

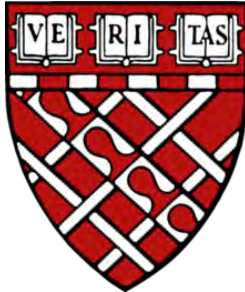
# Devens Health Impact Assessment 2014

---

*A review of planning and development regulations, policies and neighborhood design principles in Devens and their potential influence on public health.*

By: The Devens Enterprise Commission  
October 2014





The Devens Enterprise Commission is the land use planning and permitting authority overseeing the redevelopment of former Fort Devens, a military base that is being sustainably redeveloped. For more information on Devens and the Commission, visit our website at: [www.devensec.com](http://www.devensec.com) .

## The Authors

Peter Lowitt, FAICP  
Executive Director  
Devens Enterprise Commission

Neil Angus, AICP CEP, LEED AP  
Environmental Planner  
Devens Enterprise Commission

Sang Cho  
DEC Intern  
Harvard Graduate School of Design

## Acknowledgements

The Devens Health Impact Assessment (HIA) and report was a collaborative effort between the Devens Enterprise Commission (DEC), Harvard Graduate School of Design, a number of local Devens residents as well as state and local planning and public health professionals. Special thanks goes out to the following individuals who dedicated their time, expertise and knowledge to the success of this HIA:

Sal Perla, Nashoba Valley Medical Center	Regina Kim, Devens Resident
Kerry Bowie, MA Dept. of Env. Protection	John Harkins, Devens Resident
Kurt Trampusch, Env. Consultant	Betsy Thiel, Devens Resident
Ning Chen, MA Dept. of Env. Protection	Heather Knowles, Devens Resident
Kate Ito, Metro. Area Planning Commission	Maureen Babcock, Devens Resident
Cindy & Bob Carter, Devens Residents	Rick Bernklow, Devens Resident

To further add to the existing body of research on the relationship between community planning and health, the DEC will share the results of this Health Impact Assessment with the community, stakeholders and the Massachusetts planning and development community in general. The full report is available on-line at [www.devensec.com](http://www.devensec.com)

This study would not have been possible without the efforts of Sang Cho, DEC Intern and co-author of this report, who recently completed his Master's Degree in Landscape Architecture from the Harvard Graduate School of Design; Neil Angus, AICP CEP, LEED AP for helping guide this assessment and co-authoring this report; and Laura Smead, Health and Place Initiative Research Associate with the Harvard Graduate School of Design for her time and assistance in participating in the HIA and helping reviewing the final report.

On Behalf of the DEC, I would like to extend our profound thanks to all who participated in the development and execution of this HIA.

Sincerely,

Peter Lowitt, FAICP  
Executive Director,  
Devens Enterprise Commission

# Table of Contents

Executive Summary .....	i
1.0 Introduction .....	1
1.1 The importance of health and the built environment .....	1
1.2 Devens: A Regional Context .....	2
1.2.1 <i>Natural Environment</i> .....	3
1.2.2 <i>Transportation</i> .....	5
1.2.3 <i>Regional Demographics</i> .....	5
1.3 Devens Redevelopment .....	6
1.4 What is a Health Impact Assessment? .....	8
1.5 The Devens Grant Road HIA .....	9
2.0 Methodology .....	10
2.1 Screening .....	10
2.2 Scoping .....	10
2.2.1 <i>The Study Area</i> .....	11
2.2.2 <i>Identifying Health Risk Factors</i> .....	16
2.2.3 <i>Community Engagement</i> .....	22
2.3 Assessment .....	23
2.4 Reporting .....	23
2.5 Evaluation and Monitoring .....	23
3.0 Process .....	24
4.0 Findings .....	26
4.1 Social Cohesion .....	26
4.2 Access to Healthy Foods .....	31
4.3 Environmental Health .....	34
4.3.1 <i>Water and Air Pollution</i> .....	34
4.3.2 <i>Buildings</i> .....	36
4.3.3 <i>Transportation &amp; Accessibility</i> .....	37
4.4 Public Health and Safety .....	42
5.0 Recommendations .....	47
6.0 Conclusion .....	51
References .....	52
Appendix .....	55

## List of Figures:

Figure 1.0: Devens location .....	2
Figure 1.1: Community Type .....	3
Figure 1.2: Areas of Critical Environmental Concern & BioMap 2 Habitat Areas .....	4
Figure 1.3: Transportation Networks .....	5
Figure 1.4: Employment and Median Household Income .....	6
Figure 1.5: Grant Rd. Redev. & existing housing in Ayer, Harvard, Shirley & Devens .....	7
Figure 1.6: Devens Land Use Classifications .....	8
Figure 2.0: Aerial Map of Grant Road, Devens and Surrounding Towns .....	11
Figure 2.1: Mock Development Scenario (#1) for the Grant Road Residential Area .....	12
Figure 2.2: Mock Development Scenario (#2) for the Grant Road Residential Area .....	13
Figure 2.3: Adult Obesity Rates .....	19
Figure 2.4: Adults Lacking Daily Exercise .....	20
Figure 2.5: Language Isolation Households .....	21
Figure 2.6: HIA Workshop Participants Reviewing Mock Development Scenarios.....	22
Figure 3.0: HIA Process and Corresponding Timeline .....	24
Figure 3.1: Generalized Causal Pathway Diagram .....	25
Figure 4.0: Checklist results: Social Capital .....	27
Figure 4.1: Mock development scenario attributes that may influence Social Capital .....	28
Figure 4.2: Checklist results: Mental health.....	29
Figure 4.3: Proximity to public recreation and open space. ....	30
Figure 4.4: Mock dev. scenario attributes that may influence access to healthy foods.....	31
Figure 4.5: Checklist results: Food. ....	32
Figure 4.6: Community garden impacts on property values.....	32
Figure 4.7: Devens proximity to supermarkets and farmers markets.....	33
Figure 4.8: Mock development scenario attributes that may influence outdoor air quality .....	34
Figure 4.9: Checklist results: Air Quality .....	35
Figure 4.10: Checklist results: Water Quality and Quantity .....	35
Figure 4.11: Checklist results: Environment .....	36
Figure 4.12: Mock dev. scenario attributes that may influence energy, water & indoor AQ .....	37
Figure 4.13: Mock development scenario attributes that may influence transportation.....	38
Figure 4.14: Checklist results: Transportation. ....	39
Figure 4.15: Checklist results: Accessibility.....	39
Figure 4.16: Checklist results: Physical Activity .....	40
Figure 4.17: School Walkability.....	41
Figure 4.18: Relationship between road width and number of vehicle accidents .....	42
Figure 4.19: Mock dev. scenario attributes that may influence public health and safety .....	43
Figure 4.20: Scenario #1 street layout in relation to surrounding street networks .....	44
Figure 4.21: Scenario #2 street layout in relation to surrounding street networks .....	45
Figure 4.22: Checklist results: Safety .....	46
Figure 5.0: HIA Recommendation development process .....	47
Figure 5.1: Policy Recommendations.....	48
Figure 5.2: Design Recommendations .....	49
Figure 5.3: Programming Recommendations .....	50
Figure 5.4: Education Recommendations .....	50

## List of Tables:

Table 1.0: Relationships between Development Attributes and Health Impacts.....	1
Table 2.0: Mock Development Scenario Key Features .....	15
Table 2.1: Screening/Scoping Checklist .....	16



# Executive Summary

With obesity rates in the United States at an all-time high, many planners across North America believe it's time to reconnect with our roots and more clearly align community planning and public health issues. How we develop our cities and neighborhoods can have direct and indirect impacts on public health issues. Understanding the relationship between health and planning or policy decisions allows decision-makers to “gain better insight of outcomes, balance health against other policy considerations, appraise options, and improve the tradeoffs” (Kemmm, Parry 2004). Simply put, knowing more allows for more nuanced and comprehensive solutions to the complex problems decision-makers face.

Recognizing the connections between land use planning and public health, the Devens Enterprise Commission (DEC), the regulatory agency overseeing the redevelopment of a 4,400 acre former military base located 35 miles west of Boston, Massachusetts, adopted a Healthy Communities Proclamation (<http://www.devensec.com/sustain.html>). This proclamation recognizes that what we build is important, but how and where we build is equally important and can directly influence the day-to-day activities that impact public health. To build off of the Healthy Communities Proclamation and further promote the sustainable redevelopment of Devens, in early 2014 the DEC conducted a Health Impact Assessment (HIA) in partnership with an interdisciplinary group of representatives from the existing residential neighborhoods in Devens, the Massachusetts Department of Environmental Protection, Nashoba Valley Medical Center, and the Harvard Graduate School of Design. The HIA provided a window of opportunity for the Devens Enterprise Commission to:

1. Compare and contrast the potential health impacts of two alternative regulatory compliance paths for future residential development in Devens;
2. Encourage community engagement and discussion among local decision-makers and stakeholders about planning for healthy communities and how these elements might be considered in future projects and plans;
3. Increase awareness of the multiple factors that can impact health and design, and;
4. Prevent or mitigate negative health outcomes by applying the broad and holistic methodologies and analytical tools used to conduct an HIA.

This approach was developed to help ensure health implications are taken into consideration to promote redevelopment that is more equitable, while at the same time addressing traffic congestion, air quality, as well as public health and safety. While there is no “one-size fits all” solution, raising awareness of the connections between planning and design choices and public health early in the planning and development process will help foster a more sustainable approach to any future redevelopment in Devens.

The Grant Road Residential District within Devens was identified as the primary area for future residential development within Devens as part of the Devens Reuse Plan. This HIA used mock development scenarios to evaluate the potential direct and indirect public health implications of each of the two regulatory compliance paths. To ensure a more comprehensive approach to this HIA, the geographic boundaries of the study area were expanded to include all 4,400 acres of Devens, as well as the surrounding communities of Ayer, Shirley, and Harvard.



**Mock Development Scenario #1: Innovative Residential Development (IRD) Regulatory Compliance Path – 120 units over 30 Acres in the Grant Road neighborhood:**



**Housing Mix: (#of units)**

30 single family	16 single fam. cottage	16 two-family	28 – multi-family (9x 3-4 units)
30 multi-family (4x 6-12 units)			

**Mock Development Scenario #2: Conventional Residential Development Regulatory Compliance Path – 120 units over 60 Acres in the grant road neighborhood:**



**Housing Mix: (#of units)**

80 single family	22 two-family	12 – 3-4 family	6 multi-family (1x6 unit)
------------------	---------------	-----------------	---------------------------

The mock development scenarios were evaluated against a number of key components of a healthy community: Sustainable safe transportation, healthy housing, healthy economy, social cohesion, public infrastructure and environmental stewardship as well as land use:

*Healthy Housing:* Devens is a model of sustainable development and as such the use of energy-efficient construction and renewable energy systems are encouraged, in addition to utilizing building materials and finishes that contribute to healthy indoor air quality. Devens is also a former Superfund site and the Grant Road housing area is a brownfield site that has been remediated to facilitate redevelopment.

*Social Cohesion:* Devens requires a mix of housing tenure, type and affordability be provided as part of any Grant Road redevelopment scenario – facilitating the creation of a more socially diverse community. The Grant Road area is in proximity to an existing neighborhood and any future development needs to be compatible with and respect existing residents. Community interaction and availability of services are important considerations. Crime rates are very low in Devens but perceived safety is an additional aspect that will impact social cohesion.

*Healthy Economy:* Devens is a regional employment center with over 4,000 jobs and continues to attract a diverse array of business and industry. Devens currently has and requires new developments to include various forms of low and moderate-income housing to attract a diverse range of individuals and families with varying income levels and be within close proximity to jobs within Devens.

*Environmental Stewardship:* Devens lies within a non-attainment area for air quality (Ozone) as designated by the US Environmental Protection Agency. Redevelopment scenarios each have varying levels of impact on air and water quantity and quality. Access to open space with its mental health benefits also varies with each development scenario.

*Sustainable Safe Transportation:* The Grant Road redevelopment area is located within two miles of two commuter rail stations on the MBTA Fitchburg Commuter rail line. It is also located within two miles of the Jackson Road exit onto Route 2, a major east west transportation corridor. Each mock development scenario provides differing levels of multi-modal (walk, bike, drive, transit) transportation options. Each mock development scenario provides different levels of connectivity and accessibility. Universal design (unrestricted access for all ages and abilities) and safe, convenient access to recreation and public health facilities/services are important considerations for either development scenario.

*Land Use:* The Grant Road area is zoned for residential uses. Community services are within biking and walking distance of some portions of the Grant Road area. The Grant Road area is served by existing water, sewer, electric and natural gas infrastructure.

This HIA includes a comprehensive review of each of the six key steps that went into the planning, development and execution of this HIA:

1. **screening** to determine whether an HIA is appropriate or required;
2. **scoping** to identify which health effects to consider;
3. **assessment** to identify the magnitude of health impacts and the affected population;
4. **recommendations**, to aid in avoiding and/or mitigating potential adverse health effects;
5. **reporting** to present results to decision-makers and community stakeholders, and;
6. **monitoring and evaluation** to review and evaluate the actual health outcomes.



## Summary of HIA Steps:



Extensive research, literature reviews and consultations with health professionals were undertaken as part of the initial screening and scoping phases of this HIA. Using both qualitative and quantitative methods, this information was used to help prioritize health impacts as they related to potential residential development in the Grant Road area. Stakeholder input from local residents along with a team of interdisciplinary professionals from urban planning, design, and public health participated in a one-day workshop that evaluated the two mock development scenarios for the Grant Road neighborhood.

Based on all of the information collected as part of this HIA, four key priority impact areas were identified for Devens:

- **Social Cohesion:** Promoting opportunities for social interactions between community residents, businesses and organizations;
- **Access to Healthy Foods:** Providing better access to local food sources, and educating residents to help improve their ability to make healthier food choices;
- **Environmental Health:** Development that promotes more compact, efficient forms of development that preserve open space, reduce greenhouse gas emissions and improve overall environmental health;
- **Public Health and Safety:** Inclusionary neighborhood design that focuses on people, not just cars and provides accessibility for all ages and abilities.

From these priority impact areas, a number of programming, policy and regulatory recommendations were developed to help maximize healthy community design principles in any future redevelopment of the Grant Road residential area:

1. Promote the use of more compact development patterns;
2. Adopt a complete streets policy for universal accessibility and promote high levels of street connectivity to encourage walkability and avoid funneling new traffic into existing residential areas within Devens
3. Introduce traffic calming measures to reduce speeds in residential areas and improve safety. Effective traffic calming measures could include but not be limited to street trees, a single-lane roundabout at the Grant, Pine and Hospital intersection, bump-outs, chicanes, sidewalks, exclusive pedestrian-scale lighting, signal phasing and refuge islands;
4. Incorporate safe routes to schools to facilitate walking and biking, thereby reducing auto dependency, improving air quality and promoting physical activity;
5. Promote more energy and water efficient development techniques such as lower HERS rating requirements and higher water efficiency standards to further the sustainable development goal of the Devens Reuse Plan;

6. Incentivize and support community gardens to promote social interaction and better access to local and healthy foods;
7. Educate residents about raised planting beds and other safe management approaches to growing, harvesting and preparing their own food in Devens;
8. Research the feasibility of establishing transit service, taking into account projected employment and population growth in Devens;
9. Support existing food pantry serving healthy foods;
10. Provide nutrition and gardening classes for residents and businesses;
11. Provide local recreational, as well as historic, cultural and educational amenities for Devens residents and our neighbors from surrounding communities;
12. Organize community walks and other events that promote more social interaction and healthy lifestyles;
13. Provide a variety of housing options for larger and smaller lots with varying sizes of private and public spaces to offer more choice and social diversity;
14. Consider local transit stop locations to provide transportation options and promote the potential health benefits associated with transit usage;
15. Use architecture and design techniques to assure privacy and access/views to green space are available on or from all lots. Use these same techniques to ensure universal design features are incorporated into all aspects of the built environment;
16. Invest in community development projects such as neighborhood parks to provide more recreation and social interaction opportunities;
17. Develop an array of social programs to meet the needs of a diverse population (children to adults and special needs populations).

Understanding the multiple connections that each of these recommendations has to each of the priority impact areas is also key to their successful implementation. The full report includes a series of figures that depict each of the recommendations and how they relate to and overlap with a number of the HIA priority impact areas.

Ultimately, the results of this HIA were mixed. Compact development is not necessarily a 'silver bullet' for providing better health outcomes in all situations. Through this exercise we learned a great deal about the connections between planning and public health. The authors of this report would recommend the use of Health Impact Assessments in any areas undergoing redevelopment - in order to better comprehend the connections between planning and public health - for the broader public good.

This Health Impact Assessment ultimately reinforces the nexus between planning and public health issues. By evaluating and understanding how regulations, policies and urban design choices might impact public health, the DEC will be able to use the results of this HIA to help raise awareness of and educate the general public and the development community on the interconnectiveness between planning, development and public health. The research in this HIA linking the built environment and its associations with public health issues was truly eye-opening and makes a great case for designing communities that integrate the natural environment and consider people first. As part of its 5-year review process, the DEC will evaluate and monitor the implementation of healthy community design principles and the recommendations in this report in an effort to help further the sustainable redevelopment goals of the Devens Reuse Plan.

# 1.0 Introduction

Planning to protect the public's health, safety and welfare began in the 19th Century as a tool to address poor sanitation, overcrowded, dark urban tenements and poor working and living conditions. With obesity rates at an all-time high, many planners across North America believe it's time to reconnect with our roots and more clearly align urban planning and public health issues. This approach is being pursued through programs that seek to make our towns and cities more amenable to pedestrians while concurrently addressing traffic congestion, air quality, as well as public health and safety. Another connection between planning and public health is evident in programs that seek to grow and deliver fresh fruit and produce in urban areas.

## 1.1 The importance of health and the built environment

The physical environment in which people live is an important determinant of health. A community that promotes good health is also likely to be one that promotes well-being and security. Social and environmental features of such communities facilitate access to vital services, healthy food, clean air and water. Citizens of these communities can more likely to be active and engaged in their community, and feel empowered to create change. Design of the built environment shapes the way we live. A compact and walkable built environment where we live, work and play is very different from a dispersed development that relies on the automobile for primary access to and from. But a compact, walkable, mixed use environment is not a "silver bullet" to prescribe a "healthy" place, nor is an auto-centric development automatically an "unhealthy" place. Each impacts the way we travel and the environments we are exposed to. Although there are other important factors such as behavior, socioeconomic, and genetics which can influence an individual's health; shaping of the built environment converges many health challenges to reverse chronic disease trends that may have a direct relationship to transportation choices, land use patterns, infrastructure, and accessibility. Understanding the relationship between health and planning or policy decisions allows decision-makers to "gain better insight of outcomes, balance health against other policy considerations, appraise options, and improve the tradeoffs" (Kemmer, Parry 2004). Simply put, knowing more allows for more nuanced and comprehensive solutions to the complex problems decision-makers face. The following table highlights some of the general connections between certain development attributes and their potential impacts on public health:

*Table 1.0: Relationships between Development Attributes and Health Impacts*

Development Attributes	Potential Health Impacts
Density and mix of Land Uses	Walkability/physical activity, social interaction
Accessibility (universal design, sidewalks, bike lanes)	Safety, walkability/physical activity
Connectivity (street network, access to community resources such as parks and open spaces)	Walkability/physical activity, social interaction, automobile use (GHG emissions)
Green Infrastructure (street trees, parks, open space)	Air quality, mental health benefits (views of green), physical activity
Community gardens	Social interaction, mental health, diet, nutrition
Lighting levels	Crime/safety, comfort
Impervious surfaces	Urban Heat Island/air quality



In 2013 the Devens Enterprise Commission (DEC), the regulatory agency overseeing the redevelopment of Fort Devens, adopted a Healthy Communities Proclamation (<http://www.devensec.com/sustain.html>). This proclamation recognizes that what we build is important, but how and where we build is equally important and can directly influence the day-to-day activities that impact public health. To build off of the Healthy Communities Proclamation and further promote the sustainable redevelopment of Devens, the DEC conducted a Health Impact Assessment that compared and contrasted two unique regulatory approaches and how they might be applied to future development in the Grant Road residential area of the Devens Regional Enterprise Zone in Massachusetts. This Health Impact Assessment created a greater nexus between planning and public health issues through the discussion of how regulations, policies and urban design choices might impact public health.

