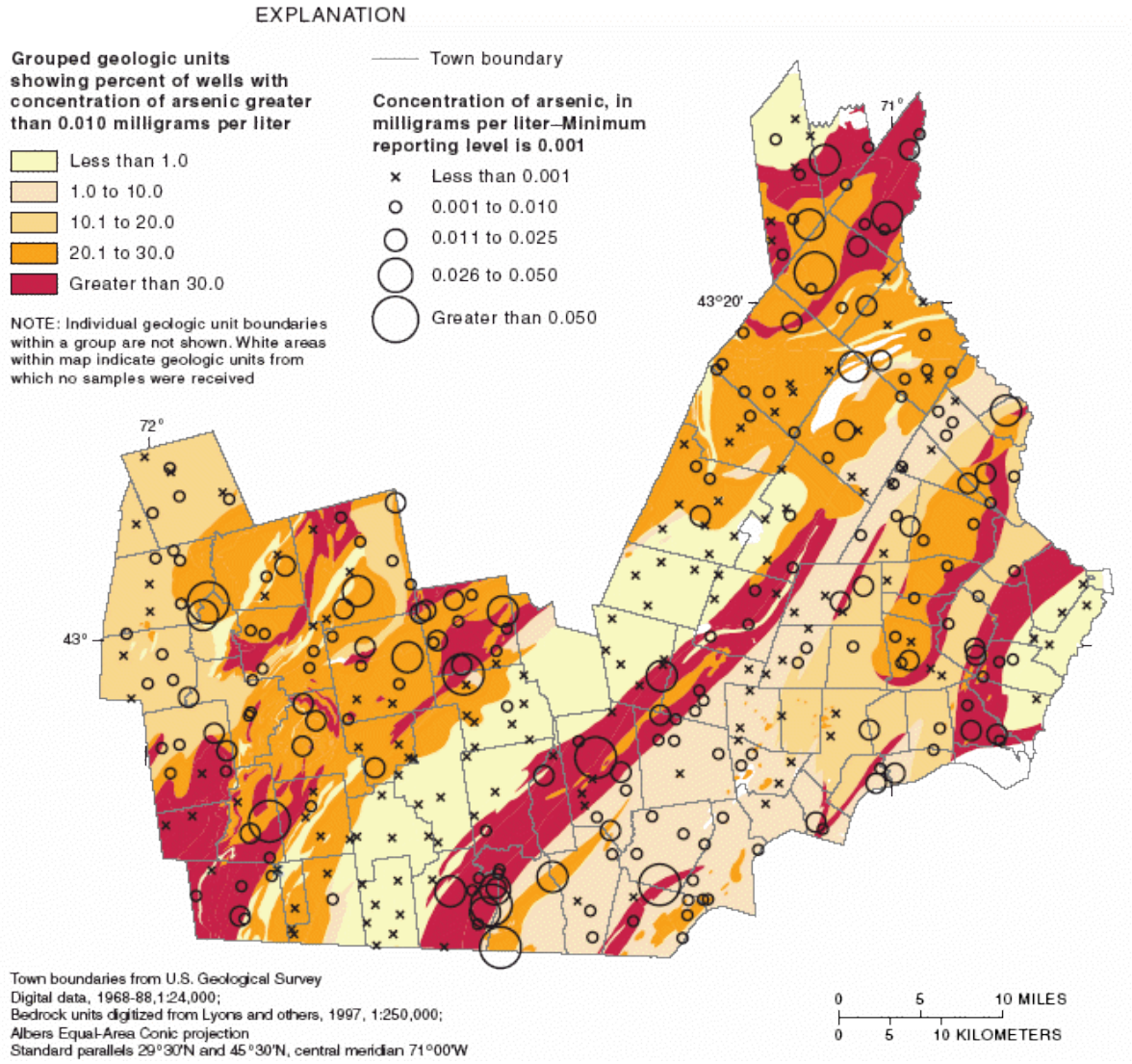
MAP 5: MILFORD SEWER AND WELLS



Source: Town of Milford, 2013

New Hampshire is a water abundant state; however, the bedrock geomorphology harbors a plethora of metals and toxins including arsenic. The USGS map demonstrates an arsenic belt extending through southern NH into Maine. Historical well testing in Milford reveals elevated arsenic levels, potentially harming residents who are served by private wells (Ayotte, Montgomery, Flanagan, & Robinson, 2003; Conley, A. & Daniels, D., 2011).