## 1.2 Devens: A Regional Context

Located 35 miles outside of Boston, Devens is comprised of land that was formally within the boundaries of the Towns of Ayer, Harvard and Shirley:

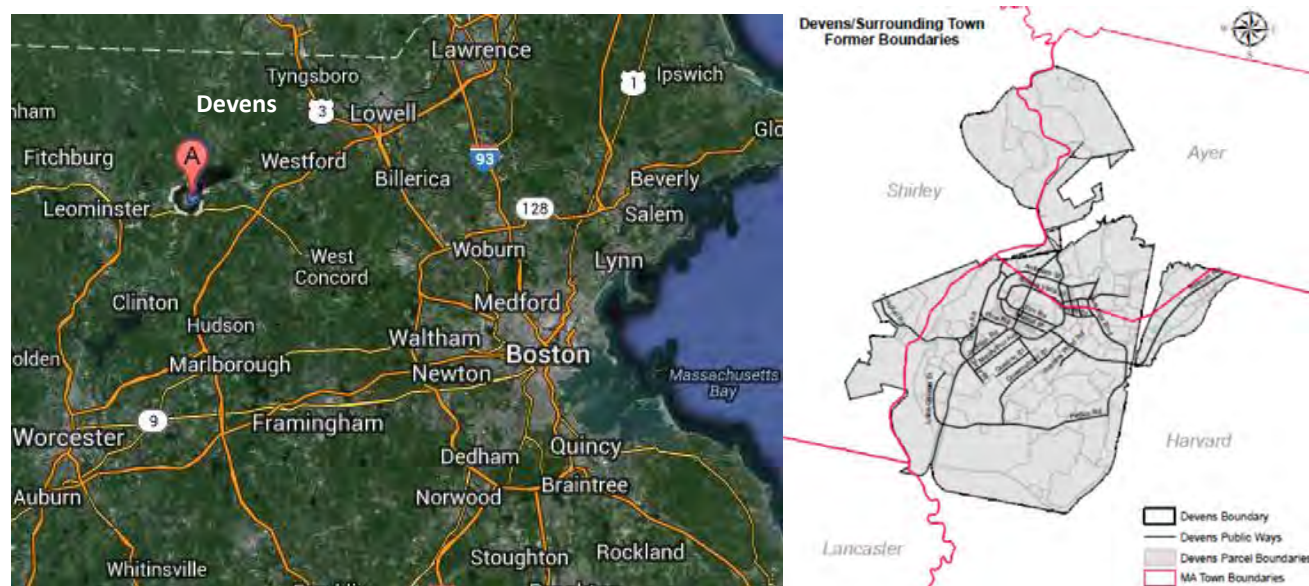


Figure 1.0: Devens location

The Devens region is comprised of a mix of rural and small town areas (refer to Figure 1.1) which developed around the railroad crossroads for New England in Ayer (the most industrialized community in the area) and which attracted the Army to establish Camp Devens here in the run up to WWI. Harvard is an affluent community comprised mainly of residential and agricultural land uses, with one of the best school systems in the state, Ayer and Shirley are more working class communities with a greater mix of commercial, industrial and residential land uses. Ayer is amongst the most integrated communities in the area, perhaps a legacy of the military who have remained in the region after retiring from the service.

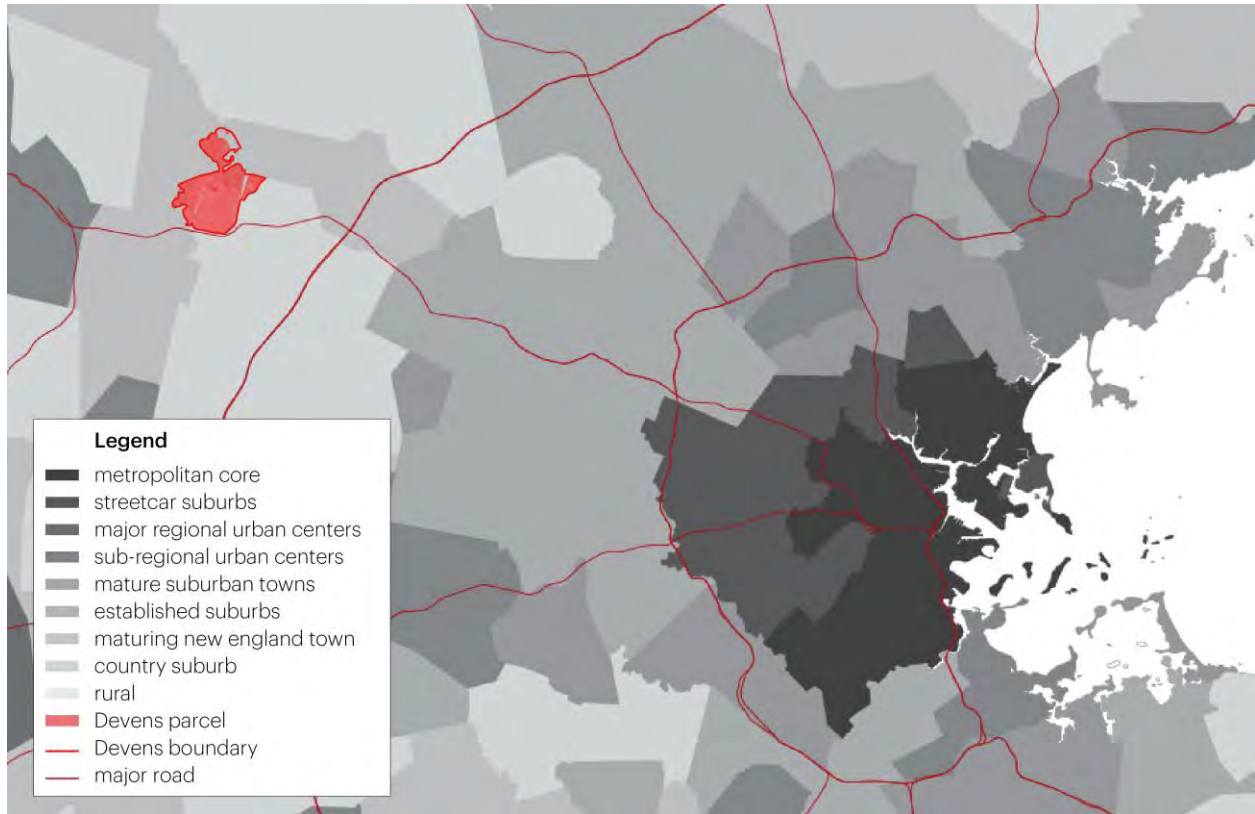


Figure 1.1: Community Type

### 1.2.1 Natural Environment

Harvard has numerous orchards located throughout its hilly environs, and branches of the Nashua River run through all three communities on their journey to the Merrimac. Geologically, this is part of the region where the coastal plain butts up against the mountains/highlands. Ecologically speaking, this boundary area contains a large diversity of flora, fauna which has resulted in a large number of Areas of Critical Environmental Concern (ACEC) being designated by the Commonwealth of Massachusetts. The Massachusetts Division of Fisheries and Wildlife has also identified numerous areas within Devens and the surrounding region as being critical to maintaining biodiversity in Massachusetts. These areas include ACEC's and other priority natural communities, high quality wetland, vernal pool and other aquatic habitats, and large intact landscape blocks of forest ecosystems. Measures to protect these resource areas are integrated into the Devens Reuse Plan. Figure 1.2 depicts the ACEC's and BioMap 2 areas within Devens and the surrounding region.

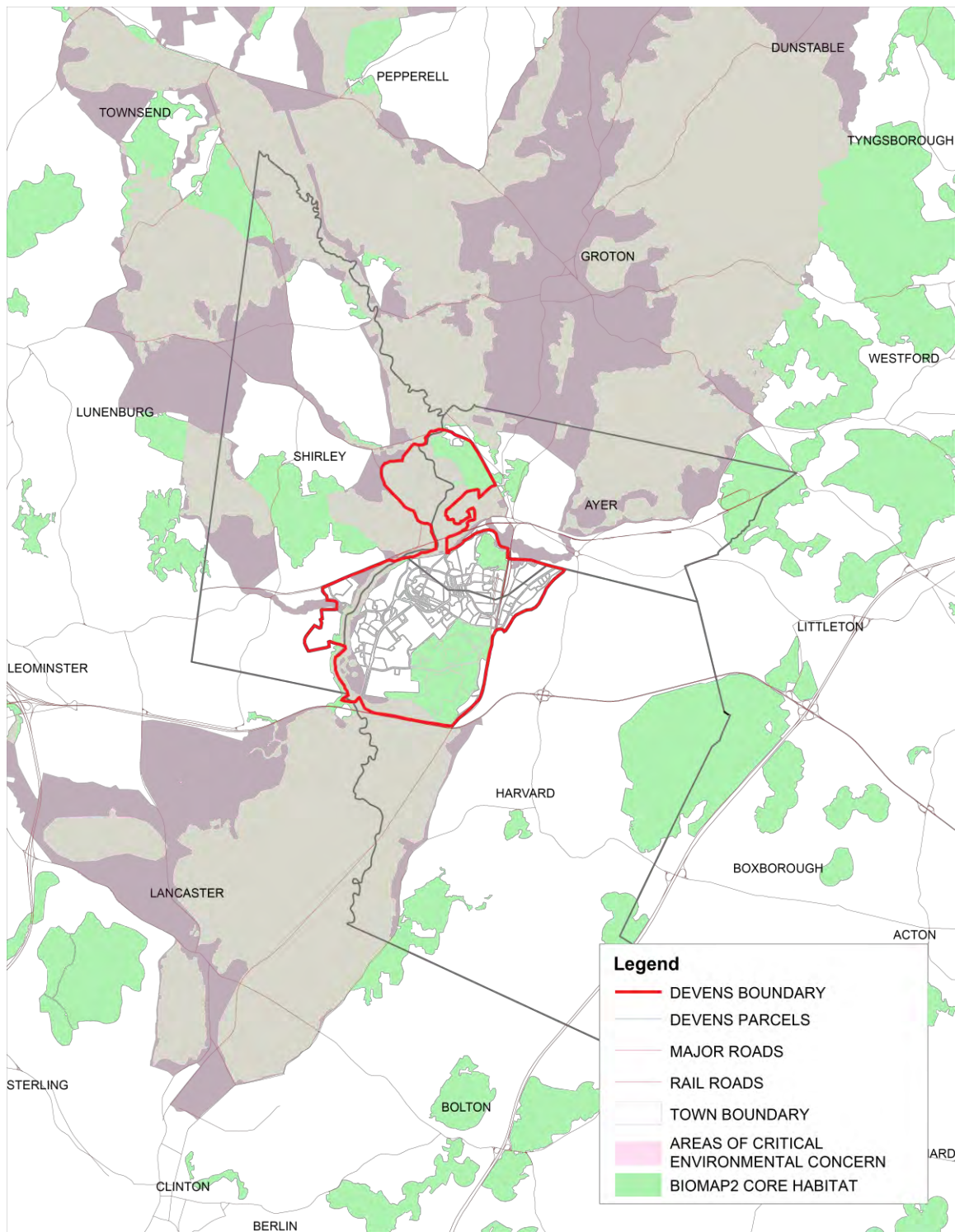


Figure 1.2: Areas of Critical Environmental Concern and BioMap2 Habitat Areas (source: Mass GIS)



### 1.2.2 Transportation

Devens is located off of MA State Route 2, just outside the I-495 ring road on the outskirts of the metro Boston region. The Massachusetts Bay Transportation Authority (MBTA) serves the Devens area via the Fitchburg Line commuter rail, which dissects Devens and has adjacent station stops in the Towns of Shirley and Ayer. This rail line connects the Devens region with Boston. The Montachusett Regional Transit Authority provides local shuttle service to and from Devens and the surrounding region as well.



Figure 1.3: Transportation networks

### 1.2.3 Regional Demographics

Populations within the surrounding towns of Ayer, Harvard and Shirley currently range from 3000-6000 per town. The population of Devens is approximately 450. The Town of Ayer has a number of commercial and industrial areas that employ a larger number of people than the other surrounding towns; however Devens, home to an eco-industrial park and over 1000 acres of industrially zoned land, contains the largest employment base in the region (over 4000).

Figure 1.4 depicts the employment distribution within Devens and the surrounding towns, as well as median household income. In terms of social economic status, the Town of Harvard has the least population density with higher median income. On the other hand, Ayer and Shirley median income is lower with higher population density. Devens, as an Eco-Industrial Park, has a higher employment rate than the three surrounding towns, although its residential population remains low.

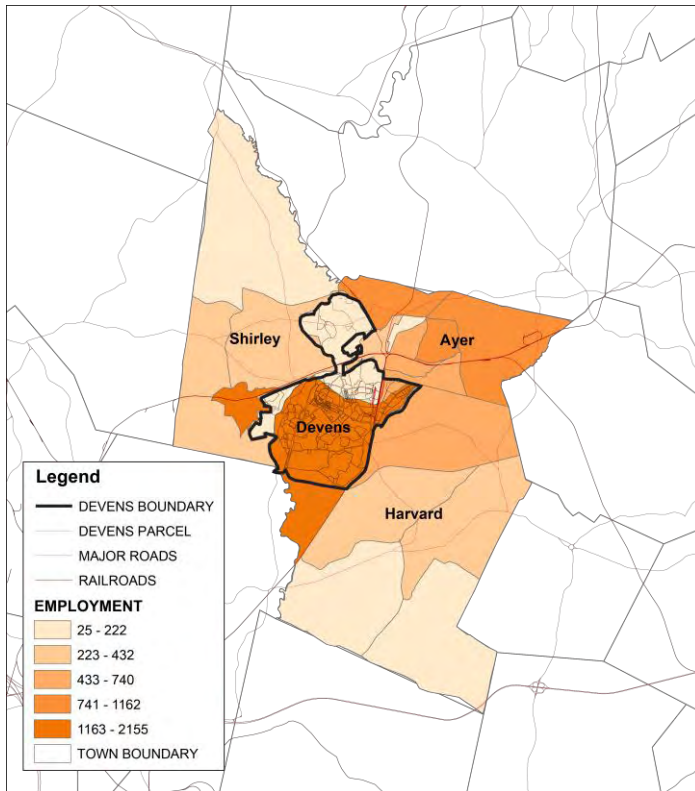
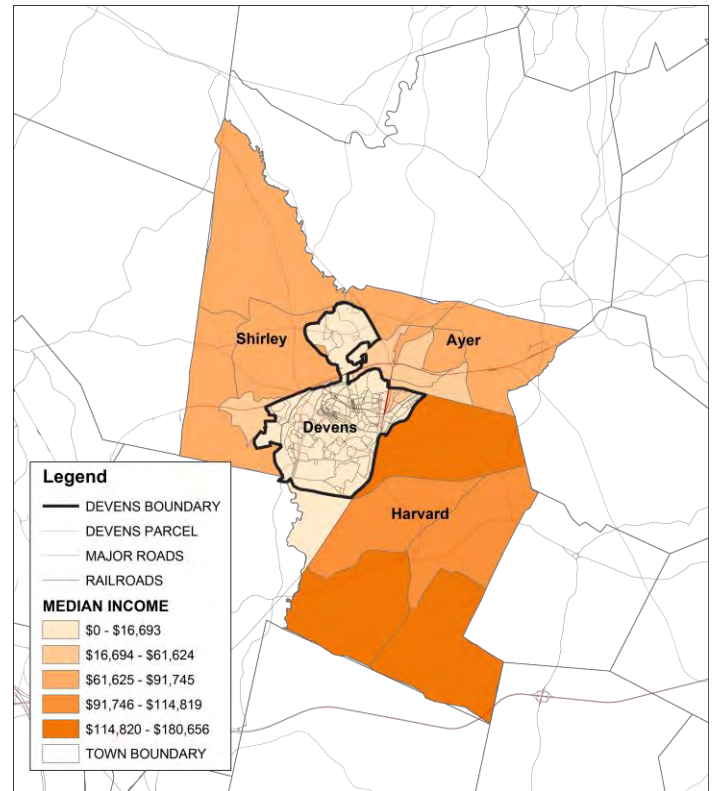


Figure 1.4: 2012 employment (source: Mass GIS)



2010 median household income (source: Mass GIS)

### 1.3 Devens Redevelopment

The Grant Road area within Devens was a former military housing area designated for housing redevelopment as part of the Reuse Plan developed when the base went through the Base Realignment and Closure Act process in 1993-94. The Devens Reuse Plan calls for Devens to become a model of sustainable development. Sustainable Development for Devens means balancing economic development, environmental protection and social equity. As the base contained over 10,000 housing units at the time of closure in 1993, the host communities were concerned about the potential for thousands of housing units coming into the market place in the midst of a recession. As a result, the number of housing units that would be allowed in Devens was capped at 282 units.

To date 120 units of housing have been developed within Devens, mostly historic officer (brick colonials) and NCO housing (brick bungalows) and 20 units of new net-zero energy housing. Figure 1.5 shows the relatively low-density of housing within Devens, compared to the surrounding region. Devens is also currently home to over 90 businesses and industries that employ more than 4,000 people.





Figure 1.5: Grant Road Redevelopment Zone and existing housing in Ayer, Harvard, Shirley and Devens.

The Commonwealth of Massachusetts has articulated a clear connection between available housing and retaining and attracting jobs to the Commonwealth. In 2013 the Governor stated that he wanted 10,000 new units of housing built in order to help retain our college educated workforce in Massachusetts by providing them with housing they could afford in this expensive housing market (Department of Housing and Community Development 2013).

Figure 1.6 depicts the current and proposed land use classifications for lands within Devens. Under the current conventional DEC Rules and Regulations (2013), residential development can occur on 15,000 sf or greater lots with 100' minimum frontage requirements (within the areas shaded in yellow on Figure 1.6). To support more sustainable approaches to redevelopment, in 2013 the DEC adopted new Innovative Residential Development (IRD) Regulations that contain clustering provisions that allow for 10,000 sf maximum and 5000 sf minimum single/duplex lot sizes and 75-50' frontages with a required minimum density of 7 dwelling units per acre. Conventional DEC development regulations provide standard street designs, however the new IRD Regulations create three new street types that incorporate more pedestrian friendly design elements (shorter block lengths, narrower street widths, bike lanes, sidewalks, universal accessibility and low-impact development). Conventional development requires compliance with MA Building Code minimum requirements and does not address indoor air quality. The new IRD regulations require more energy efficient buildings, the use of low to no VOC paints, and EPA Water sense fixtures.



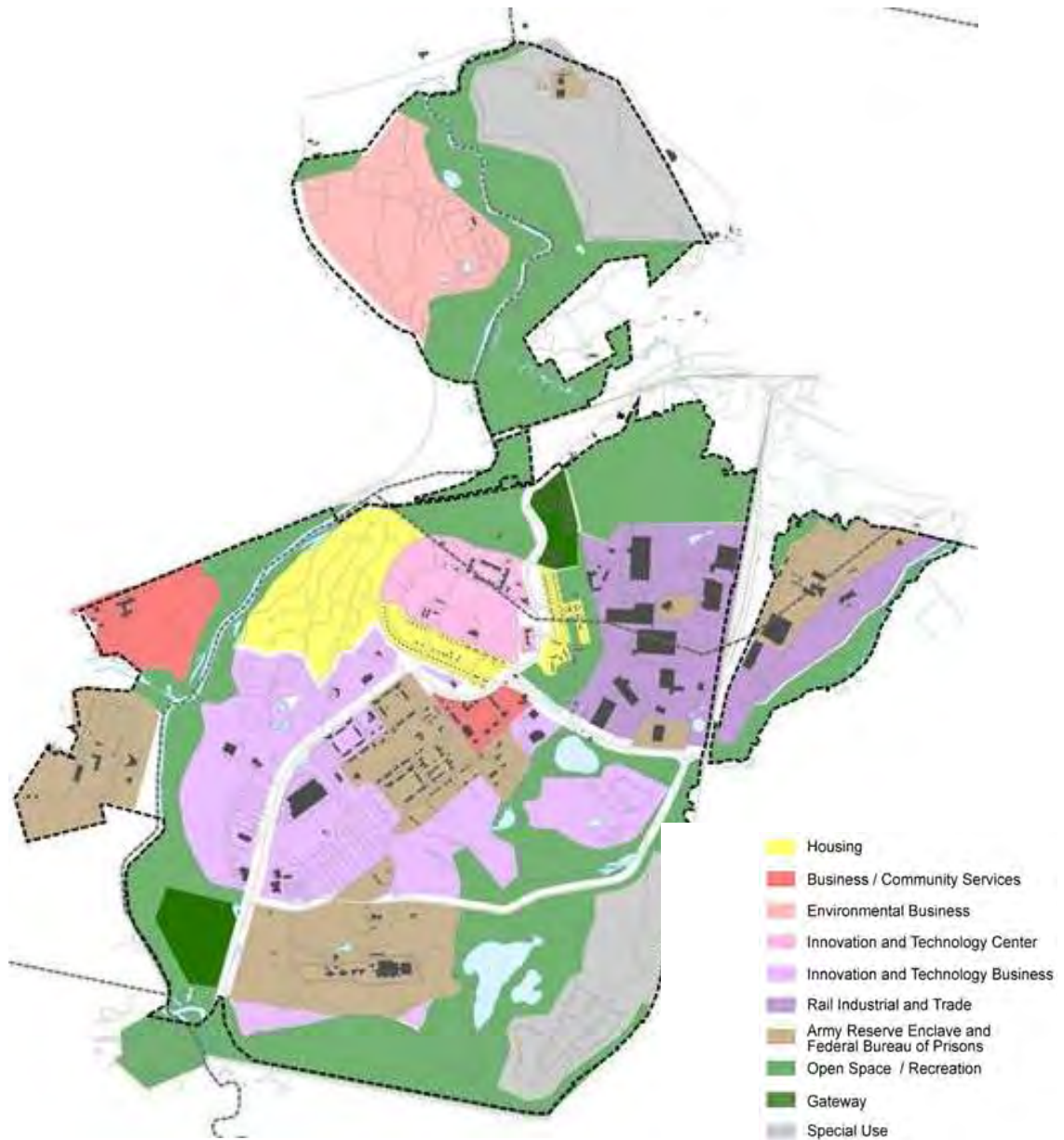


Figure 1.6: Devens Land Use Classifications

## 1.4 What is a Health Impact Assessment?

A Health Impact Assessment (HIA) is defined as “a combination of procedures, methods and tools by which a policy, program or project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population” (WHO, Gothenburg Consensus, 1999). HIA is a process that helps evaluate the potential health effects of a plan, project or policy before it is built or implemented. An HIA can provide recommendations to increase positive health outcomes and minimize adverse health outcomes. HIA’s brings potential public health impacts and considerations into the decision-making process for plans, projects, and policies that fall outside the traditional public health arenas.

## 1.5 The Devens Grant Road HIA

Recognizing the link between community planning and public health, the DEC believes consideration of the potential health impacts associated with regulations applied to the Grant Road Residential District could help facilitate a more sustainable redevelopment project and influence future redevelopment initiatives in Devens. A Health Impact Assessment was conducted by Devens Enterprise Commission staff members in partnership with an interdisciplinary group of representatives from the existing residential neighborhoods in Devens, the Massachusetts Department of Environmental Protection, Nashoba Valley Medical Center, and the Harvard Graduate School of Design, in an effort to identify and prioritize the broad public health implications of two mock development scenarios created for the Grant Road residential zoning district in Devens, Massachusetts. Each mock development scenario was developed based on two alternative regulatory compliance paths that currently exist for residential development within Devens.

The Grant Road HIA provided a window of opportunity for the Devens Enterprise Commission to:

1. Compare and contrast the potential health impacts of conventional residential development patterns vs. Innovative Residential Development patterns;
2. Encourage discussion among local decision-makers and stakeholders about planning for healthy communities and how these elements might be considered in future projects and plans;
3. Increase awareness of the multiple factors that can impact health and design, and;
4. Prevent or mitigate negative health outcomes by applying the broad and holistic methodologies and analytical tools used to conduct an HIA.

The remainder of this report reviews the HIA methodology, implementation process, findings and recommendations.

## 2.0 Methodology

There are six steps to conduct an HIA: **screening** to determine whether an HIA is appropriate or required; **scoping** to identify which health effects to consider; **assessment** to identify the magnitude of health impacts and the affected population; **recommendation**, make decisions to reach a set of final recommendations to mitigate adverse health effects; **reporting** to present results to decision-makers and community stakeholders, and; **monitoring and evaluation** to review the processes involved in the HIA and its impact and evaluate the actual health outcomes as a result of the project or policy. This section presents an overview of each of these steps as they relate to the Grant Road HIA in Devens.

### 2.1 Screening:

The screening phase assesses whether or not there is any value to conducting an HIA. In September 2013, DEC Staff began discussions with faculty from the Harvard Graduate School of Design to assess the value of an HIA for future residential development in the Grant Road area in Devens. The major factors that influenced this assessment were:

- Any redevelopment within the Grant Road area could potentially DOUBLE the residential population of the community.
- Grant Road could be developed under two separate and distinct development regulations and utilizing an HIA would allow for a comparison of the health impacts of the two sets of regulations.
- Comparing the DEC's conventional and IRD development regulations would further the DEC's commitment to Healthy Community Design and raise awareness of the potential health impacts of future development.

The Grant Road residential redevelopment scenario exercise would also provide a window of opportunity for community engagement and increased local awareness of the connections between neighborhood planning and public health. Knowledge of the potential health impacts of certain development/design considerations might allow for their mitigation in future residential redevelopment initiatives in the Grant Road district and beyond. For these reasons, the DEC decided to move forward with conducting an HIA. The Grant Road HIA will add value to the community as well as developers and decision makers in prioritizing broad aspects of economic, environmental and social determinants of health and planning to enhance physical activities, social cohesion, traffic, safety, and healthy eating, to build a healthier and smarter community in Devens.

### 2.2 Scoping

The scoping phase involves planning and designing the HIA, identifying which health effects to consider, and developing a work plan. Through weekly DEC staff meetings (starting from October 2013 to March 2014), and a one-day workshop (in April 2014) the following scoping elements were developed:



### 2.2.1 The Study Area:

The Grant Road Residential District within Devens was identified as the primary area for future residential development within Devens as part of the Devens Reuse Plan. To ensure a more comprehensive approach to this HIA, the geographic boundaries of the study area were expanded to include the entire Devens Regional Enterprise Zone (Devens), and the whole of the underlying communities of Ayer, Shirley, and Harvard, which comprise the host communities of Devens. Figure 2.0 depicts the Grant Road Residential District in the context of Devens and the surrounding towns.

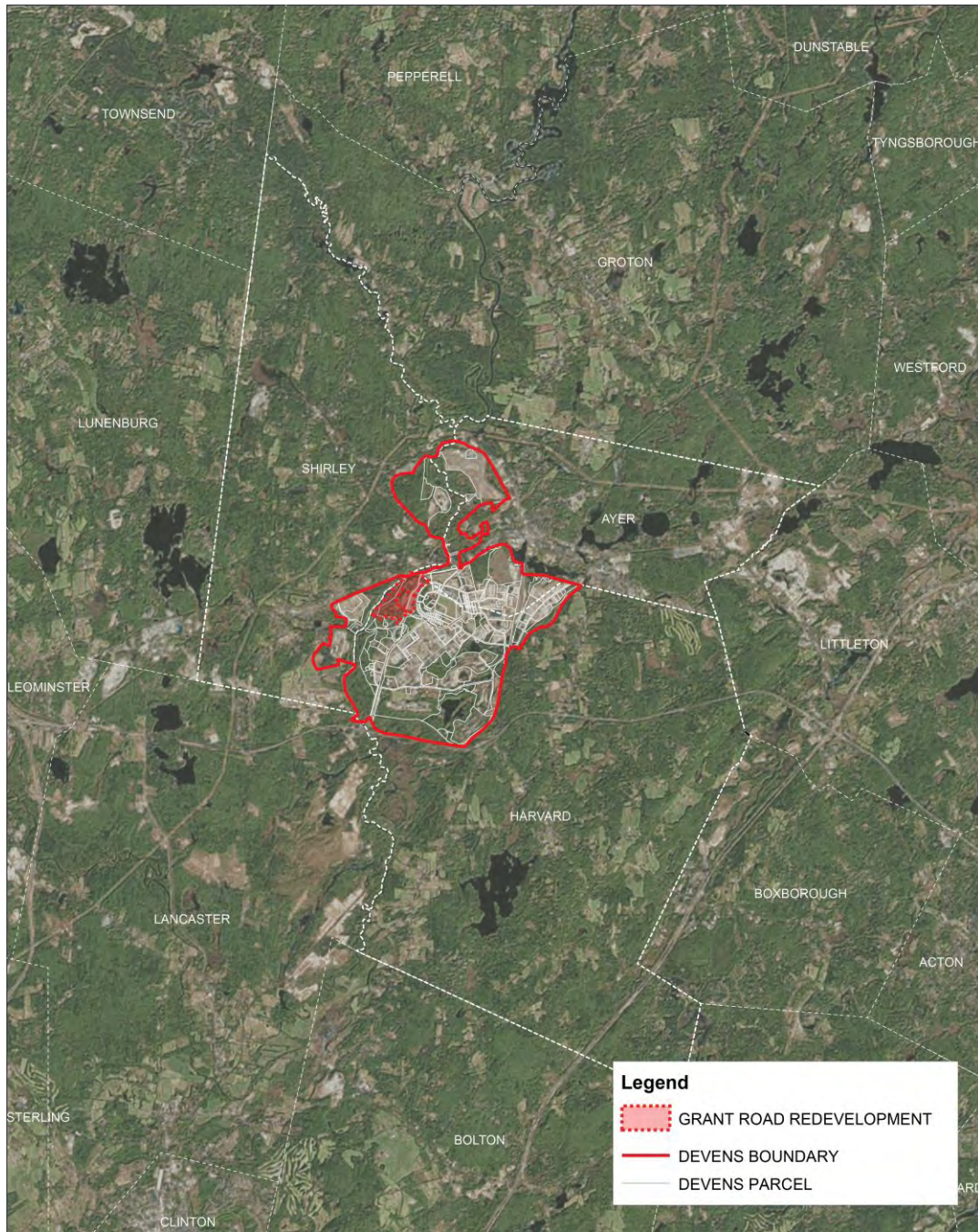


Fig 2.0: Aerial Map of Grant Road Residential District, Devens and surrounding Towns (source: Mass GIS)



As previously discussed in the Devens Redevelopment section, there are currently two regulatory compliance paths for residential development within the Grant Road area: (1) innovative residential development (IRD); and (2) conventional. To help evaluate the health impacts of each regulatory compliance path, DEC Staff developed two probable mock residential scenarios. The first scenario, utilizes the IRD regulations and the second scenario utilizes conventional development regulations:

**Innovative Residential Development (IRD):**

# 120 Unit Development Scenario #1 (30 acres)

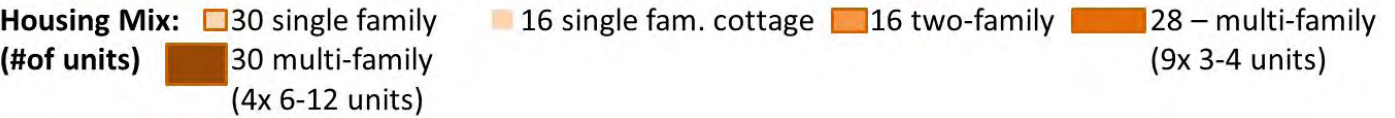
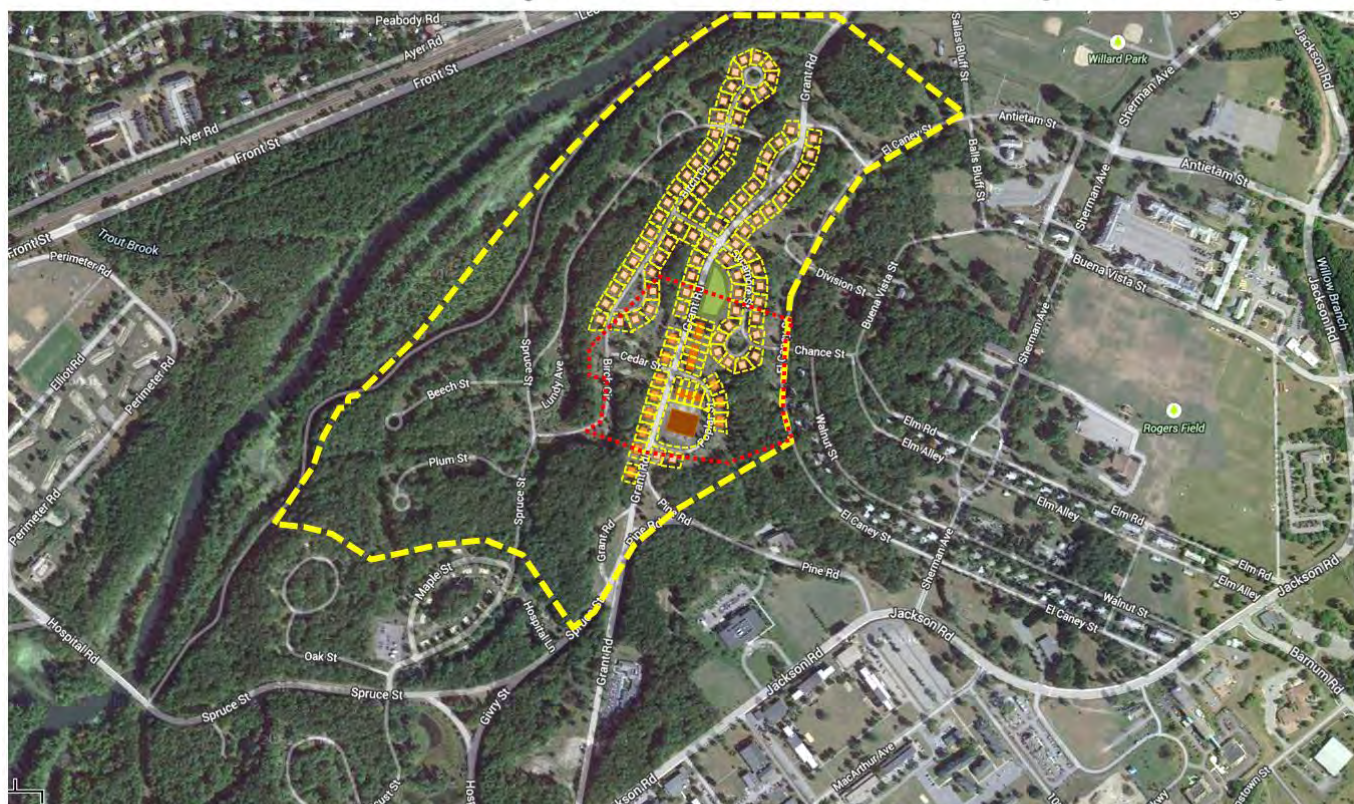


Figure 2.1: Mock development scenarios for the Grant Road Residential area.



**Conventional Residential Development:**

## 120 Unit Development Scenario #2 (60 acres)



**Housing Mix:** 80 single family 22 two-family 12 – 3-4 family 6 multi-family  
(#of units) (1x6 unit)

Figure 2.2: Mock development scenarios for the Grant Road Residential area.

These mock scenarios would be evaluated against the key components of a healthy community: Sustainable safe transportation, healthy housing, healthy economy, social cohesion, public infrastructure and environmental stewardship as well as land use. Background information on how each of these components of a healthy community relates to Devens and the mock development scenarios was developed for this HIA. The following is a brief summary of each component as it relates to Devens and the Grant Road area:

*Healthy Housing:* Devens is a model of sustainable development and as such the use of energy-efficient construction and renewable energy systems are encouraged, in addition to utilizing building materials and finishes that contribute to healthy indoor air quality. Devens is also a former Superfund site and the Grant Road housing area is a brownfield site that has been remediated to facilitate redevelopment. Soil management plans and groundwater use restrictions would apply to either scenario.



*Social Cohesion:* The redevelopment area will eventually attract a diverse range of individuals and families with children. . Devens requires a mix of housing tenure, type and affordability be provided as part of any Grant Road redevelopment scenario – facilitating the creation of a more socially diverse community. The Grant Road area is in proximity to an existing neighborhood and any future development needs to be compatible with and respect existing residents. Community interaction and availability of services (or lack thereof) are important considerations. Devens does not currently have access to healthy foods or a supermarket within walking or biking distance. One site within center of Devens has been identified as a potential development site for a supermarket but the area currently lacks the population to support it. Other community resources such as daycare, schools, a community center, a museum, Native American Cultural center, parks and active and passive open spaces and that are easily accessible to residents. Crime rates are very low in Devens but perceived safety is an additional aspect that will impact social cohesion.

*Healthy Economy:* Devens is a regional employment center with over 4,000 jobs and continues to attract a diverse array of business and industry. Providing affordable housing choices for employees within Devens can help further the sustainable redevelopment objectives of the Devens Reuse Plan and is attractive to business and industry already in, or looking to locate in Massachusetts. Each mock development scenario has requirements for providing various forms of low and moderate-income housing that will attract a diverse range of individuals and families with varying income levels and be within close proximity to jobs within Devens.

*Environmental Stewardship:* Devens lies within a non-attainment area for air quality (Ozone) as designated by the US Environmental Protection Agency. The redevelopment scenarios each have varying levels of impact on air and water quantity and quality. Access to open space with its mental health benefits also varies with each development scenario.

*Sustainable Safe Transportation:* The Grant Road redevelopment area is located within two miles of two commuter rail stations on the MBTA Fitchburg Commuter rail line. It is also located within two miles of the Jackson Road exit onto Route 2, a major east west transportation corridor. Each mock development scenario provides differing levels of multi-modal (walk, bike, drive, transit) transportation options. Each mock development scenario provides different levels of connectivity and accessibility. Universal design (unrestricted access for all ages and abilities) and safe, convenient access to recreation and public health facilities/services will be important considerations for either development scenario. Both mock development scenarios provide opportunities to create safe routes to schools.

*Land Use:* The Grant Road area is zoned for residential uses. Community services are within biking and walking distance of some portions of the Grant Road area. The Grant Road area is served by existing water, sewer, electric and natural gas infrastructure.

To better understand the differences between each of the mock development scenarios, a summary chart of the key features of each development scenario was also developed (see Table 2.0). This chart was key to the comparative analysis of the two different sets of regulations being applied to the Grant Road redevelopment area.

Table 2.0: Mock Development Scenario key features

Development Scenario #1	Development Scenario #2
<b>Total Development Area:</b> 30 acres	<b>Total Development Area:</b> 60 acres
<b>Total number of housing units:</b> 120	<b>Total number of housing units:</b> 120
<b>Lot Sizes:</b> <ul style="list-style-type: none"> <li>• Single family (large) – 9,000sf</li> <li>• Single family (small) – 5,000sf</li> <li>• Two-family- 9,000sf</li> <li>• Three-four family – 13,000sf</li> <li>• 20-unit multi-family – ~30,000sf</li> </ul>	<b>Lot Sizes:</b> <ul style="list-style-type: none"> <li>• Single and two-family units - 15,000sf</li> <li>• Three-four family units – 17,500-20,000sf</li> <li>• Multi-family (max. 8 units/structure)- 22,500-30,000sf</li> </ul>
<b>Housing Mix (# of units &amp;type):</b> <ul style="list-style-type: none"> <li>• 30 single family</li> <li>• 16 single family cottage</li> <li>• 16 two-family</li> <li>• 28 three-four family</li> <li>• 30 six-twelve unit multi-family</li> <li>• Mix of rental and for sale units</li> </ul>	<b>Housing Mix (# of units &amp;type):</b> <ul style="list-style-type: none"> <li>• 80 single family</li> <li>• 22 two-family</li> <li>• 12 three-four family</li> <li>• 1x6-unit multi-family</li> <li>• Mix of rental and for sale units</li> </ul>
<b>Overall density:</b> 7.0 units per acre	<b>Overall density:</b> 2.7 units per acre
<b>Affordability Requirements:</b> <ul style="list-style-type: none"> <li>• 10 low income (multi-family)</li> <li>• 30 moderate income units (mix of single and multi)</li> </ul>	<b>Affordability Requirements:</b> <ul style="list-style-type: none"> <li>• 12 Low-Income units (multi-family)</li> <li>• 18 Moderate-Income units</li> </ul>
<b>Frontage:</b> 50 feet/lot	<b>Frontage:</b> 100 feet/lot
<b>Street Right of Way Widths:</b> <ul style="list-style-type: none"> <li>• Grant Road – 55’</li> <li>• Local Streets – 40’</li> <li>• Neighborhood Road – 20’</li> </ul>	<b>Street Right of Way Widths:</b> <ul style="list-style-type: none"> <li>• Grant Road – 66’</li> <li>• Local Streets – 50’</li> </ul>
<b>Amount of Impervious:</b> 10 acres	<b>Amount of Impervious:</b> 20 acres
<b>Amount of Open Space:</b> 10 acres	<b>Amount of Open Space:</b> 15 acres
<b>Type of Open Space:</b> <ul style="list-style-type: none"> <li>• Natural areas</li> <li>• Village green</li> <li>• Community garden</li> <li>• Trail access</li> </ul>	<b>Type of Open Space:</b> <ul style="list-style-type: none"> <li>• Natural areas</li> <li>• Village green</li> <li>• Trail access</li> </ul>
<b>Average unit distance to active open space:</b> 600’	<b>Average unit distance to active open space:</b> 1200’
<b>Accessibility:</b> <ul style="list-style-type: none"> <li>• Existing streets and new streets and roads</li> <li>• Sidewalks on both sides of street</li> <li>• Maximum block length – 800’</li> <li>• Bike lanes on Grant, all other streets 25MPH or less</li> </ul>	<b>Accessibility:</b> <ul style="list-style-type: none"> <li>• Utilizing existing street network</li> <li>• Sidewalks on one side of street</li> <li>• Maximum block length – 1700’</li> </ul>
<b>Connectivity:</b> intersections per square mile: ~150	<b>Connectivity:</b> intersections per square mile: ~90
<b>Building Design Standards:</b> <ul style="list-style-type: none"> <li>• HERS Rating of 60 or less</li> <li>• EPA Water Sense Plumbing Fixtures</li> <li>• Low-No VOC paints, sealants and finishes</li> </ul>	<b>Building Design Standards:</b> <ul style="list-style-type: none"> <li>• MA base building Code (HERS ~90)</li> <li>• MA base Plumbing Code</li> <li>• No indoor air quality standards</li> </ul>
<b>Proximity to local services:</b> <ul style="list-style-type: none"> <li>• Closest unit – 2000 ft.</li> <li>• Furthest unit – 3200 ft</li> </ul>	<b>Proximity to local services:</b> <ul style="list-style-type: none"> <li>• Closest unit – 2000 ft.</li> <li>• Furthest unit – 5000 ft</li> </ul>

### 2.2.2 Identifying Health Risk Factors:

The Behavioral Risk Factor Surveillance System (BRFSS) is a health survey that is conducted by health departments in all 50 states. The BRFSS collects information on health risk behaviors, health practices, and healthcare access and use through telephone surveys of persons aged 18 years and older. Our Healthy Mass ([www.ourhealthymass.org](http://www.ourhealthymass.org)) was also created to provide information to Massachusetts residents on the health status of their communities. The BRFSS and Our Healthy Mass were used to scope the existing health status for the towns within the study area.

A Screening/Scoping Checklist (Table 2.1) was carefully developed by DEC staff with input from Harvard Graduate School of Design (HGSD) and Harvard School of Public Health (HSPH) advisors. The checklist was initially adapted from Design for Health screening/scoping tool kit (DFH, 2008) and tailored to align with the mock development scenarios and the DEC Rules and Regulations.

The checklist presents the key health impact areas and questions to be addressed during the workshop. The health impact areas to be explored include: transportation, accessibility, air quality, environment, food, mental health, physical activity, safety, social capital and water quality and quantity.