MAP 6: PERCENT AND CONCENTRATION OF ARSENIC LEVELS FOUND IN PRIVATE WELLS IN SOUTHERN NH



Source: USGS, 2003

In addition to arsenic in bedrock geomorphology, historical spraying of pesticides and herbicides contained toxic levels of arsenic accumulating in soils. Milford values its rural character but previous farming techniques incorporated areal applications of DDT and other toxics on apple orchards (Ayotte et al., 2003). Soils testing is required in the Milford Site Plan regulations but lacks for arsenic (Town of Milford, 2011a). Arsenic is stored in soils and released through land disturbance activities. Once

unrestricted, it accumulates in stormwater runoff polluting water ways, harming wildlife and communities downstream.

Vulnerable Populations

All vulnerable populations for this HIA can potentially be effected by water quality in Milford. Children and elderly populations can be particularly affected due to age and immune systems response, nevertheless, all age groups can be significantly affected and poisoning can occur at any age. The extension of public water and sewage is included in the density bonuses which would significantly decrease the potential for toxin exposure through a private well where water quality can vary greatly depending on location.

Water Quality Policy Analysis

The OSCD addresses water quality by preservation of open space and the addition of stormwater management systems during construction. Site design requirements and stormwater guidelines address stormwater runoff and potential contamination sources (PCS) through stormwater prevention plans (SWPP) and Best Management Practice's (BMP) issued by NHDES (Town of Milford, 2011b).

Furthermore, green building techniques and low impact development (LID) methods, as included in the proposed IRDD standards, multiply the opportunities for homeowners to collect and store rainwater, incorporate biorention cells and pervious or semi-pervious surfaces to increase ground water infiltration. Playgrounds, walking paths and sidewalks included in the proposed IRDD standards offer supplementary options for groundwater infiltration and landscaping techniques to reduce pollution, flooding and enhance neighborhood aesthetics.

Exposure to Air Pollutants

Outdoor Air Pollutants and Health

Air quality is a natural process which varies overtime. Wildfires, volcanoes, hurricanes and other natural disasters change air quality by releasing carbon dioxide, carbon monoxide, sulfates and nitrous gases into the air and dispersing through global air currents. Natural air quality varies according to seasonality and vegetation coverage and is further altered by manmade air pollutants such as transportation patterns.

Air quality consists of ground level ozone and particle pollution (fine particles) including pollen counts. Ozone gas includes sulfur dioxide and smog in levels of parts per billion (ppb). Smog consists of ground levels of nitrogen oxides (NOx) and volatile organic compounds (VOC) reacting in the presence of sunlight. Quantities of smog occur due to the amount of released emissions from motor vehicles, electric utilities, gasoline and chemical solvents (US EPA, 2013). Ozone exposure causes short and long term health effects (see Table 7) (Conley, A. & Daniels, D., 2011).

TABLE 7: OZONE EFFECTS

Short-Term Ozone Effects	Long-Term Ozone Effects
Coughing	Lung Inflammation
Painful Breathing	Impairment of Lung Function
Temporary Loss of Lung Function	Changes in Lung structure
Aggravate Asthma, Emphysema and Bronchitis	Premature Aging of Lungs

Source: City of Nashua Public Health Department, 2011

Health effects of air pollutants are thoroughly documented. As infill development occurs, air quality can decrease due to traffic congestion and industrial pollutants. Busy roadways provide opportunities for commercial and residential development subsequently increasing potential exposure to vulnerable populations. Children and elderly populations living within 100-200 meters of a highway show poor lung function, asthma and cancers (Bhatia, Rajiv & Rivard, Thomas, 2008). Air quality is linked with other diseases: heart disease and atherosclerosis (Giles et al., 2011). Secondary effects of poor air quality include type 2 diabetes and obesity. Poor air quality limits outdoor activities obliging residents to remain indoors decreasing physical activity and social interaction (Giles et al., 2011).

The Built Environment and Exposure to Indoor Air Pollutants

Indoor air quality is shown to be polluted as building designs vary. Building design and materials deteriorate overtime releasing harmful toxins hence creating poor environmental areas subjecting vulnerable populations to molds, fungi and vermin (Jacobs et al., 2007). “Indoor air pollution” can include the following: ozone, allergens, paints and other volatile organic compounds, cleaning products, tobacco smoke, soil gas intrusion (e.g. Radon) and bioeffluents (Jacobs et al., 2007).