Table .2.1: Screening/Scoping Checklist

	Topic/Issues	Questions	Comments/Notes	Scenario 1					Scenario 2				
				1	2	3	4	5	1	2	3	4	5
transportation	Transit Service	Does the plan involve residential components that are built at an average density greater than or equal to seven dwelling units per acre of buildable land available for residential use?											
	Transit Stops	Is there regularly schedule transit service within 3/4 miles of all residential and employment areas?											
Accessibility	Transit Ready	Does the residential development project incorporate measures to deliver future transit services such as designing areas to convert to bus stops?											
	Access to Health Care	How close are the residential uses to health care facilities (hospital, clinic, pharmacy, health club)?											
	Distance to Schools	How close are the residential uses to nearby schools (daycare facilities, elementary schools, secondary schools, and post secondary schools)?											

**Table .2.1: Screening/Scoping Checklist cont...**

	Topic/Issues	Questions	Comments/Notes	Scenario 1					Scenario 2				
				1	2	3	4	5	1	2	3	4	5
Air Quality	Distance from major transportation routes	Are the residential areas and schools within close proximity (200 meters 1/4 mile) of major auto related transportation routes (routes 2) that could impact air quality issues?											
	Distance from polluting uses	Does the project propose residential uses in close proximity to businesses that disproportionately contribute pollutants (such as dry cleaning, automotive painting, manufacturing requiring air permits)?											
	Green infrastructure	Are vegetated roofs, street trees, and other green infrastructure proposed for the project to mitigate air quality?											

	Topic/Issues	Questions	Comments/Notes	Scenario 1					Scenario 2				
				1	2	3	4	5	1	2	3	4	5
Environment	Lead exposure	Does the project propose to minimize exposure to lead to at risk populations (children)?											
	Exposure to VOC's	Does the project propose to minimize exposure to VOCs and other sources of indoor air pollution?											
	Certified Green Housing	Does the project contemplate using certified green housing or neighborhood programs such as LEED for Homes, LEED for Neighborhood Development or Enterprise Green Housing to address more sustainable approaches to building such as water and energy efficiency, and indoor air quality?											

	Topic/Issues	Questions	Comments/Notes	Scenario 1					Scenario 2				
				1	2	3	4	5	1	2	3	4	5
Food	Access to healthy food sources	Are there supermarkets and/or convenience stores with fresh produce within a mile of each home?											
	Ability to grow food on-site/community gardens	Are there any restrictions preventing residents from growing food on site? Are community gardens provided?											
	Distance from and availability of Seasonal Farmers Markets	Are there farmers markets within a mile of each home?											

	Topic/Issues	Questions	Comments/Notes	Scenario 1					Scenario 2				
				1	2	3	4	5	1	2	3	4	5
Mental Health	Views of Green	Does the project require lot-level landscaping and buffering in proximity to dwelling units? Do the dwellings face streets or open space or both?											

**Table .2.1: Screening/Scoping Checklist cont...**

	Topic/Issues	Questions	Comments/Notes	Scenario 1					Scenario 2				
				1	2	3	4	5	1	2	3	4	5
Physical Activity	Access to playing areas, park and trails	In order to reduce car trips and provide options for physical activity and social interaction, is the average unit distance to active open space walkable?											
	Access to trail system	Does the proposed project facilitates connections to these open spaces?											
	Multi-modal transportation	Does the project adequately account for safe circulation patterns for alternative modes of transportation other than single occupancy vehicles?											
	Accessibility	Does the proposed plan facilitate ease of access for people of all abilities and age groups?											

	Topic/Issues	Questions	Comments/Notes	Scenario 1					Scenario 2				
				1	2	3	4	5	1	2	3	4	5
Safety	Lighting	Is adequate lighting proposed for the project?											
	Complete Streets, traffic calming and transportation safety?	Does the plan and proposed street layout adequately account for safe circulation patterns for people and all modes of traffic? Does the proposed layout help reduce vehicle speeds and provide more "eyes on the street?"											

	Topic/Issues	Questions	Comments/Notes	Scenario 1					Scenario 2				
				1	2	3	4	5	1	2	3	4	5
Social Capital	Housing options	Does the project include a mix of housing densities and/or tenures (e.g. at least 15-20% of the housing stock in a different use tenure or as apartment/ condos)?											
	Social housing	Does the project propose to reserve units affordable to people of low to moderate and median incomes (80-120% of median income)?											

	Topic/Issues	Questions	Comments/Notes	Scenario 1					Scenario 2				
				1	2	3	4	5	1	2	3	4	5
Water Quality and Quantity	Groundwater quality	Does the plan propose measures to protect the groundwater on the site?											
	Drinking water quality	Is there a secure and adequate supply of good quality drinking water for the project?											
	Surface water quality	Does the project propose to take measures to protect nearby surface water quality?											
	Water quantity	Does the project propose measures to implement water conservation measures?											



Three categories were selected to evaluate the current health status in the towns of Ayer, Shirley, and Harvard: (1) adult obesity, (2) household language isolation, and (3) adults lacking physical activity. Obesity is known to increase the likelihood of heart disease, type 2 diabetes, and certain types of cancer. Figure 2.3 shows Shirley and Ayer have higher rates of obesity compared to Harvard and Devens.

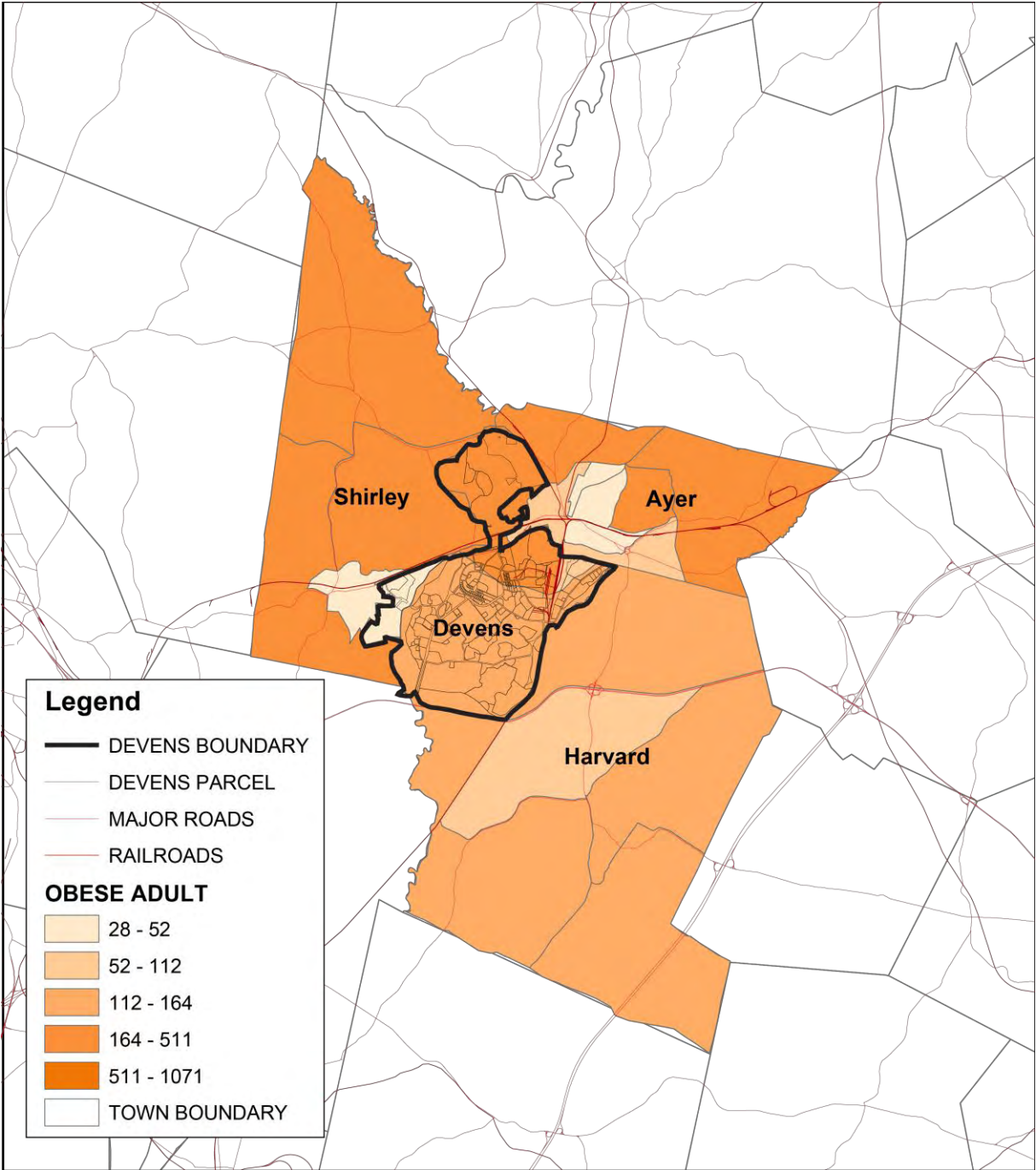


Fig 2.3: 2010 adult obesity rates (source: Mass GIS)



Risk factors such as lack of physical exercise can often lead to manifestations of chronic disease later in life. Two risk behavior data sets from BRFSS - lack of physical activity and obesity rate, were used to provide a general picture of the health status of the population.

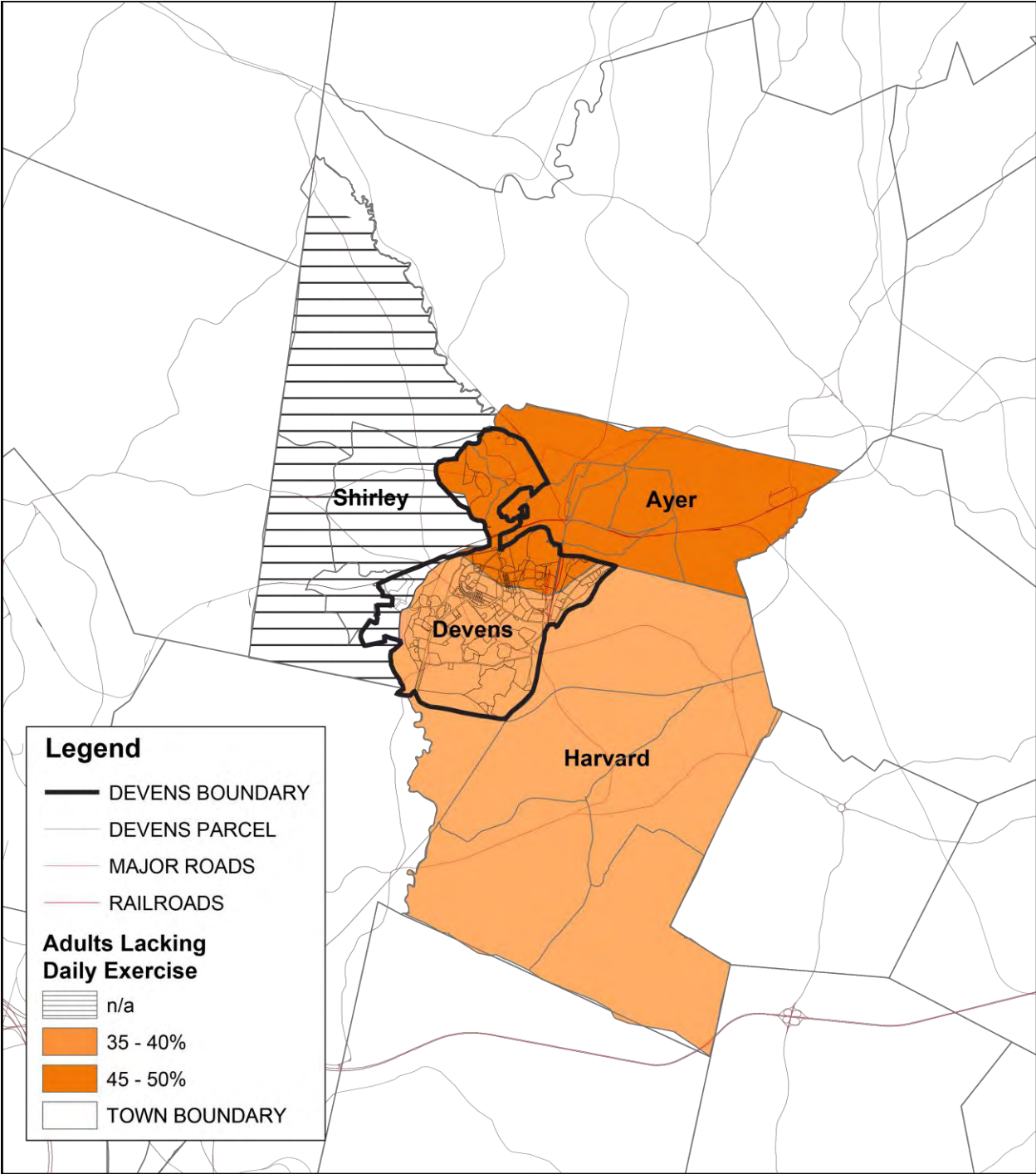


Fig 2.4: Adults lacking daily exercise (source: Mass GIS)

As figures 2.3 and 2.4 show, Ayer and Shirley show high health risks from obesity and lack of physical activity. Social indicators such as linguistically isolated households can reveal potential health risks in a population. The U.S. Census Bureau defines a person as linguistically isolated if they live in a household in which no person over 14 speaks English at least “very well”. Because of language barriers, foreign residents may have a more difficult time accessing critical resources such as health care. Figure 2.5 shows that Ayer has a higher language isolation rate than other surrounding towns due to a higher ethnic population.

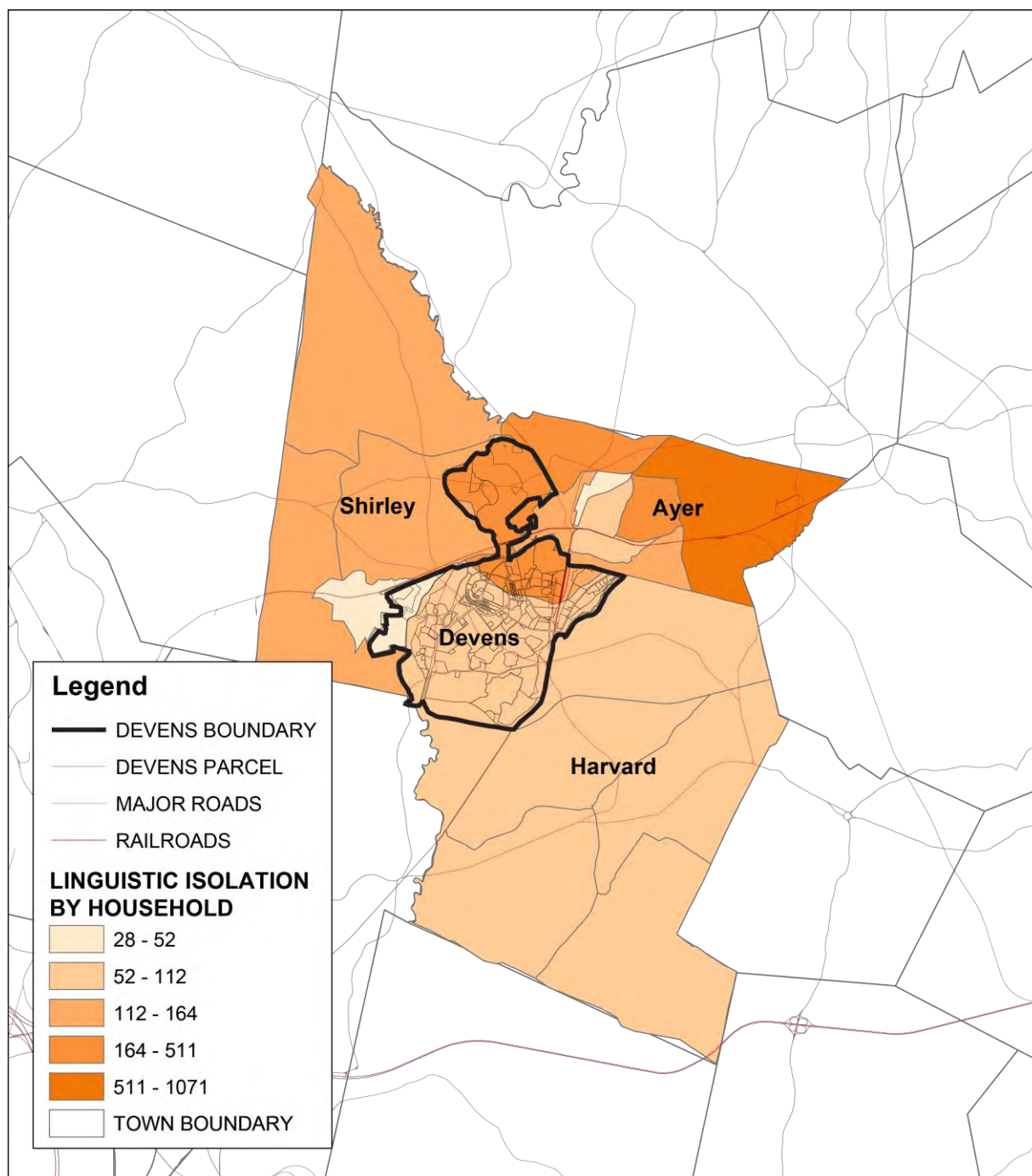


Fig 2.5: 2010 Language isolation households (source: Mass GIS)

### 2.2.3 Community Engagement:

Community participation was a priority for Devens Enterprise Commission staff. In order to better understand the potential health impacts of any future potential development in the Grant Road residential district on the existing Devens Community, their participation was a must. A one-day workshop was planned to invite community input from local residents in Devens, and to solicit input from experts with knowledge of the health and environmental aspects of development.



Fig 2.4: Devens HIA Workshop participants reviewing mock development scenarios

Participants included representatives from the existing residential neighborhoods in Devens, Massachusetts Department of Environmental Protection, Nashoba Valley Medical Center, Harvard Graduate School of Design and Harvard School of Public Health. DEC Staff provided a full presentation and overview of how land use patterns can influence public health, what an HIA is, and why this exercise was being conducted. Participants were given background information on existing local land uses and development patterns to aid in their evaluation. Copies of the mock residential development scenarios (conventional development and IRD scenarios), key features chart and copies of the Screening/Scoping checklist were provided to all workshop attendees to help them evaluate and identify immediate and future health impacts, both negative and positive.

To reduce potential bias, scenarios were not labeled and workshop participants were not told which scenario followed the Innovative Residential Development regulatory compliance path or the conventional regulatory compliance path. Participants were asked to consider the key components of a healthy community as they relate to the two different mock development scenarios: Sustainable safe transportation, healthy housing, healthy economy, social cohesion, public infrastructure and environmental stewardship as well as land use and any other factors they felt had relevance.

To assure maximum citizen participation, all community groups within Devens received an invitation to participate (the Devens Committee, the Devens Homeowners Association and the Devens Condominium Association) as well as invitations through the Devens weekly update sent to all residents by MassDevelopment Devens. Announcements were also posted in the local papers. Follow up phone calls were made to solicit higher attendance. Anyone could attend and was encouraged to participate through this open-ended process.



## 2.3 Assessment

The assessment phase synthesizes and critically assesses the information collected to prioritize health impacts. Grant Road HIA assessment phase used both qualitative and quantitative methods to analyze the proposed redevelopment plans, outline harmful and beneficial potential impacts and make recommendations to mitigate or enhance those impacts.

Scientific research and qualitative judgment were combined to assess the needs of the affected population in Devens. Predictions of the health impacts were made combining qualitative judgment of community values from the workshop, supplemented with scientific research to assess the potential health outcomes of the two redevelopment plans.

## 2.4 Reporting

The “Process”, “Findings” and Recommendations” sections of this HIA detail how the HIA process was conducted and the results and feedback and interpretations from participants. The DEC will share this Health Impact Assessment for Grant Road with the community stakeholders (workshop participants, property owner, MassDevelopment, potential developers of the Grant Road district), the Massachusetts planning and development community in general, as well as the residents of Devens and the general public through posting on the [www.devensec.com](http://www.devensec.com) website and listing this report on national HIA Report websites. Faculty advisors from the Harvard Graduate School of Design and School of Public Health will also receive copies of the report.

## 2.5 Evaluation & Monitoring

DEC will use the results of this HIA to help educate the general public and the development community on the interconnections between planning, development and public health. As part of its 5-year review process, the DEC will also evaluate how the healthy community design elements and recommendations included in this report have or have not been considered or implemented - in an effort to further the sustainable redevelopment goals of the Devens Reuse Plan.

# 3.0 Process

To implement the HIA methodology, the DEC staff and intern conducted extensive research, literature reviews and consultations with health professionals. The following diagram depicts the six major phases of an HIA along with a timeline of events and HIA research phases for this project.

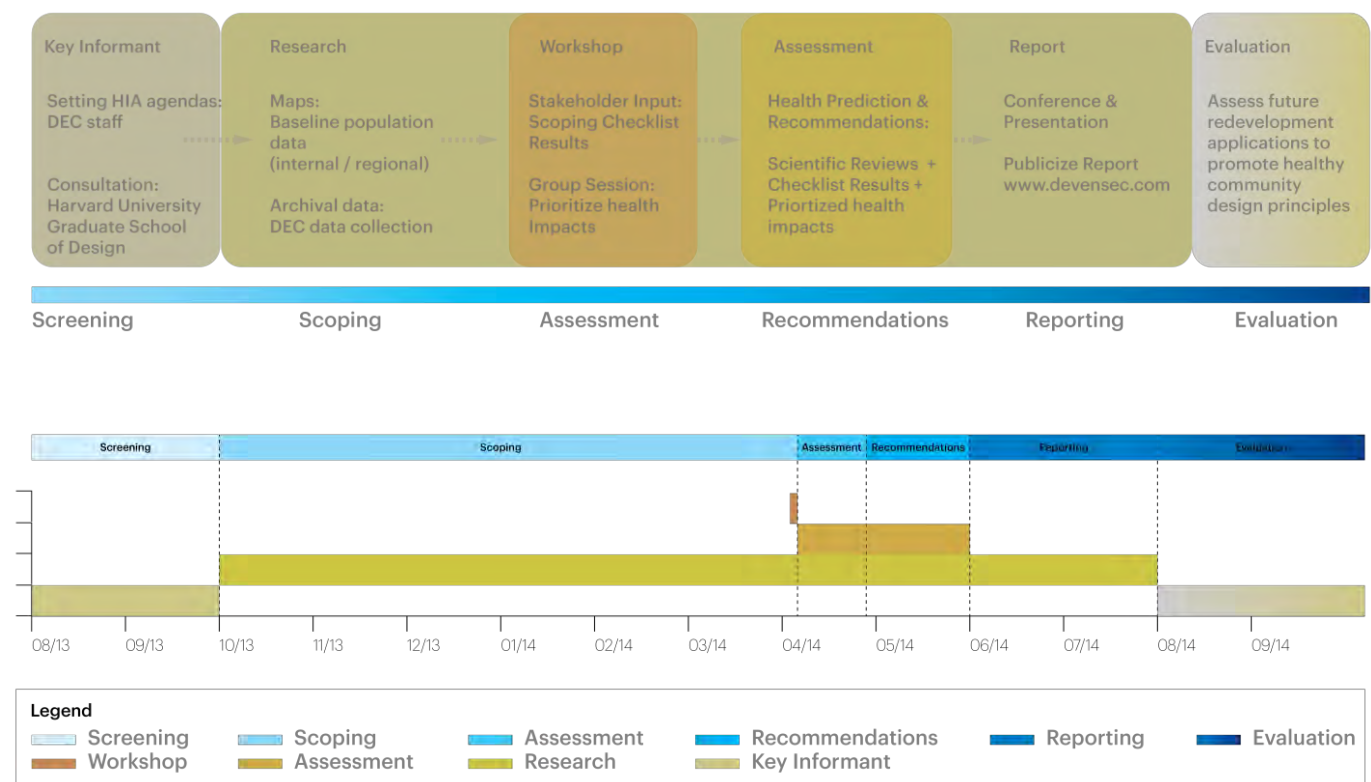


Fig 3.0: HIA Process and corresponding timeline

Following the research, the team decided to get stakeholder input from local residents along with an interdisciplinary professionals from urban planning, design, and public health to evaluate the two mock development scenarios for the Grant Road neighborhood.

Before the workshop the DEC staff conducted a scientific review and created a causal pathway diagram (Figure 3.1) to show the linkages between health impacts and walkable mixed-use urban design.

## Examples of links between Housing and related factors and health.

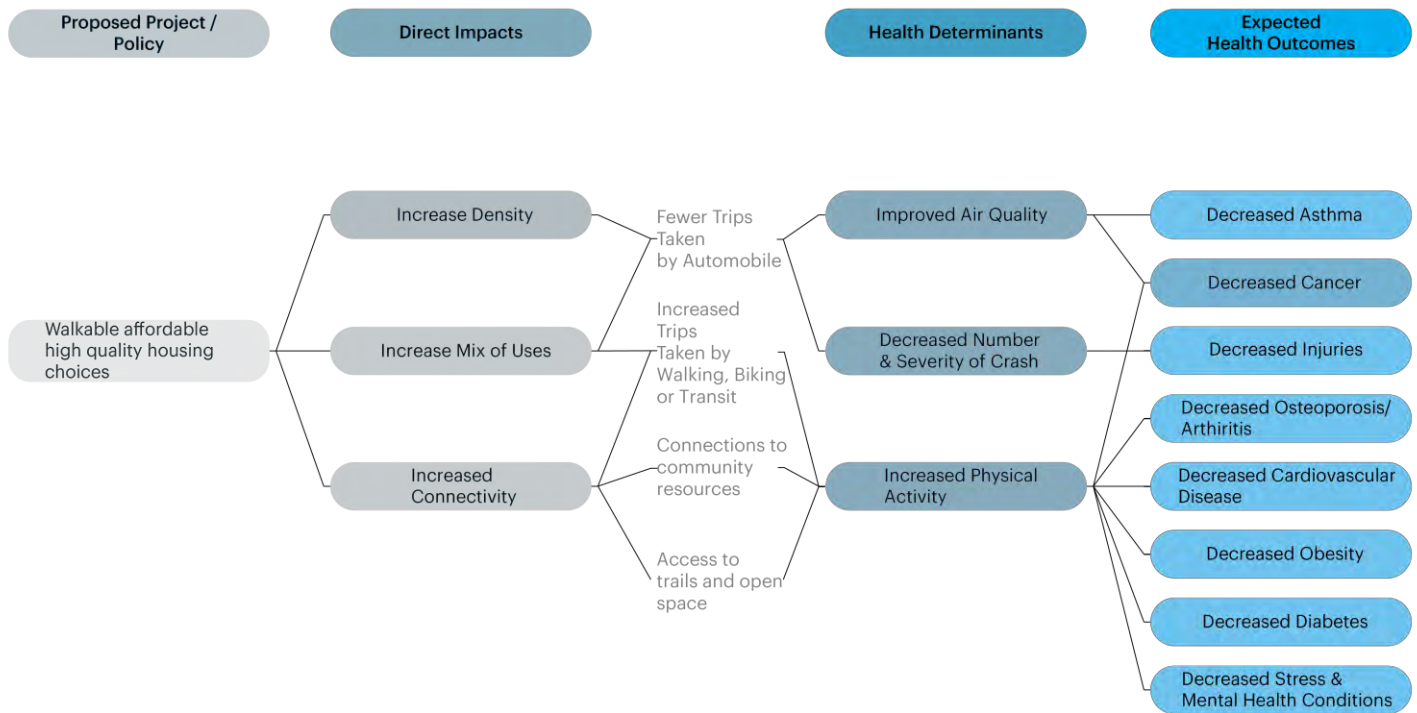


Fig 3.1: Generalized Causal Pathway Diagram

Prior to the workshop, DEC staff and intern distributed the two redevelopment scenario plans, the key features chart and the screening/scoping checklist (refer to the Methodology section of this report). The checklist was used to help workshop participants evaluate a broad range of health and design related issues that the two development regulations and corresponding scenarios might generate (social, environmental and economic). Additional background information on the links between neighborhood design and public health were sent to workshop participants in advance, along with statistical information on the demographics of Devens and the surrounding region (for context). Copies of the presentation and information sent to participants in advance are included in Appendix A.

During the workshop, participants were given a brief tutorial on the linkages between planning and public health, why this exercise was being conducted and an overview of the Devens region and the study area in general. Each of the development scenarios was described in detail and participants were provided with all the plans, checklists and background information and broken into groups. Each group was asked to review and rank each scenario in order to predict whether or not there are beneficial or negative outcomes according to the topics and questions on the screening/scoping checklist. DEC Staff and intern moderated the discussions within each group. Each group also identified a group leader who reported findings back to all workshop participants. This approach helped to better engage workshop participants in the entire process and reduce any bias from the workshop organizers.



# 4.0 Findings

The Grant Road HIA identified four priority impact areas based on information collected from the community assessment, scientific literature review, and stakeholder input:

- **Social Cohesion:** Promoting opportunities for positive and beneficial interactions between community residents, businesses and organizations (e.g. Create access to active open spaces for all community members);
- **Access to Healthy Foods:** Providing better access to local food sources, and educating residents to help improve their ability to make healthier food choices (e.g. develop community garden programs that include an educational component and support local farms and food pantries);
- **Environmental Health:** Development that promotes more compact, efficient forms of development that preserve open space, reduce greenhouse gas emissions and improve overall environmental health (e.g. cluster subdivisions with connections to existing developed areas and adjacent preserved open spaces and natural wildlife areas);
- **Public Health and Safety:** Inclusionary neighborhood designs that that focuses on people, not cars and provides accessibility for all ages and abilities (e.g. Complete Streets that incorporate traffic calming measures and promote walkability; and neighborhood design that integrates a mix of housing types).

This section documents how each priority impact is connected to health; workshop findings for the priority impact area, and; recommendations for enhancing healthy community design for each impact area.

## 4.1 Social Cohesion

Individuals who lack social connections tend to suffer higher rates of mental illness, heart disease, and mortality (Berkman and Kawachi 2000; Kawachi, Kennedy, Lochner, Prothrow-Stith 1997). Research has shown residents socially engaged with others as well as participating with community affairs tend to be mentally and physically healthier (Cohen and Wills 1985). The social environment is one aspect of a place that has an important influence on health and well-being.

The built environment can also indirectly affect social cohesion (Quigley and Thornley 2011). It is well documented that people who reside in clusters of low-income housing are at a higher risk of social isolation. Streets can also potentially cause social isolation in some communities (Quigley and Thornley 2011). Thus, communities that have better connected street and pedestrian networks might exhibit stronger social connections between members of the community (H.V. Cooper, L. Flone, J.F. Chiaradia 2014). In 2011, research revealed park spaces helped reduced residents' stress from

social interaction among residents (Fan, Das, and Chen 2011). Additionally, community gardens have shown social benefits among residents such as increasing community pride and enhancing social relationships (Wakefield, F Yeudall, C Taron, J Reynolds, and A. Skinner 2007).

While many studies show connections between planning and public health issues, they often depend on other varying factors such as urban design and neighborhood programs and services that encourage making healthier decisions. Figure 4.0 depicts each of the mock development scenarios and the key attributes that could influence social cohesiveness.

**Workshop Findings:**

Devens residents frequently felt a sense of isolation from the surrounding host communities. Although Devens has sufficient recreational open space, for the surrounding host communities and Devens residents; there are transportation barriers in accessing its facilities. Devens was a former military base designed to keep the public out, however the redevelopment efforts to date have greatly improved vehicular access to and from the surrounding communities. Additional work to provide transit, walking, biking and other alternative forms of transportation to promote access and connectivity was identified as important.

Green space can create opportunities to increase social interaction between residents of Devens and the host communities. Workshop participants also expressed their interest in open space access and ensuring any future development compliments the existing neighborhood character in Devens. Both of these elements can contribute to improved social cohesion through appropriate design measures that are included in the Devens Enterprise Commission Development Rules and Regulations. Continuing the integration of affordable and market rate units will also aid in improving social cohesion and reducing segregation/isolation within Devens. Figure 4.1 depicts the key attributes of each mock development scenario that could influence social interaction among residents.

Workshop participants were asked to determine which mock development scenario provided for better social capital options. Figure 4.0 depicts which questions from the screening/scoping checklist used in the workshop relate to which priority impact areas. A summary of the overall scoring/rating workshop participants gave each development scenario is also included.

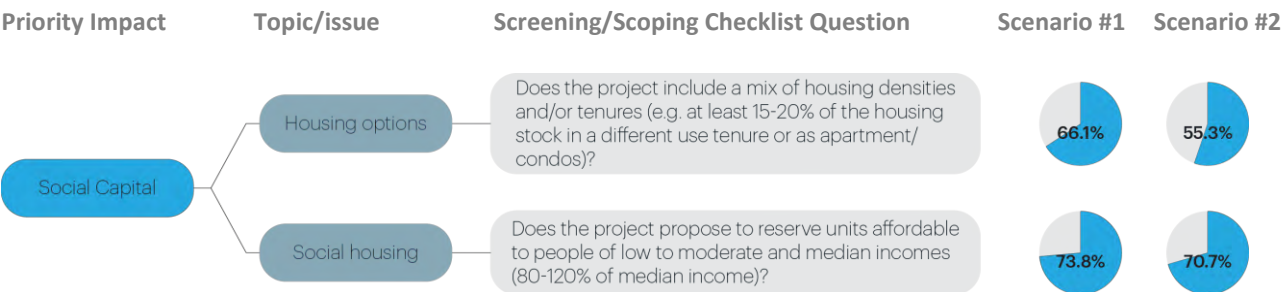
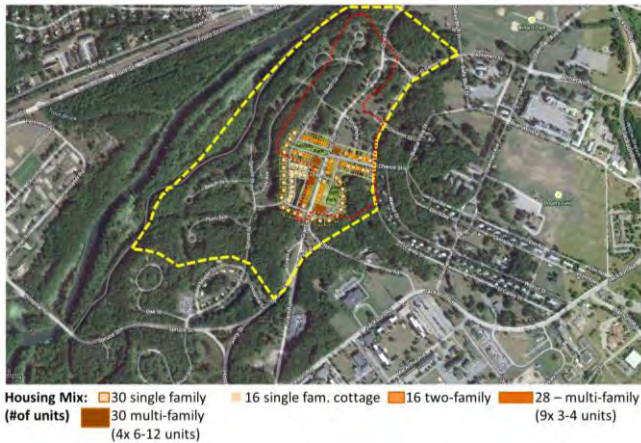


Figure 4.0: Checklist results: Social Capital.

## Innovative Residential Development

### 120 Unit Development Scenario #1 (30 acres)



**Total Development Area:** 30 acres

#### Lot Sizes:

- Single family (large) – 9,000sf
- Single family (small) – 5,000sf
- Two-family- 9,000sf
- Three-four family – 13,000sf
- 20-unit multi-family – ~30,000sf

#### Housing Mix (# of units &type):

- 30 single family
- 16 single family cottage
- 16 two-family
- 28 three-four family
- 30 six-twelve unit multi-family
- Mix of rental and for sale units

**Overall density:** 7.0 units per acre

#### Affordability Requirements:

- 10 low income (multi-family)
- 30 moderate income units (mix of single and multi)

## Conventional Residential Development

### 120 Unit Development Scenario #2 (60 acres)



**Total Development Area:** 60 acres

#### Lot Sizes:

- Single and two-family units - 15,000sf
- Three-four family units – 17,500-20,000sf
- Multi-family (max. 8 units/structure)- 22,500-30,000sf

#### Housing Mix (# of units &type):

- 80 single family
- 22 two-family
- 12 three-four family
- 1x6-unit multi-family
- Mix of rental and for sale units

**Overall density:** 2.7 units per acre

#### Affordability Requirements:

- 12 Low-Income units (multi-family)
- 18 Moderate-Income units

Figure 4.1: Mock development scenario attributes that may influence Social Capital.

Based on a review of the key attributes of each of the development scenarios, the majority of respondents recognized that Scenario #1 contained a greater diversity of housing types and densities that could lead to the potential for more social interactions between a greater demographic mix of residents. Similarly, the increased number of affordable units mixed in with market rate units in scenario #1, create the potential for increased social interaction among more diverse populations. Participants also noted that Scenario #1 has a higher density ratio centered on park space and community gardens which offers more opportunities for social interaction. Scenario #2 creates less of a variety of housing types and affordability, and has a lesser density ratio. Scenario 2 characterizes a typical suburban neighborhood development with larger setbacks, cul de sacs, and less public green space – elements that can contribute to reduced social interaction among residents.



Local residents in Devens expressed concerns with the potential for lack of privacy in both scenarios. Such issues would need to be addressed in the design and layout of any future developments. The current DEC Development Rules and Regulations contain specific building setback and landscaping requirements that aid in creating a sense of privacy without disconnecting residents.

Workshop participants were also asked to determine which mock development scenario provided for better mental wellness options (Figure 4.2).

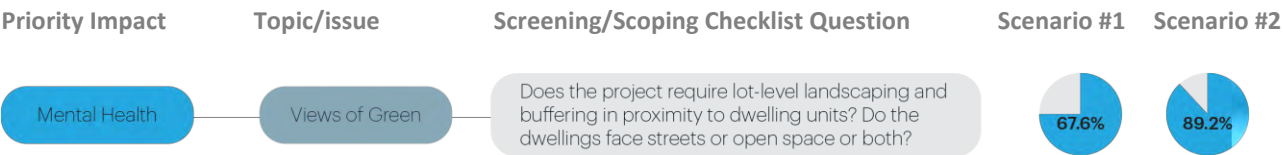


Figure 4.2: Checklist results: Mental health.

While more residential units in Scenario #1 fronted on or were closer to active open/park space, the majority of workshop participants felt that scenario #2 provided more views of green space and natural vegetation as the majority of units would abut existing natural forested areas.

Studies have shown that providing views of natural areas can contribute to mental health benefits (Kaplan 1995) and proximity and access to active open spaces can encourage more community interaction and help improve both social interactions (Talen 2000). In fact, views of landscaping can generate health benefits for all types of land uses. Figure 4.3 shows the proximity of the Grant Road residential area to active and passive recreational areas and open spaces in and around Devens.

## Map 3: Proximity to Public Recreation

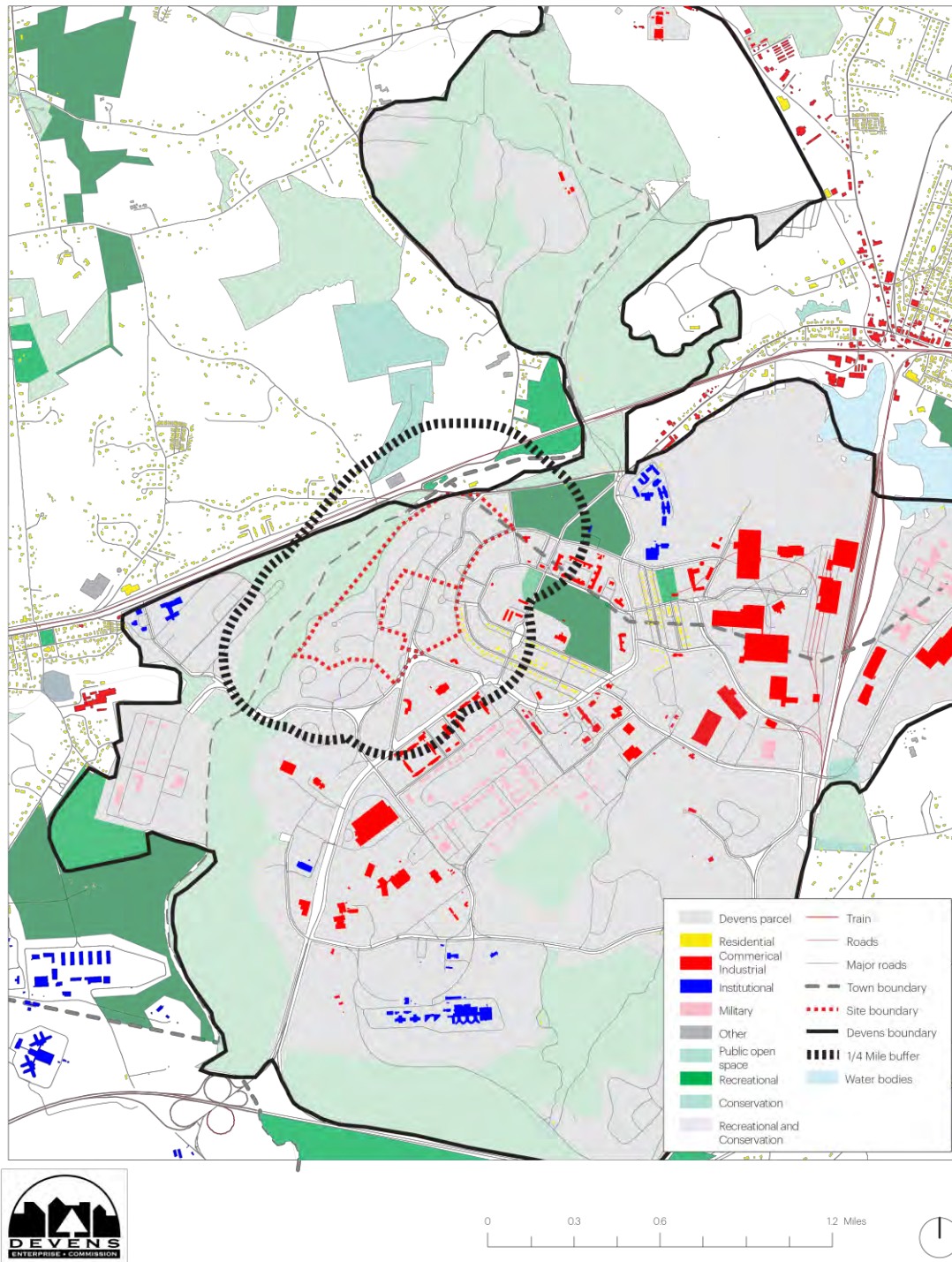


Figure 4.3: Proximity to public recreation and open space.

## 4.2 Access to Healthy Foods

Research studies link food insecurities with higher risk of diabetes, mental illness, and chronic illness such as hypertension and various cardiovascular risk factors (Seligman, Laraia, and Kushel 2010). The built environment, in relationship with accessing food, can influence diet quality, body weight, and other health outcomes (Gibson 2011). Although supporting evidence has shown the proximity to neighborhood supermarkets is linked to higher consumption of fruits and vegetables and higher overall diet quality, some investigation has shown that this does not apply to particularly those who shop by car (Aggarwal et al., 2014; Black, Moon, Baird, 2014; Cannuscio et al., 2013). Because of the limited public transportation options, rural suburban residents regardless of age, race and income heavily rely on automobile for travel needs.

In 2010 Massachusetts ranked third lowest in supermarket density in the nation. (The Food Trust 2010) Supermarkets in rural and suburban areas are likely to be located along major highways. Because of the relatively low densities of development in rural and suburban neighborhoods, there are fewer supermarkets resulting in greater geographic disparities in accessing healthy foods than their urban counterparts; with residents having to spend more on travel time with higher fuel expenses where public transit is not a feasible mode of alternative transportation. This is contrary to recent studies which show access to supermarkets can be linked to dietary behaviors rather than the availability of food sources within the neighborhood (Gustafon et al., 2011). A recent study shows residents will travel longer distance to purchase fruits and vegetable based on cost and selection of choice (Aggarwal et al., 2014). Therefore, socioeconomic factors and cultural preferences may also have an influence upon fresh food consumption based on low to high cost supermarkets.