Jacobs et al comprehensive list of probable indoor air quality contaminants is linked to adverse health impacts: asthma, radon poisoning, lead poisoning, systemic inflammation and oxidative stress (Giles et al., 2011; Jacobs et al., 2007). Indoor air quality matters greatly since on average, United States citizens spend 90 percent of their time indoors where indoor pollutant levels can be worse than those outside (Jacobs et al., 2007). Extended amounts of indoor periods expose a resident to potentially harmful substances overtime. Green building techniques and newer design elements such as those listed in the IRDD can be incorporated to reduce exposure to indoor air pollutants.

In the Northeast United States, many households heat their homes with a combination of elements including oil, gas, electric, geothermal, solar and woodstoves. Wood is plentiful and a renewable resource which can decrease heating costs when compared to more expensive nonrenewable resources. Wood stoves are operated in the fall and winter while trees are in senescence. Deprived of leaf out from foliage, smoke and particulates accumulate in and around neighborhoods exacerbating health issues for vulnerable populations (Giles et al., 2011).

Ozone at the ground level is formed from pollution emitted by cars, power plants, refineries and chemical plants react and change chemically in the presence of sunlight (US EPA, 2013).

EXISTING AIR QUALITY CONDITIONS IN MILFORD

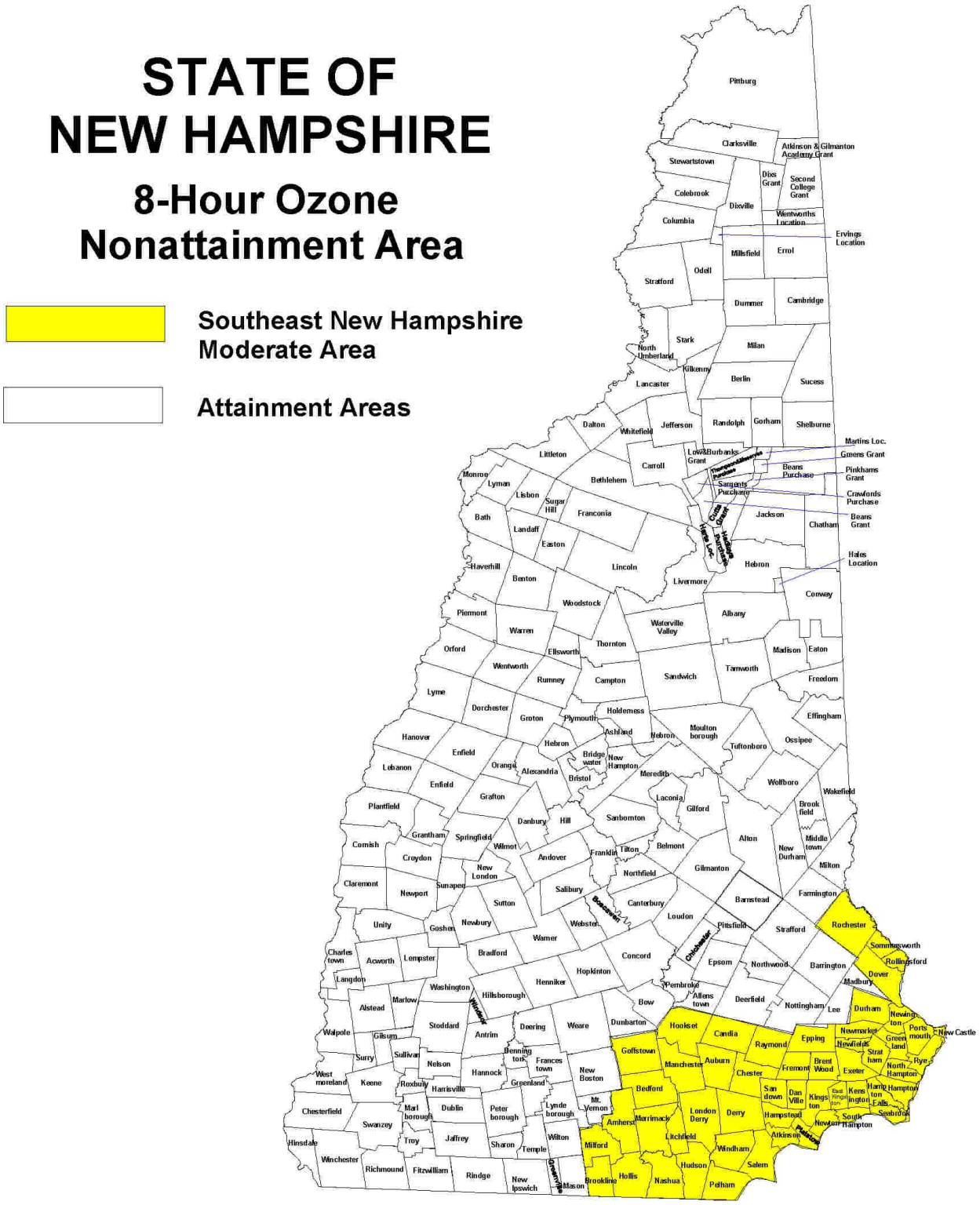
Due to the geography of New Hampshire, 92 percent of ozone and particulate matter is transported from outside the state (Conley, A. & Daniels, D., 2011). New Hampshire wind currents are affected by Midwestern US and Canadian air spaces. Air quality data for Milford is measured in the Nashua region air shed, on the map below, Miller S.P. (Miller State Park, Temple Mountain, Temple, New Hampshire). Milford is in between the Miller State Park air quality station and the Nashua air quality station. As of December 23, 2013 the area contains, "good" air quality levels (NHDES, 2013).

MAP 7: CURRENT AIR QUALITY MAP: 12/23/13

Source: NHDES, 2013

Milford is directly on the border for the Current 8 Hour Ozone Nonattainment Area which is classified as not meeting the National Ambient Air Quality Standards (NAAQS) for one or more criteria pollutants under the Clean Air Act.

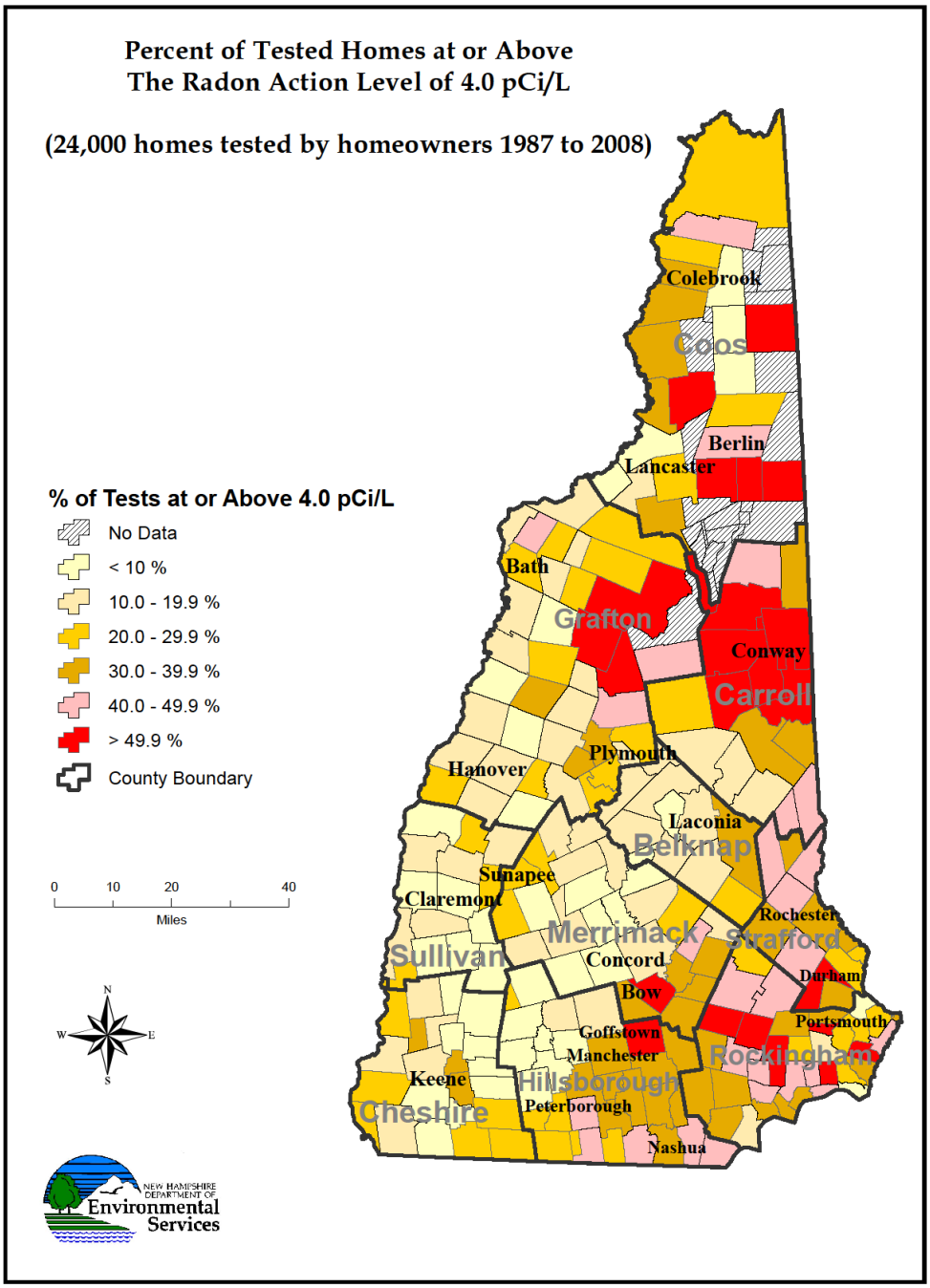
MAP 8: 8-HOUR OZONE NONATTAINMENT AREA



Source: NHDES, 2013

In addition to ozone, radon poses a health risk to Milford residents. According to NHDES, 30-39 percent of Milford homes were tested with a Radon level of 4.0 pCi/L. NHDES recommends actions be taken for any levels exceeding 4 pCi/L due to the potential increased risk of lung cancer with repeated increased exposure (NHDES, 2009). "Radon is derived from the radioactive decay of uranium within the soil, water and earth's rock layers," (Conley, A. & Daniels, D., 2011; NHDES, 2009). Exposure to radon gas is the second leading cause of lung cancer in the United States and is preventable through home air quality testing (NHDES, 2009).

MAP 9: PERCENT OF TESTED HOMES AT OR ABOVE THE RADON ACTION LEVEL OF 4.0 PCI/L



Source: NHDES, 2009

VULNERABLE POPULATIONS

All populations can potentially be affected by building design and traffic elements. Children and others spending large quantities of time outside have higher risks of exposure to outdoor air pollutants, conversely, those spending large quantities of time inside have higher risk of exposure to indoor air pollutants. Green building techniques reduce indoor air pollutants by utilizing less toxic building and insulating materials.

Recently, environmental justice issues demonstrate the correlation between lower income areas near environmentally hazardous sites. Residential areas near industrial locations are more affordable to lower income populations due to their undesirability, exposing residents to harmful contaminants increasing potential health