Each of the mock development scenarios contained a number of key attributes that could influence access to healthy foods. Figure 4.4 depicts these attributes.

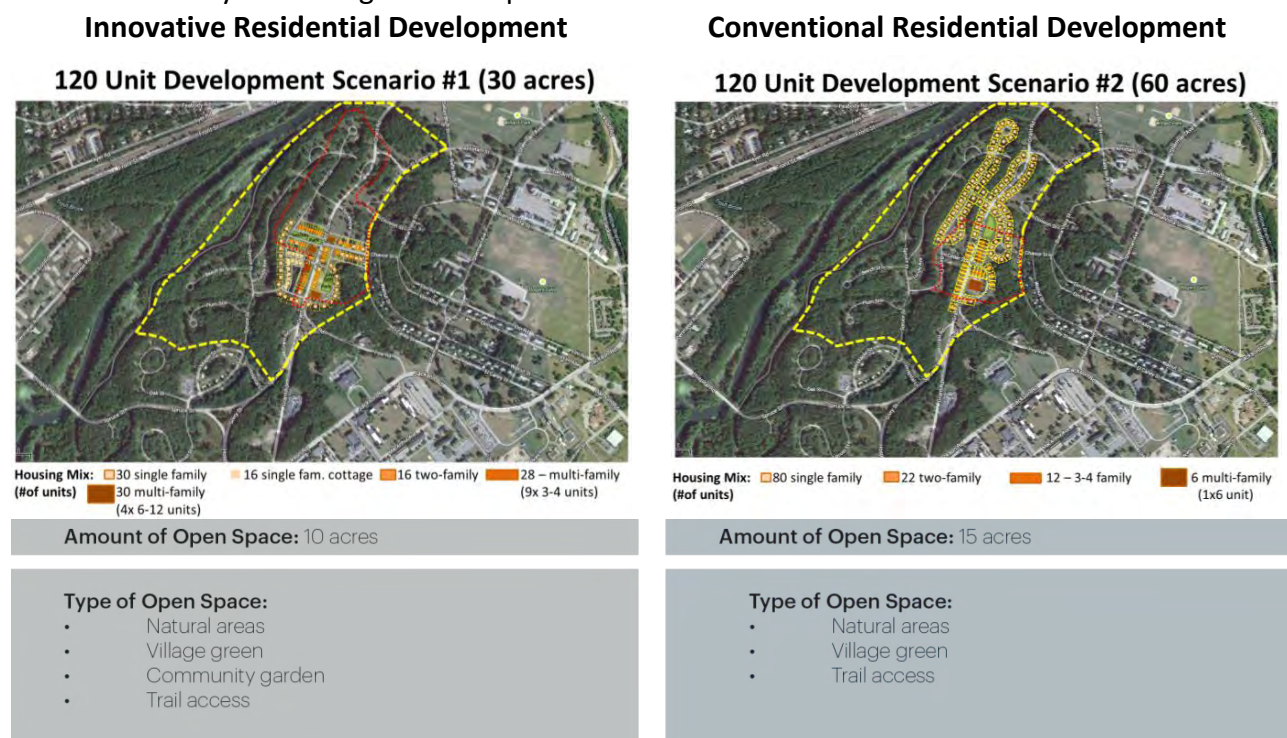


Figure 4.4: Mock development scenario attributes that may influence access to healthy foods.



### Workshop Findings:

There are currently two supermarkets within the host Communities of Ayer, Harvard, and Shirley. Based on interviews and public online sources the Ayer supermarket was rated poorly in terms of quality, variety, and affordability of fresh produce. A smaller ethnic Asian food market in Ayer has limited appeal. Seasonal farmers markets, farms and farm stands are available in the towns of Shirley, Ayer, Harvard and Groton in proximity to the Grant Road Redevelopment area; yet beyond walking distance. Figure 4.6 shows the proximity of farmers markets and supermarkets in relation to the Grant Road development area.

Community gardens are also known to have a wide range of health benefits including supplementary fresh food consumption and providing places for social gathering. Community members were interested in learning about different harvesting practices and programs to increase their knowledge of gardening. Workshop participants were asked to determine which mock development scenario provided for better healthy food options.

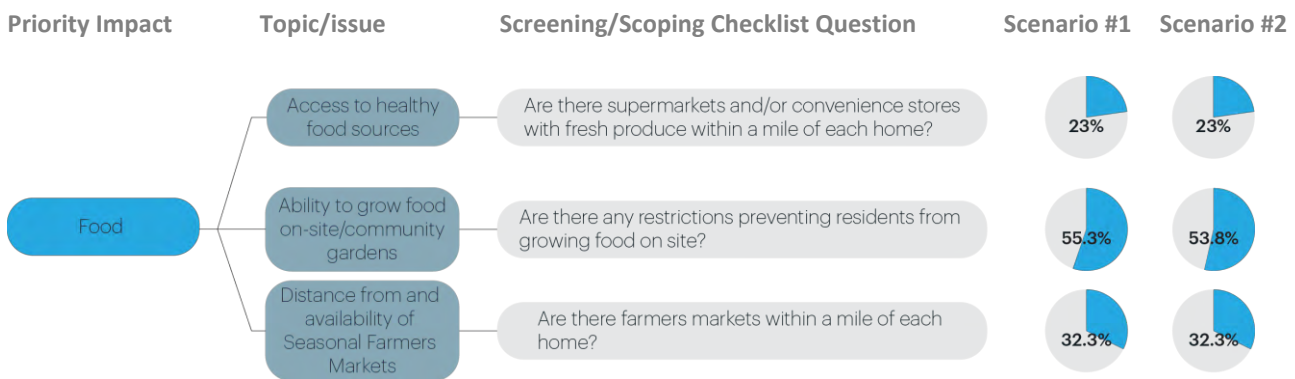


Figure 4.5: Checklist results: Food.

Workshop participants recognized that neither of the scenarios provided good access to healthy foods. Although there are farmers markets in all the surrounding towns, none are within walking distance.

Both development scenarios encourage access to active open space however workshop participants recognized that Scenario #1 actually provided community garden programs and activities which promote social interaction as well as better access to healthy foods. Real estate studies have shown that community gardens are also linked to increased property values over the long term (Voicu & Been, 2008).



Figure 4.6: Community Garden impacts on property values (source: Green Roofs for Healthy Cities, 2014)

## Map 6: Supermarket / Farmers Market Accessibility

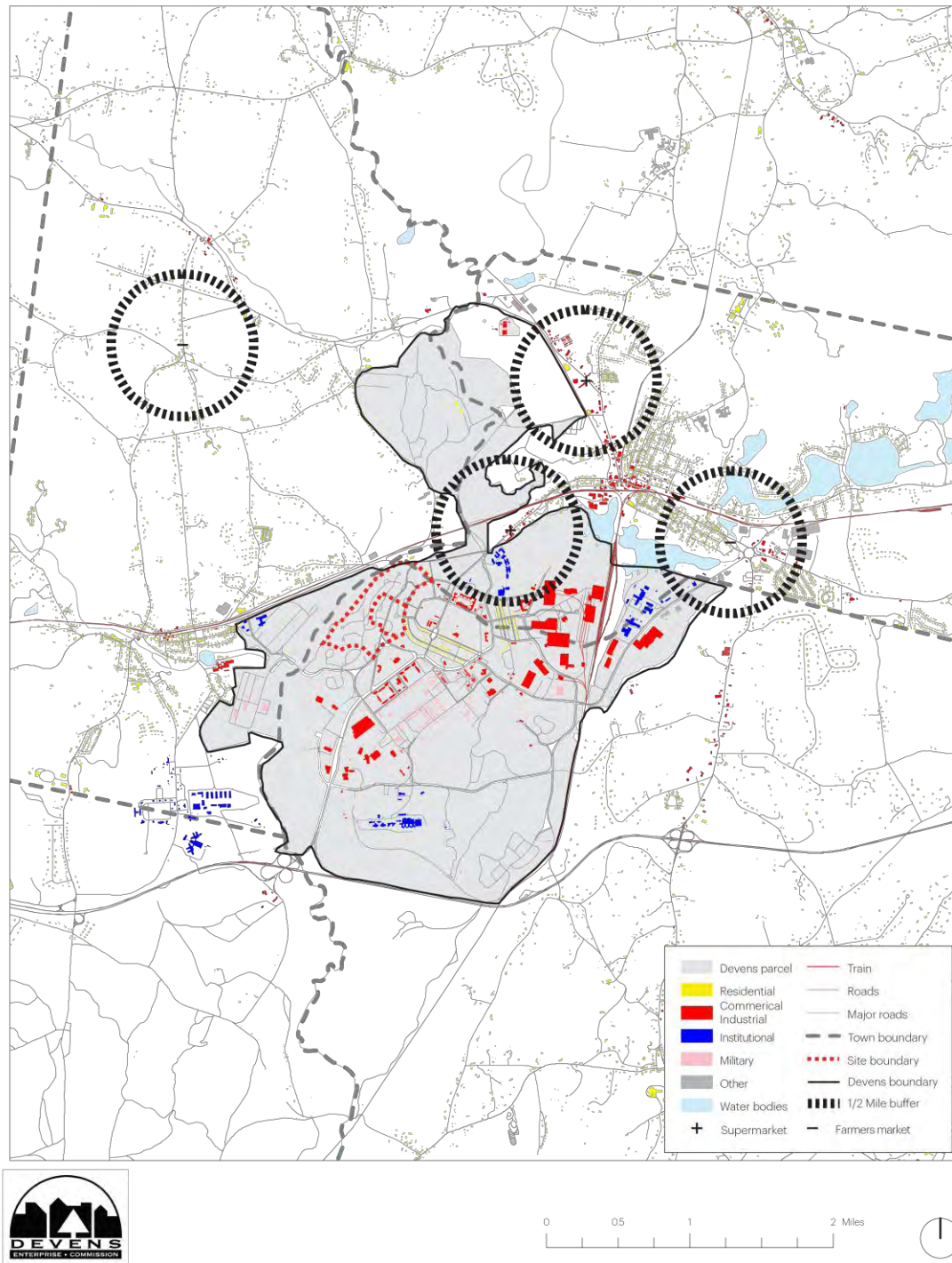


Figure 4.7: Devens proximity to supermarket & famers markets.

# 4.3 Environmental Health

## 4.3.1 Water and air pollution

Environmental pollution is a well-documented cause of health impacts. Because urban sprawl is associated with increased automobile use, it may contribute to air and water pollution resulting in environmental impacts such as run-off from roadways, parking lots, and other factors (Stone, 2008; Tu, Xia, Clarke, and Frie 2007). Increasing impervious surfaces such as roadways, driveways and buildings disrupt the land’s natural filtering capacity and can result in increased runoff of pollutants degrading water quality. Sprawling suburban development creates the need for longer roads and larger lots that require longer driveways and more impervious surfaces. Suburban development also accounts for half of all household greenhouse-gas emission although the suburbs contain less than half the U.S. population (Jones and Kammen 2014). Massachusetts is listed by the EPA as being in a severe nonattainment area for air quality. In addition, a typical residential lawn usually lacks plant diversity and is considered to be compacted due to construction resulting in higher risk of contaminate runoff from pesticides, and fertilizers.

Street trees also provide numerous environmental benefits, including stormwater management, reduced urban heat island, as well ecological benefits such as natural air filtration and wildlife habitat. Recent research has linked the absence of street trees to an increased incidence of low birth weight babies (Donovan et al., 2011). This further strengthens the case for incorporating more green infrastructure elements into existing and future residential housing developments. Each of the mock development scenarios contained a number of key attributes that could influence outdoor air quality:

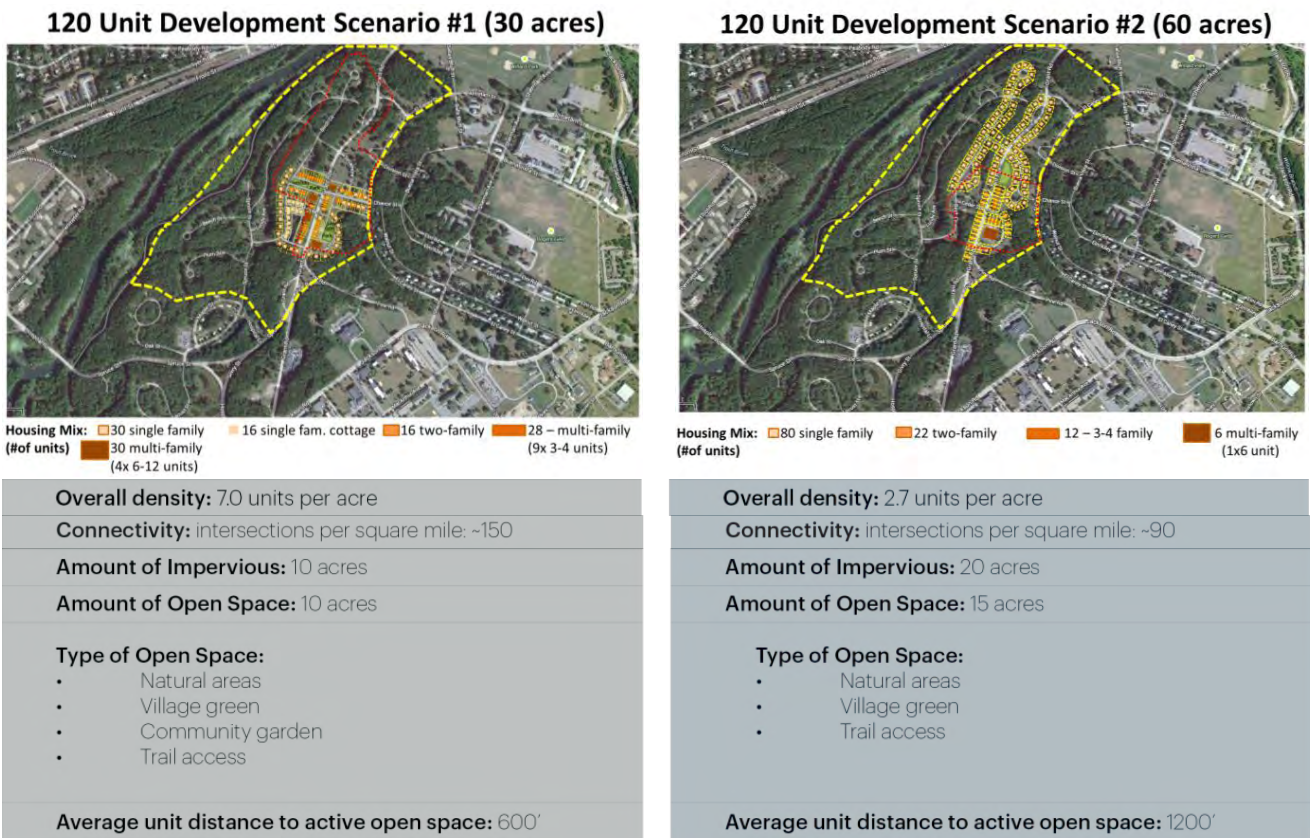


Figure 4.8: Mock development scenario attributes that may influence outdoor air quality.



Workshop participants were asked to determine which mock development scenario they felt provided for better outdoor air quality options:

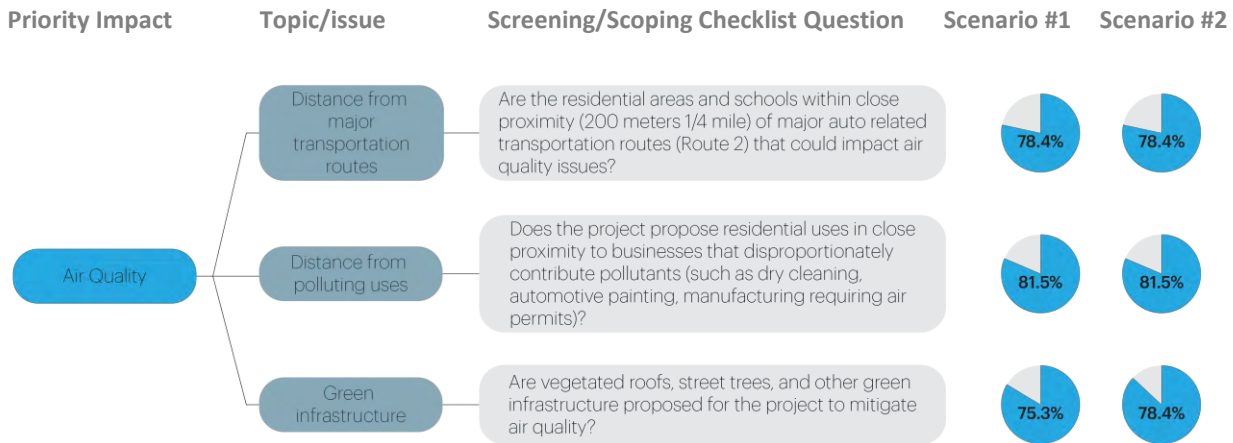


Figure 4.9: Checklist results: Air Quality.

As both scenarios are located in the same area, proximity to existing transportation and services was fairly similar. However, participants found that all of the proposed lots within Scenario #1 were within walking/biking distance (1/2 mile) of a number of local services such as a bank, school, daycare and convenience store, while a small percentage of the proposed lots in Scenario #2 were outside the 1/2 mile radius, making driving more likely for those lots and adding to increased air pollution. Scenario #2 would also require more removal of existing vegetation that would further impact localized air quality as opposed to Scenario #1. Green infrastructure elements were required to be integrated into both development scenarios, so both scenarios scored very similar for their green infrastructure attributes.

Workshop participants were also asked to determine which mock development scenario they felt provided for improved water quality and quantity:

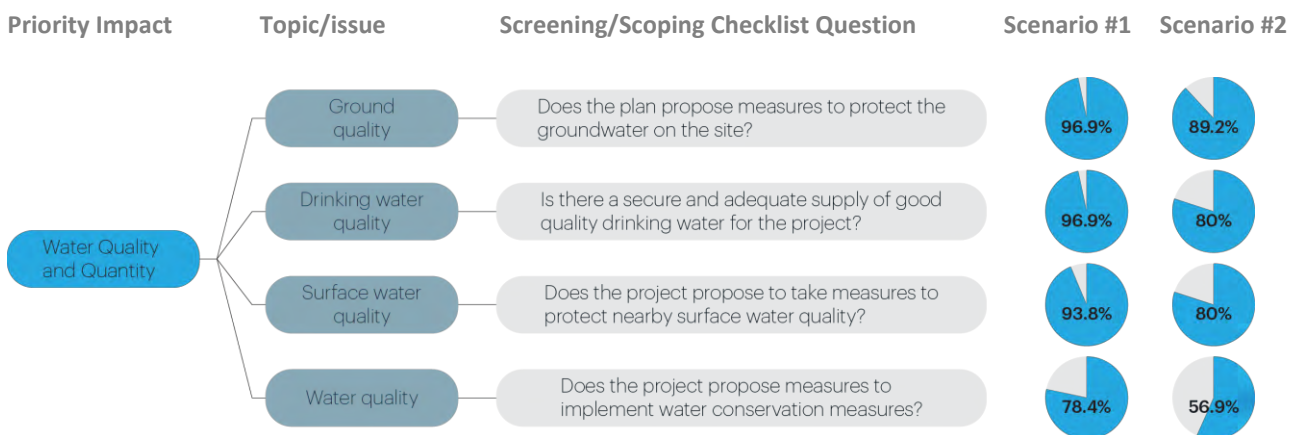


Figure 4.10: Checklist results: Water Quality and Quantity.



Scenario #1 scored higher than Scenario #2 for both water quality and quantity due to the more efficient use of water inside buildings. Scenario #1 also scored higher because it has a smaller development footprint – same number of units but smaller lots (less manicured lawns to maintain and less fertilizer and pesticide use) and less impervious surface and more direct infiltration of runoff to recharge groundwater.

4.3.2 Buildings

Buildings account for over 40% of the nation’s greenhouse gas emissions. As we spend a great deal of time inside buildings, they can have a tremendous impact on our health. Building construction methods that improve overall efficiency can result in less energy usage and greater economic benefits as well as environmental benefits with reduced greenhouse gas emissions. More efficient buildings have also been found to be more strong and resilient. In the face of a changing climate with increased frequency of intense storms, this is an extremely important consideration. Indoor air quality also directly impacts environmental health. The use of materials and finishes that do not off-gas helps reduce greenhouse gas emissions while providing cleaner indoor air for us to breathe. Water use in buildings also contributes to greenhouse gas emissions as the extraction, treatment and distribution is extremely energy intensive. As fresh water resources become scarcer, more efficient use of water resources in our buildings is critical.

Each of the mock development scenarios also contained key attributes that could influence building energy, water and indoor air quality (see figure 4.11). Workshop participants were also asked to determine which mock development scenario provided for better environmental health options. Figure 4.10 depicts the priority impact area, what topic/issue it relates to, and the corresponding questions from the screening/scoping checklist, along with the percentage of positive responses from workshop attendees for either mock development scenario.