effects such as asthma and cancer. Nationally, New Hampshire has one of the highest rates of asthma. Current levels of asthma for Hillsborough County are 8.3 percent with children from low income household of $20,000 or less are likely to have asthma than those from households with an income of over $50,000 (Conley, A. & Daniels, D., 2011).

AIR POLLUTANTS POLICY ANALYSIS

The OSCD and density bonuses do not specifically address air quality except through maintenance of open space. Neighborhood and transportation designs can reduce infrastructure and potential exposure to outdoor air pollutants by park and outdoor space placement away from roads. The Town may wish to also consider addressing energy systems, radon or arsenic through offering additional bonuses for employing green building techniques (Town of Milford, 2011a).

RECOMMENDATIONS

Characterization Table

The characterization table compares the current list of density bonuses with the health determinants, health outcomes and vulnerable populations identified through scoping and stakeholder engagement. The arrows indicate the potential likely direction of impact based on literature review. The public infrastructure section includes two shaded areas: offsite public facilities and off site compensatory open space. These sections are highlighted different colors to include additional design features within that bonus. A number of density bonuses do not have enough data to support an accurate analysis of interactions with the health issue or population.

The Health Determinants section and the Health Outcomes sections indicate many positives from the density bonuses. The Health Determinants sections up arrows are positive and down arrows are negative. Conversely, the Health Outcomes sections down arrows are positive and up arrows are negative. The positive down arrow demonstrates a reduction in disease or a negative health concern.