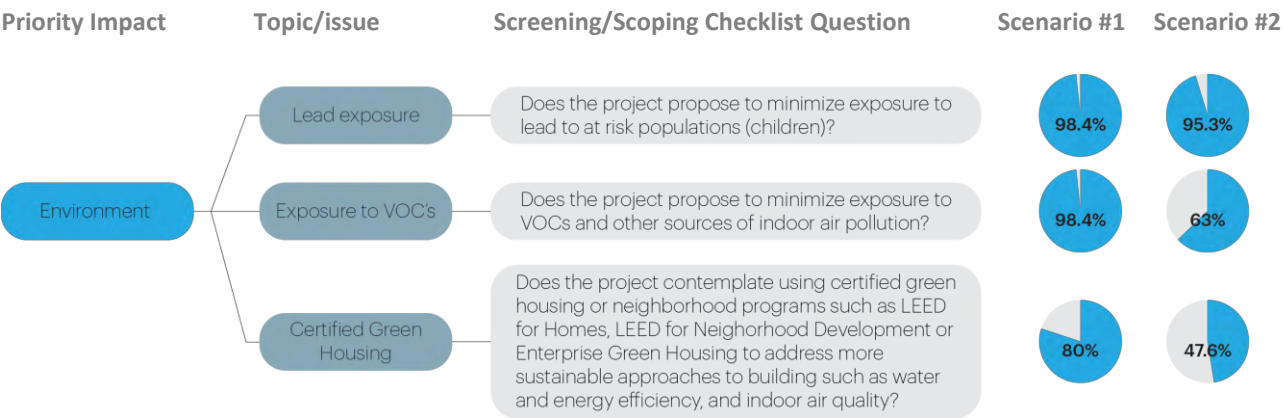


Figure 4.11: Checklist results: Environment

## Innovative Residential Development

### 120 Unit Development Scenario #1 (30 acres)



**Housing Mix:** 30 single family, 16 single fam. cottage, 16 two-family, 28 – multi-family (9x 3-4 units), 30 multi-family (4x 6-12 units)

#### Building Design Standards:

- HERS Rating of 60 or less
- EPA Water Sense Plumbing Fixtures
- Low-No VOC paints, sealants and finishes

**Amount of Open Space:** 10 acres

#### Type of Open Space:

- Natural areas
- Village green
- Community garden
- Trail access

**Average unit distance to active open space:** 600'

#### Accessibility:

- Existing streets and new streets and roads
- Sidewalks on both sides of street
- Maximum block length – 800'
- Bike lanes on Grant, all other streets 25MPH or less

**Connectivity:** intersections per square mile: ~150

## Conventional Residential Development

### 120 Unit Development Scenario #2 (60 acres)



**Housing Mix:** 80 single family, 22 two-family, 12 – 3-4 family, 6 multi-family (1x6 unit)

#### Building Design Standards:

- MA base building Code (HERS ~90)
- MA base Plumbing Code
- No indoor air quality standards

**Amount of Open Space:** 15 acres

#### Type of Open Space:

- Natural areas
- Village green
- Trail access

**Average unit distance to active open space:** 1200'

#### Accessibility:

- Utilizing existing street network
- Sidewalks on one side of street
- Maximum block length – 1700'

**Connectivity:** intersections per square mile: ~90

Figure 4.12: Mock development scenario attributes that may influence energy, water and indoor air quality.

Scenario#1 and the DEC's Innovative Residential Development Regulations require developers to go beyond base building and plumbing codes and require more energy and water efficient building construction as well as the use of low-no Volatile Organic Compounds (VOC's) finishes in homes. These requirements resulted in Scenario #1 scoring much higher than Scenario #2 in terms of overall environmental health and quality. Scenario #1 also conserves twice amount of green space reducing wildlife habitat fragmentation compared to Scenario #2.

### 4.3.3 Transportation & Accessibility

Access to transit has an indirect relationship with health. Many residents in rural and suburban communities may devote significant time and money on transportation to get to work, stores, healthcare services, community resources and other services. It is acknowledged that improving the walkability of communities and providing better access to transit can have beneficial health outcomes such as increased physical activity, reduced pollution, and reduced fatalities and injuries due to driving. This is especially important for those who don't drive, such as the elderly, young and those with special needs. There is evidence of health benefits for men who commute to work by public transportation - are 44% less likely to be overweight (Zheng 2008). Low-income households are more impacted by travel cost burdens in accessing jobs and services resulting in deferring other household expenses in order to be able to travel by car. A study shows transportation costs for low-income households can be reduced by implementing walkable, transit oriented neighborhoods (Bell and Cohen 2009).

Each of the mock development scenarios contained a number of key attributes that could influence transportation choices:

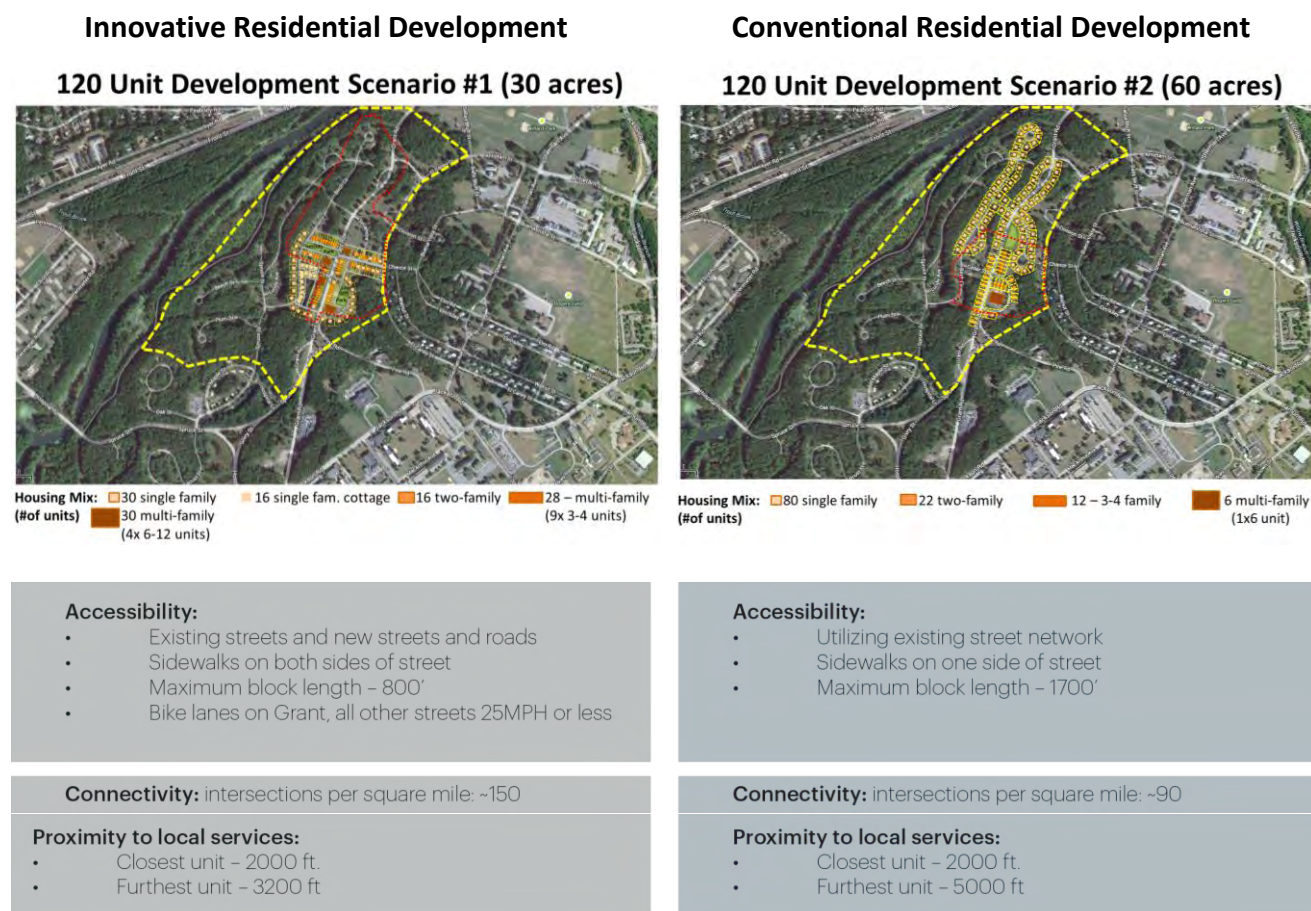


Figure 4.13: Mock development scenario attributes that may influence transportation.



### Workshop Findings:

Workshop participants were also asked to determine which mock development scenario provided for better transportation options:

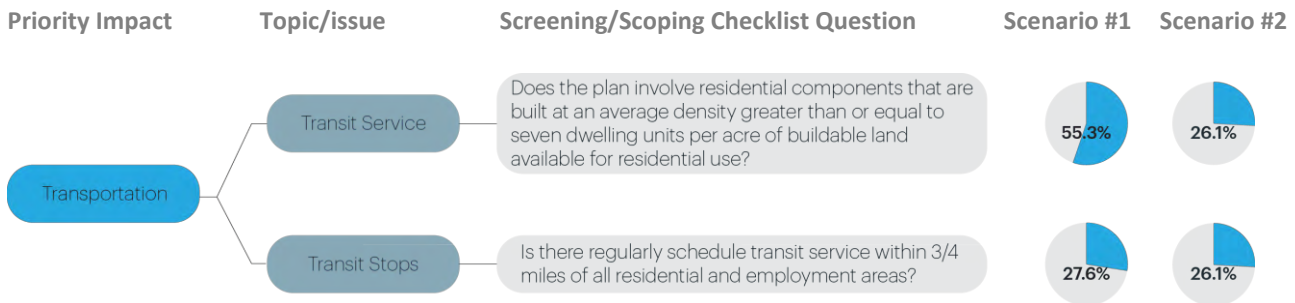


Figure 4.14: Checklist results: Transportation.

Residents in general expressed the need for public transit in Devens to assist in accessing goods and services from the core communities of Harvard, Shirley, and Ayer and those beyond. Research has shown public transit mobility can potentially provide financial and physical health benefits in suburban rural communities through the reduction of auto dependent lifestyle. In Massachusetts, emerging suburbs such as Devens account for 31% of vehicles registered (Reardon 2010). Ayer, which has the highest walk to commuter rail ridership along Fitchburg Commuter Rail line, showed daily 50-75 miles Vehicle Miles Travelled (VMT) and the Harvard, Shirley, and Devens daily VMT rate was an average of 75-100 miles (Reardon 2010). Transportation costs for those living in Devens and its surrounding communities cost an average of \$ 2,073 per household more for annual expenditures on transportation compared to the Boston region (Reardon 2010). Thus lower-income households residing in Devens could financially benefit from transit services especially during economic downturns. It is reasonable to assume that the expected population increase in the redevelopment of Grant Road Residential District would entail greater demand for public transit services in the future. Shuttle transit services could accommodate the needs of Devens residents and workers arriving and departing from commuter rail stops in the adjacent towns of Shirley and Ayer.

Workshop participants were also asked to determine which mock development scenario provided for better access to service options:

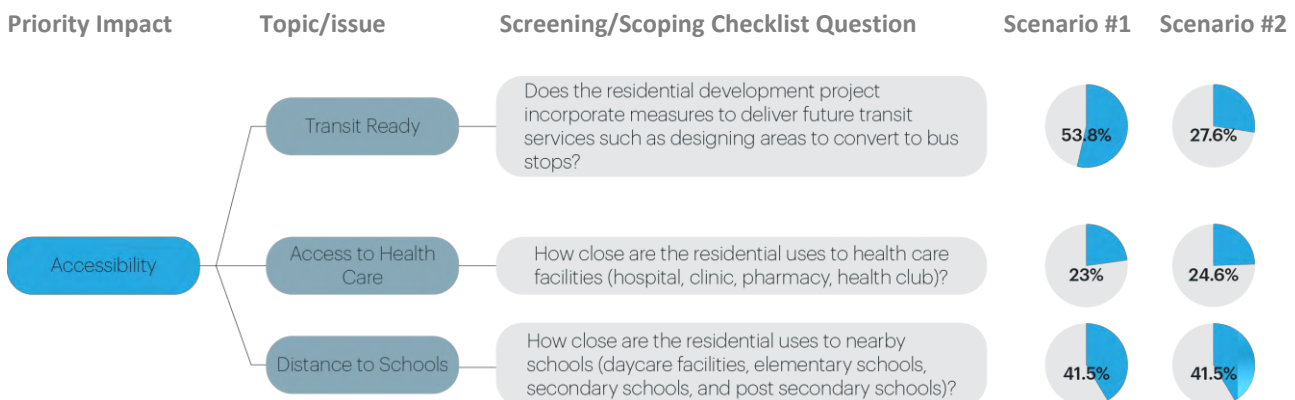


Figure 4.15: Checklist results: Accessibility



Overall, scenario#1 provided for a higher density of development, which would be easier to serve with future transit. The Innovative Residential Development regulations in Scenario #1 allow for cluster development and different street types that make the overall development more accessible. Scenario #1 also includes a number of attributes such as shorter block lengths, sidewalks and bikes lanes that further help facilitate alternative transportation choices other than the automobile.

Workshop participants were also asked to determine which mock development scenario provided for better physical activity options:

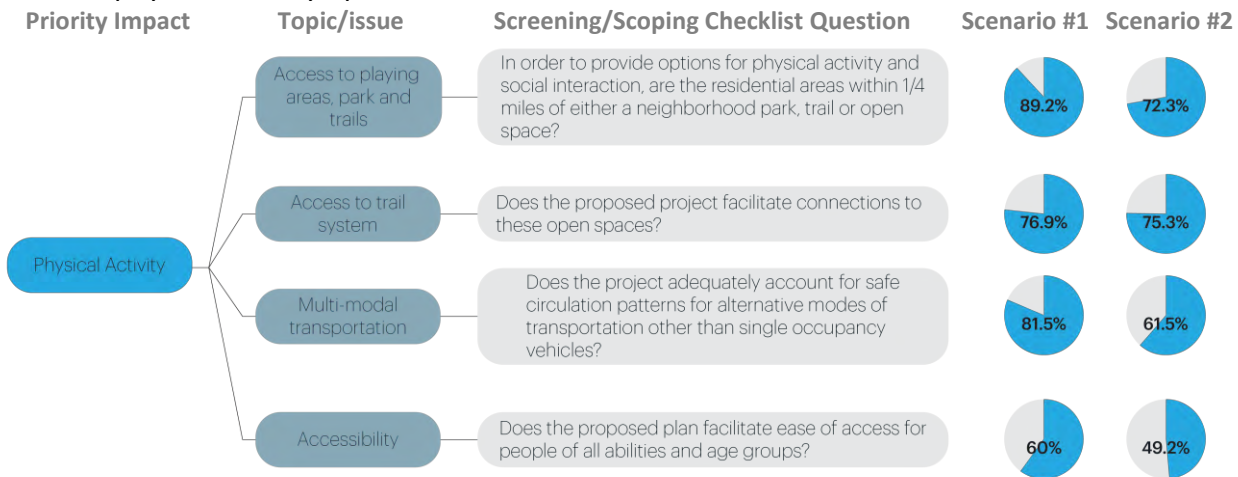


Figure 4.16: Checklist results: Physical Activity

Workshop participants found that Scenario #1 provided much more accessible active public open spaces that would help facilitate more social and physical activity. In addition, the proposed street layout in Scenario #1 (grid pattern vs. curvilinear streets with cul-de-sacs) was found to improve safety, accessibility and connectivity. Studies have shown that when residents feel safer, they are more likely to venture outside, socialize and participate in physical activity (Woods et al., 2008).

Individuals and families of varying sizes, ages and abilities all have different needs that a more diverse housing stock can also help meet. More and more people (singles, as well as families) are choosing to live in smaller homes that are easier and cheaper to maintain and closer to their work and/or amenities such as parks, shopping, daycare, restaurants and other local services (Keely, van Ark, Levanon, and Burbank 2012). By including a mix of housing types and sizes that include universal design elements and more efficient building construction and operation methods, we can facilitate a wider array of choices and accommodate changing family demographics and a more diverse population within Devens as well as help support the ability of people to age in place.

Devens also contains a number of daycare facilities as well as educational facilities. The existing residential areas within Devens are within close proximity to a number of daycare and educational facilities. Figure 4.16 indicates the general location of these facilities (Shriver Job Corps, Parker Charter School, Ayer-Shirley Middle School, Evergreen Garden Preschool) along with a half-mile radius surrounding (typical walking/biking distance). The added walkability and connectivity elements of Scenario #1 would facilitate the design and construction of street networks that could better accommodate all forms of transportation, making walking or biking to nearby daycare services and/or schools more likely.

## Map 9: School Walkability

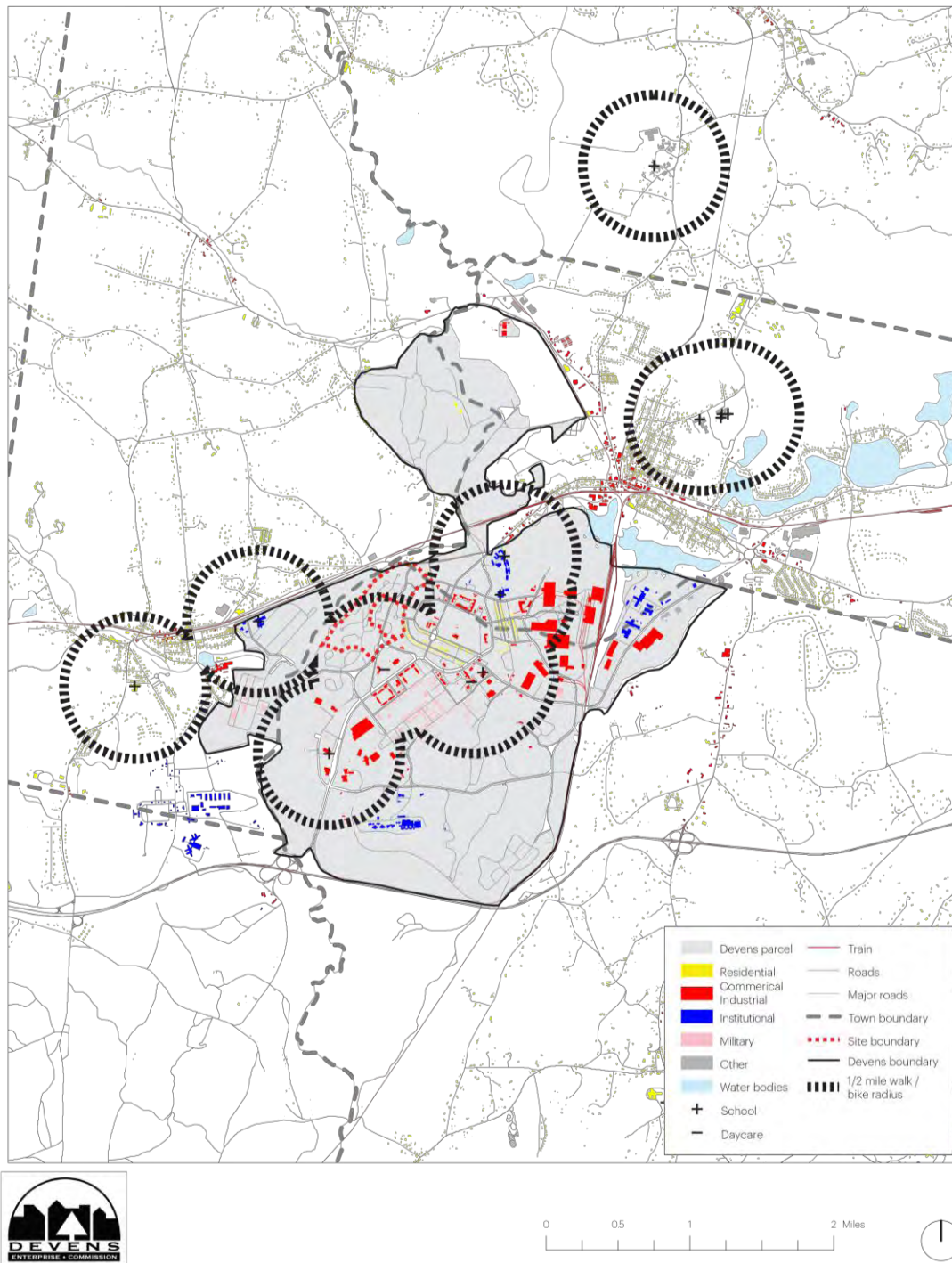


Figure 4.17: School Walkability.

## 4.4 Public Health and Safety

Excess and inappropriate speeds are responsible for a high proportion of the mortality and morbidity that result from road crashes. Although the rate of pedestrian fatalities due to traffic injuries has declined nationally, it still poses serious public health issues. Each year, motor vehicle crashes account for 76,000 pedestrian crash injuries and 4,743 fatalities in the United States (National Highway Traffic Safety Administration 2012). Pedestrians have been largely ignored or given minimal consideration in the design of much of nation's roadway system making them vulnerable to unintentional injuries and death. High speeds are especially dangerous for pedestrians and cyclists, who are disproportionately threatened by even small increases in traffic speed. Poor road design, lack of enforcement, and speed limits that are set too high can encourage high speeds and the potential for negative health impacts.