TABLE 8: CHARACTERIZATION TABLE WITH DENSITY BONUSES

↑=likely direction of impacts based on existing evidence and professional judgment of key stakeholders and experts 0=minimal impact, no impact or no data available	Health Determinants						Health Outcomes							Impacts on Vulnerable Populations		
Open Space	Opportunities for Social Cohesion	Reduced Exposure to Air Pollutants	Maintain Water Quality	Improved Safety from Crime	Improved Safety from Traffic Accidents	Improved Housing Affordability	Diabetes	Heart Disease	Asthma	Stress	Depression	Physical Injuries	Substance Abuse	Health of Youth	Health of Elderly	Health of Low-Income
Increased by 50% or more (maximum 10% increase above the permitted density)	↕	↓	↑	0	0	↕	0	0	↕	↓	↓	0	0	0	0	0
Increased by increments (conservation of greater than the minimum required of the parcel as Designated Open Space shall receive a max 5% increase in the permitted density for every additional 10% of the parcel that is included in the Designated Open Space)	↕	↓	↑	↑	0	↕	0	0	↕	↓	↓	0	0	↑	0	0
Recreation																
Bike lanes	↑	↕	↕	0	↑	0	↓	↓	↕	↓	↓	↓	0	↑	↑	↑
Walkways	↑	↕	↕	↕	↑	↕	↓	↓	↕	↓	↓	↓	↕	↑	↑	↑
Trail Connections	↑	↕	↕	↕	↑	↑	↓	↓	↕	↓	↓	↕	0	↑	↑	↑
Trails/Walkways along waterfront	↑	↑	↕	↕	↑	0	↓	↓	↓	↓	↓	↓	0	↑	↑	↑
Pocket Parks	↑	↕	↑	↕	↑	↑	↓	↓	↕	↓	↓	↕	↕	↑	↑	↑
Active and/or passive recreation areas and/or facilities	↑	↕	↑	↕	↑	↑	↓	↓	↕	↓	↓	↕	↕	↑	↑	↑
Playground(s)	↑	↕	↑	↕	↑	↑	↓	0	↕	↓	↓	↕	↓	↑	0	↑
Housing Options																
Accessory Dwelling Units	↑	0	0	↑	0	↑	0	↓	0	↓	↓	0	↓	0	↑	↑
Townhomes	↑	0	↕	↑	0	↑	0	↓	0	↕	↓	0	↓	0	↑	↑
Age Restricted Senior Housing	↑	0	↕	↑	↑	↑	↓	↓	↓	↕	↕	↓	↕	0	↑	↑
Cottage Housing	↑	↑	↕	↑	↑	↑	0	↓	↓	↓	↓	0	↓	↑	↑	↑
Innovative Design and Development																
Green Building	↕	↓	↕	↑	0	↕	↓	↓	↓	↓	↓	↓	↓	↑	↑	↑
Sidewalks	↑	↕	↓	↑	↑	↕	↓	↓	↕	↓	↓	↕	↓	↑	↑	↑
Granite Features	0	↓	↓	0	0	0	0	0	0	0	0	0	0	0	0	0
Landscaping	↕	↓	↕	↑	↕	↕	0	0	↕	↓	↓	↕	↓	↑	↑	↑
Low Impact Development	↕	↕	↕	↑	↕	↕	0	0	↕	↓	↓	↕	↓	↑	↑	↑
Alternative Parking Design	↕	↑	↕	↑	↑	↕	0	↓	↕	↓	0	↕	↓	0	↕	↑
Community Garden	↑	↕	↑	↑	0	↕	↓	↓	↕	↓	↓	↕	↓	↑	↑	↑
Increased Building Height with Smaller Footprint	↓	↓	↕	↓	0	0	0	0	↕	0	0	↑	↑	0	0	0
Public Infrastructure																
Extension of Public Water and Sewer	0	0	↑	0	0	↑	0	0	0	↕	0	0	0	↑	↑	↑
Offsite public facilities	↑	0	0	0	0	0	0	0	0	↓	↓	0	0	↑	↑	↑
Sidewalks	↑	↕	↓	↑	↑	↕	↓	↓	↕	↓	↓	↕	↓	↑	↑	↑
Bicycle Paths	↑	↕	↕	↕	↑	↕	↓	↓	↕	↓	↓	↕	↓	↑	↑	↑
Pedestrian Paths	↑	↕	↕	↕	↑	↕	↓	↓	↕	↓	↓	↕	↓	↑	↑	↑
Trails and Corridors	↑	↓	↕	↕	↑	↕	↓	↓	↕	↓	↓	↕	↕	↑	↑	↑
Streetscaping	↑	↓	↕	↑	↑	↑	↓	↓	↓	↓	↓	↓	↓	↑	↑	↑
Low Impact Development	↕	↕	↕	↑	↕	↕	0	0	↕	↓	↓	↕	↓	↑	↑	↑
Alternative Parking Design	↕	↑	↕	↑	↑	↕	0	↓	↕	↓	0	↕	↓	0	↕	↑
Pocket parks	↑	↕	↑	↕	↑	↑	↓	↓	↕	↓	↓	↕	↕	↑	↑	↑
Playground(s)	↑	↕	↑	↕	↑	↑	↓	0	↕	↓	↓	↕	↓	↑	0	↑
Monetary Contribution to Town to Improve Existing Recreation Facilities	↑	↕	↑	↑	↑	↕	↓	↓	↕	↓	↓	↕	↓	↑	↑	↑
Off Site Compensatory Open Space	↓	↕	↑	0	0	0	0	0	0	0	0	0	0	0	0	0
Provide Open Space Off Site = at least 50% more than required	↓	↕	↑	0	0	0	0	0	0	0	0	0	0	0	0	0

MONITORING

As it stands today, completion of the density bonuses is postponed to 2014. The Section 6 density bonus section is slated to be taken up after March 2014 town meeting with possible voting in March 2015; hence, no immediate monitoring can take place. Furthermore, the Planning Board will not be able to evaluate the impact of the density bonuses until an application is presented for development at this time is undetermined. The Planning Board can utilize multiple recommendations proposed to further enhance the density bonuses by providing more comprehensive understanding of the specific bonus impact on health.

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APPENDICES

Crash and Crime Maps

Community Policing Through Environmental Design Example

Milford, NH Police Department Data
Arrests by Street
1/1/2013 - 10/21/2013

Legend

- 0.5 Mile Buffer
- 1 Mile Buffer
- School
- ★ Milford Oval

Arrests (Along Entire Street)

- 1 - 5
- 6 - 10
- 11 - 20
- 21 - 30
- 75 - 90

N
W E
S

1 Miles

Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2012

Milford, NH
Reportable Crashes by Crash Type
Within 0.5 miles of Schools and the Milford Oval
2009 - 2011

Legend

- 0.5 Mile Buffer
- School
- Milford Oval
- Sidewalk

Crash Type (Count)

- Bicyclist (5)
- Pedestrian (3)
- Other Motor Vehicle (170)
- Parked Motor Vehicle (15)
- Fixed Object (33)
- Other (17)

39 Crahses
1 Bicyclist
32 Other Motor Vehicle
2 Parked Vehicle
3 Fixed Object
1 Other

165 Crashes
3 Bicyclist
3 Pedestrian
120 Other Motor Vehicle
12 Parked Vehicle
22 Fixed Object
5 Other

5 Crashes
3 Other Motor Vehicle
2 Fixed Object

79 Crashes
2 Bicyclist
1 Pedestrian
46 Other Motor Vehicle
5 Parked Vehicle
14 Fixed Object
11 Other

N
W E
S
1
Miles

Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2012

office of neighborhood involvement

Enhancing the quality of neighborhoods through community participation

1221 SW 4th Avenue, Suite 110
Portland, Oregon 97204

tel 503-823-4000
fax 503-823-3050
tty 503-823-6969

Amanda Fritz
Commissioner

Amalia Alarcón de Morris
Bureau Director

City/County
Information & Referral Line
503-823-4000

This document is available at the ONI website:
www.portlandoregon.gov/oni/cp

Crime Prevention Through Environmental Design

Office of Neighborhood Involvement Crime Prevention Program
Spring 2009

Crime Prevention Through Environmental Design ("CPTED") is the design, maintenance, and use of the built environment in order to enhance quality of life and to reduce both the incidence and fear of crime. CPTED involves the balanced application of these three principles:

Natural Surveillance. Natural surveillance is achieved through design and maintenance that allow people engaged in their normal activity to easily observe the space around them, as well as eliminating hiding places for people engaged in criminal activity. Natural surveillance is generally achieved by the use of appropriate lighting, low or see-through fencing or landscaping, the removal of areas that offer concealment, and the placement of windows, doors, and walkways to provide the opportunity for easy observation of surrounding areas by responsible users of property.

Territoriality. Territoriality means providing clear designation between public, private, and semi-private areas and makes it easier for people to understand, and participate in, an area's intended use. Territoriality communicates a sense of active "ownership" of an area that can discourage the perception that illegal acts may be committed in the area without notice or consequences. The use of see-through screening, low fencing, gates, signage, different pavement textures, or other landscaping elements that visually show the transition between areas intended for different uses are examples of the principle of territoriality.

Access Control. Access control is a concept directed primarily at decreasing criminal accessibility, especially into areas where a person with criminal intent would not easily be seen by others. Examples of access control would include a highly visible gate or entry way through which all users of a property must enter, or the appropriate use of signage, door and window locks, or fencing to discourage unwanted access into private space or into dark or unmonitored areas.

The principles of Natural Surveillance, Access Control, and Territoriality can be expressed in a *natural/passive* manner (designed-in, not requiring any active effort on the part of responsible users), an *organized/active* manner (planned activities or routines), and/or a *mechanical* manner (installing additional equipment to achieve the principle). Natural/passive CPTED, designed into a space before it is even built, is the ideal.

Continued on the back cover

Examples of GOOD Crime Prevention Through Environmental Design

Natural surveillance has been designed into these townhouses by creating “eyes” on the front of the building with windows, porches, and balconies.

The managers of this convenience store maintain natural surveillance by keeping the windows clear of posters and ads.

Paving on the walkway, elevation, and flower beds reinforce a sense of moving from public space on the sidewalk into private space.

A reception/security desk is an example of organized or active access control.

Exterior doors should have deadbolts as a form of access control. The deadbolt’s “throw” should be at least 1 inch, making the door harder to kick in.

Examples of BAD Crime Prevention Through Environmental Design

This light is way too bright. Huge differences in light levels make it hard for the human eye to adjust. A gentle, all-over wash of light is far preferable.

Poor maintenance on this laurel hedge has eliminated almost all natural surveillance of this house, making it more vulnerable to crime.

A would-be criminal may see this store as an easy one to rob because ads in the windows almost completely obscure the view inside.

In an effort to display territoriality, this homeowner has gone too far, making this an unpleasant place to be for responsible users.

Little or no maintenance is taking place on this property, giving a sense that a person can do anything here and get away with it.

Continued from front cover...

Two other important CPTED concepts:

Activity Support. Activity support involves both passive and active efforts to promote the presence of responsible pedestrian users in a given area, thus increasing the community value of the area, while discouraging actions by would-be offenders who desire anonymity for their actions. Passive examples are design elements that make an area appealing to appropriate pedestrian use, such as attractive landscaping, safety from car traffic, and public art. Active examples involve scheduling events for an area to attract appropriate users, such as picnics, concerts, children's play groups, or sports events.

Management and Maintenance. Proper maintenance of landscaping, lighting and other features is vital to ensuring that CPTED elements serve their intended purpose. Unfortunately, failure to maintain property — and its management parallel, the failure to stop harmful use of property — will rapidly undermine the impact of even the best CPTED design elements. While CPTED principles supplement effective maintenance and management practices, they can not make up for the negative impacts of ineffective management. Damaged fencing, overgrown hedges, graffiti left to weather and age, litter and debris, broken windows, as well as such factors as inattentive or overly-permissive management practices will attract would-be offenders and, equally, drive away responsible users of the space. While effective design is an important part of good crime prevention, following through with consistent maintenance and management practices ensures that the designed-in elements keep their effectiveness.

For CPTED principles to accomplish the goals of enhanced livability and better natural safety, *each principle must work together with the others*. For example, activity support can be undermined if a property is stripped bare of landscaping in the interests of natural surveillance alone. Installing a tall opaque wall or fence will take the concept of territoriality too far by undermining natural surveillance benefits. Access control solutions that are aggressive in appearance (such as window bars, harsh lighting treatments, or hostile-looking fencing) can undermine activity support. The intent, therefore, is to use the combined balance of these principles to promote a safer, more livable environment for all.

For assistance with Crime Prevention Through Environmental Design at your property, contact your Crime Prevention Coordinator. Visit www.portlandonline.com/oni/cp for our line of do-it-yourself CPTED assessment worksheets for different types of properties, and more information about CPTED.

Crime Prevention Program

All numbers are area code 503

Administrative offices	823-4064
Central Northeast	823-2781, 823-2779
East	823-3505, 823-5532
North	823-4098, 823-4094
Northeast	823-4763, 823-4764
Northwest	823-4257
Southeast	823-0540, 823-3432
Southwest	823-3131
Downtown	823-5852
Program manager	823-2030
Training & events supervisor	823-9666

Related services

Liquor license notification	823-3092
Graffiti abatement	823-5860
Noise control	823-7350
Neighborhood inspections	823-7306
Neighborhood mediation	595-4890
City/County information & referral	823-4000