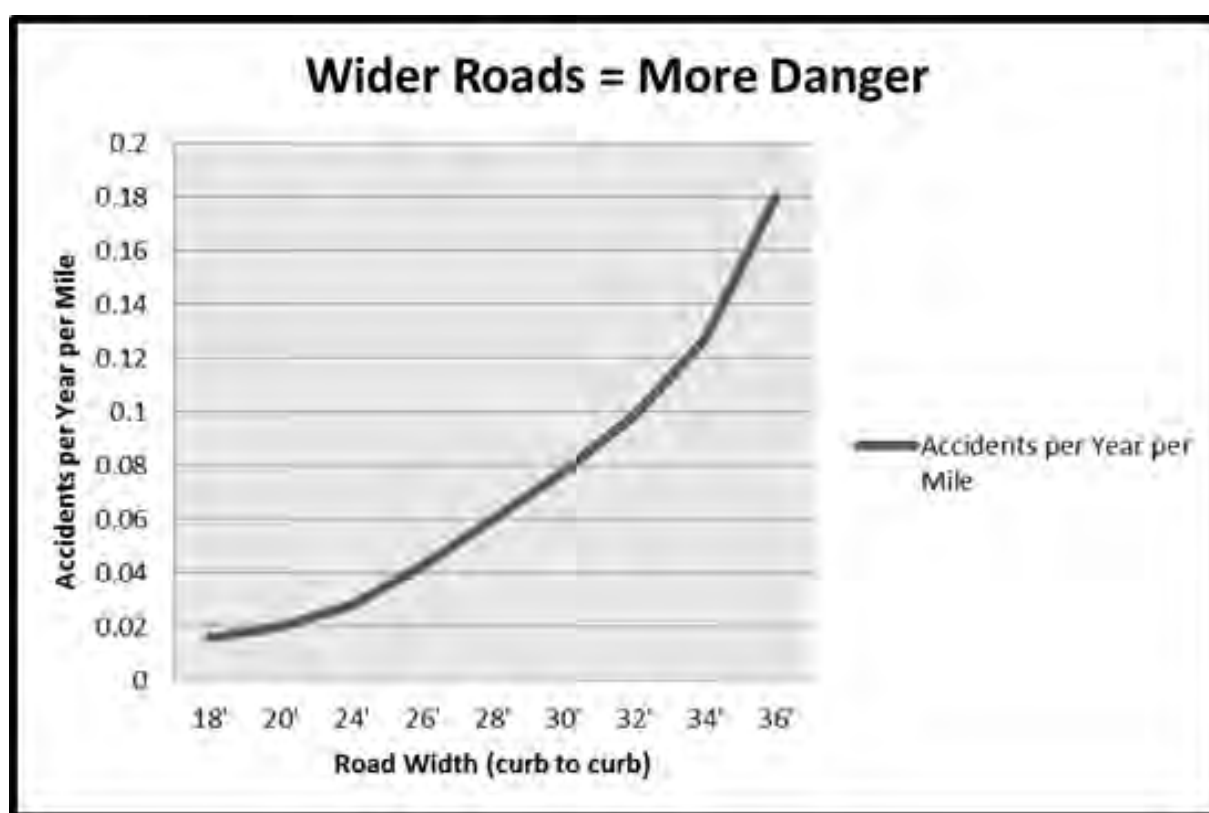


Figure 4.18: Relationship between road width and number of vehicle accidents (CNU, 2009).

Design of the built environment can be highly influential in promoting physical activity through the use of alternative modes of transportation (i.e., biking, walking) and mitigating traffic accidents. Physically redesigning roads with traffic calming measures can produce physical and visual cues that will naturally slow down drivers and reduce injuries and fatalities (Bellefleur and Gagnon 2011). Roads that do not accommodate pedestrians and modes of transportation often result in more limited opportunities for physical activity outdoors and can lead to additional negative impacts on air quality from tailpipe emissions. These factors can also impact the rates of asthma and cardiovascular disease. Improving pedestrian infrastructure such as bike lanes, trails, and sidewalks produces

multiple benefits for health through decreased number of vehicles on the roads (and fewer emissions) and increased opportunities for recreation and fitness in a better quality environment.

### **Workshop Findings:**

Each of the mock development scenarios contained key attributes that could influence public health and safety:



Figure 4.19: Mock development scenario attributes that may influence public health and safety.

In Devens, residents were concerned about high-speed traffic on Grant Road, which runs through an area that is currently undeveloped and used as a major cut-through road by the surrounding communities. Redevelopment of the Grant Road neighborhood will therefore pose safety issues with biking and walking. Any redevelopment of this area will need to consider “complete street” policies that incorporate context-sensitive design considerations, including traffic calming measures. A complete streets policy adopted in Devens can help ensure future road projects take into account the needs of all users, of all ages and abilities, particularly those of pedestrians and bicyclists.

Redevelopment could implement effective traffic calming measures to include single-lane roundabouts, sidewalks, exclusive pedestrians signal phasing, pedestrian refuge islands and the like. Because of the dispersal of a relatively small residential population throughout Devens, there have been no reported fatalities due to traffic accidents. Workshop participants determined the risk could be higher with the population increase in the Grant Road Residential area in the future unless appropriate safety and design measures are incorporated into any future developments.



## Map 12: Mock Housing Scenario 1 Street Layout

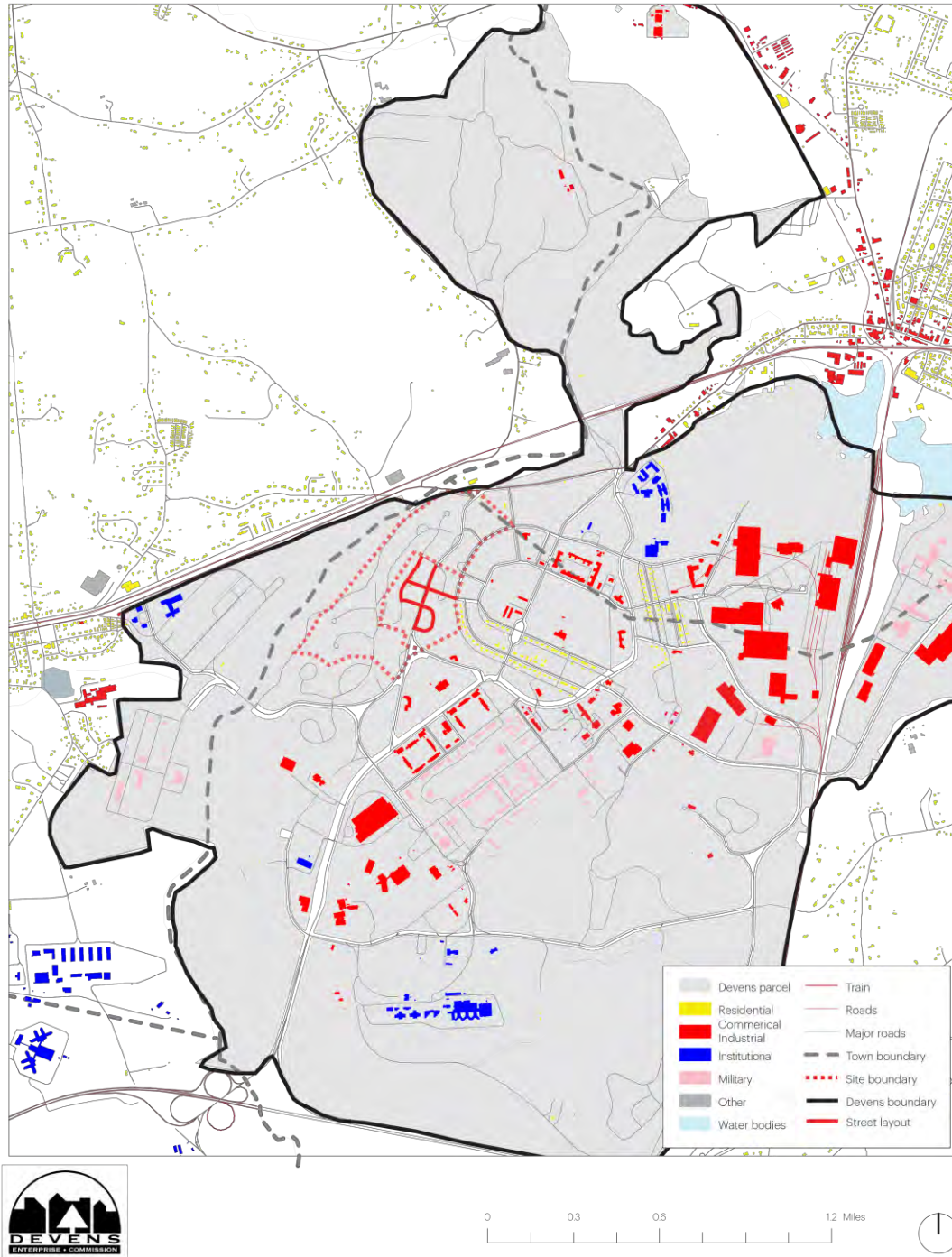


Figure 4.20: Scenario #1 IRD street layout in relation to surrounding street networks.

## Map 13: Mock Housing Scenario 2 Street Layout

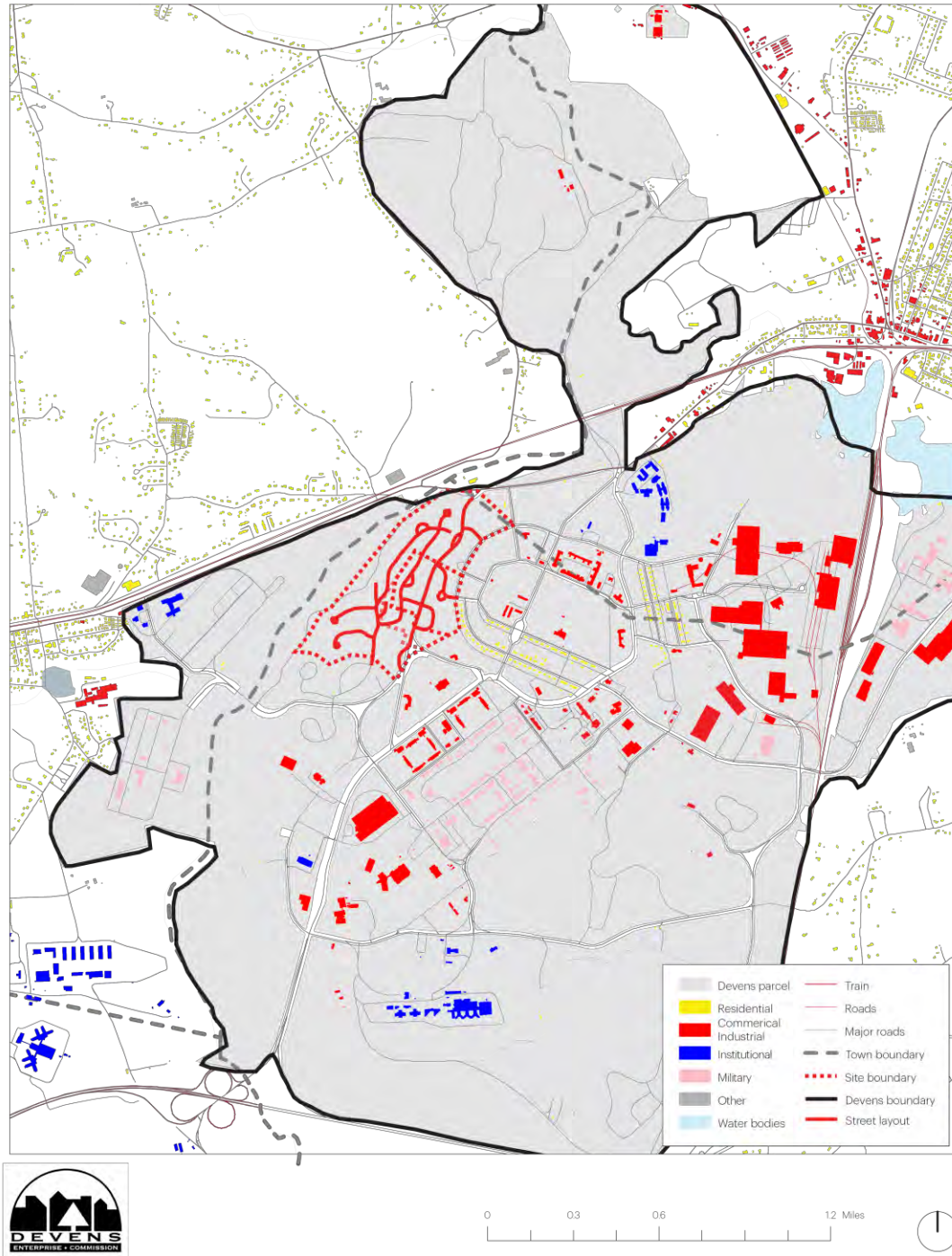


Figure 4.21: Scenario #2 Conventional street layout in relation to surrounding street networks.

Residents were also concerned with the connections between existing neighborhoods and the redevelopment of Grant Road. The deployment of additional street layouts and traffic calming measures to keep new residents from utilizing existing private alleys, such as El Caney, would benefit both new and current residents.

Workshop participants were asked to determine which mock development scenario provided for better safety options:

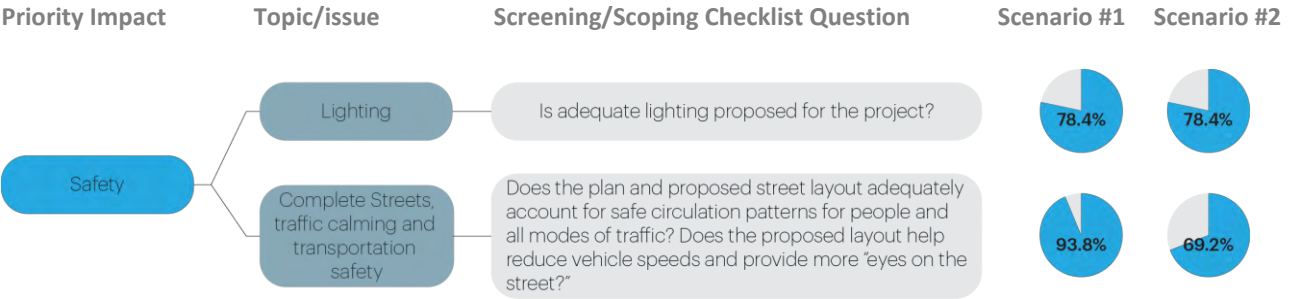


Figure 4.22: Checklist results: Safety.

Scenario #1 features a well-connected curvilinear street design that provides drivers, cyclists and pedestrians with multiple route options, thereby minimizing walking distances and avoiding traffic bottlenecks. This type of street layout also helps create more walkable neighborhoods and generates less traffic with all homes closer to nearby schools, services and stores. In addition, the increased density of housing in Scenario #1 can provide natural surveillance to monitor street activities and reduce the potential for crime. For these reasons, scenario #1 scored much higher than Scenario #2, which features a less connected street design that funnels drivers, cyclists and pedestrians onto single streets, creating more potential for conflicts and reducing safety for all users. In addition, the more compact form of development in Scenario #1 requires shorter infrastructure, which saves in servicing and energy costs.

As previously discussed, Devens also contains a number of daycare facilities as well as educational facilities (Shriver Job Corps, Parker Charter School, Ayer-Shirley Middle School, Evergreen Garden Preschool). As such, “safe routes to schools” is another important consideration. The added walkability and connectivity elements of Scenario #1 would facilitate the design and construction of safer street networks that would better accommodate all forms of transportation, making walking or biking to nearby daycare services and/or schools more likely.



## 5.0 Recommendations

Based on the research and literature reviews and combined with an in-depth analysis of the workshop results, this HIA process generated a number of key recommendations that should be taken into consideration as part of any redevelopment of the Grant Road Residential area.



Figure 5.0: HIA Recommendation development process.

By collecting data gathered from the community workshop and conducting scientific literature reviews, a number of programming, policy and regulatory recommendations were developed to help maximize healthy community design principles in any future redevelopment of the Grant Road residential area:

1. Promote the use of more compact development patterns;
2. Adopt a complete streets policy for universal accessibility and promote high levels of street connectivity to encourage walkability and avoid funneling new traffic into existing residential areas within Devens
3. Introduce traffic calming measures to reduce speeds in residential areas and improve safety. Effective traffic calming measures could include but not be limited to street trees, a single-lane roundabout at the Grant, Pine and Hospital intersection, bump-outs, chicanes, sidewalks, exclusive pedestrian-scale lighting, signal phasing and refuge islands;
4. Incorporate safe routes to schools to facilitate walking and biking, thereby reducing auto dependency, improving air quality and promoting physical activity;
5. Promote more energy and water efficient development techniques such as lower HERS rating requirements and higher water efficiency standards to further the sustainable development goal of the Devens Reuse Plan;
6. Incentivize and support community gardens to promote social interaction and better access to local and healthy foods;
7. Educate residents about raised planting beds and other safe management approaches to growing, harvesting and preparing their own food in Devens;
8. Research the feasibility of establishing transit service, taking into account projected employment and population growth in Devens;
9. Support existing food pantry serving healthy foods;

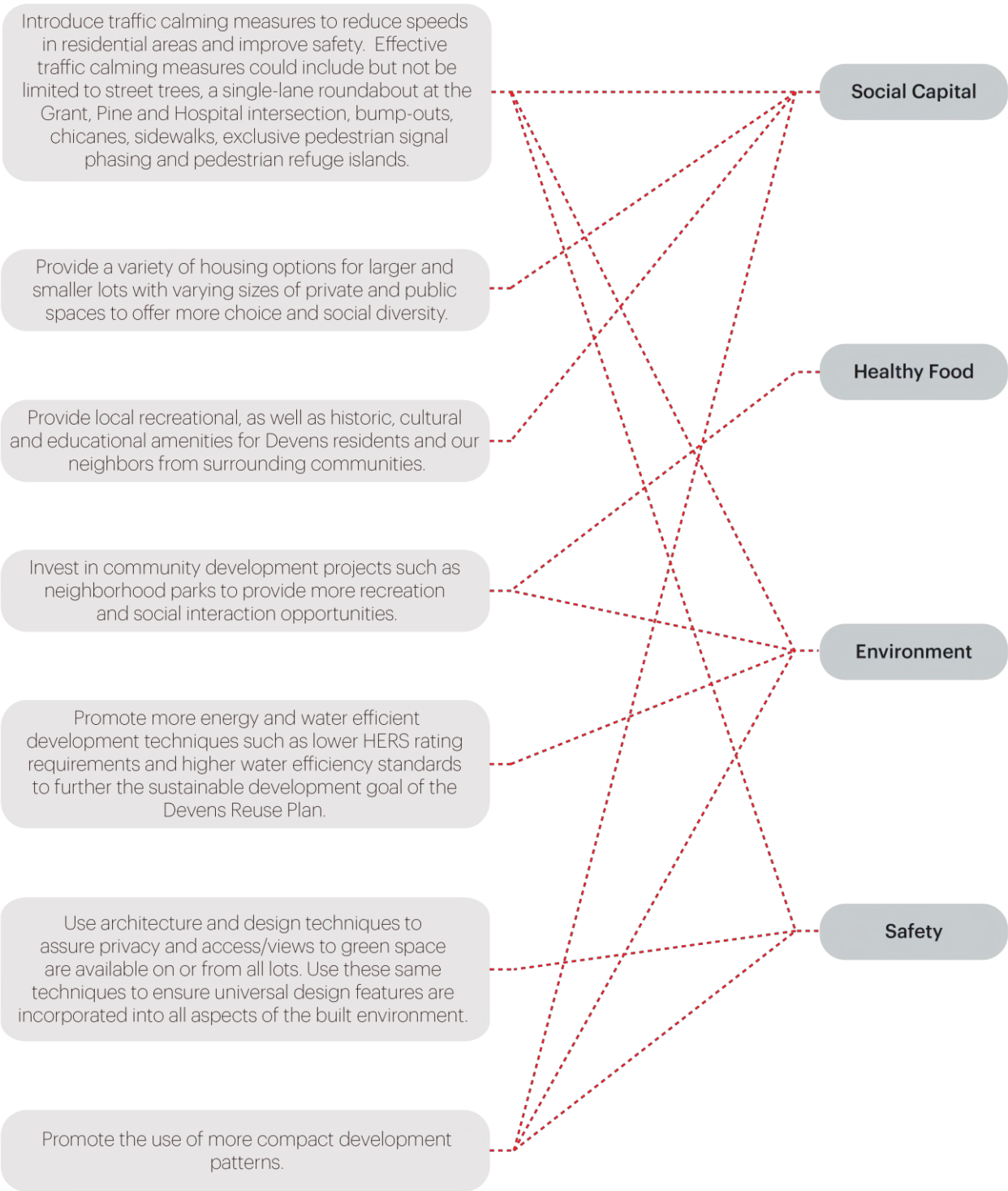
10. Provide nutrition and gardening classes for residents and businesses;
11. Provide local recreational, as well as historic, cultural and educational amenities for Devens residents and our neighbors from surrounding communities;
12. Organize community walks and other events that promote more social interaction and healthy lifestyles;
13. Provide a variety of housing options for larger and smaller lots with varying sizes of private and public spaces to offer more choice and social diversity;
14. Consider local transit stop locations to provide transportation options and promote the potential health benefits associated with transit usage;
15. Use architecture and design techniques to assure privacy and access/views to green space are available on or from all lots. Use these same techniques to ensure universal design features are incorporated into all aspects of the built environment;
16. Invest in community development projects such as neighborhood parks to provide more recreation and social interaction opportunities;
17. Develop an array of social programs to meet the needs of a diverse population (children to adults and special needs populations).

Many of these recommendations are interrelated with a number of the priority impact areas identified in this HIA. The following figures depict each of the recommendations and how they relate to and overlap with a number of the HIA priority impact areas. Understanding the multiple connections that each of these recommendations has to each of the priority impact areas is key to their successful implementation. The recommendations have also been grouped into design, policy, education and programming categories to aid in understanding at what stage or level these recommendations should be considered in any future development projects.

**Figure 5.1: Policy Recommendations:**

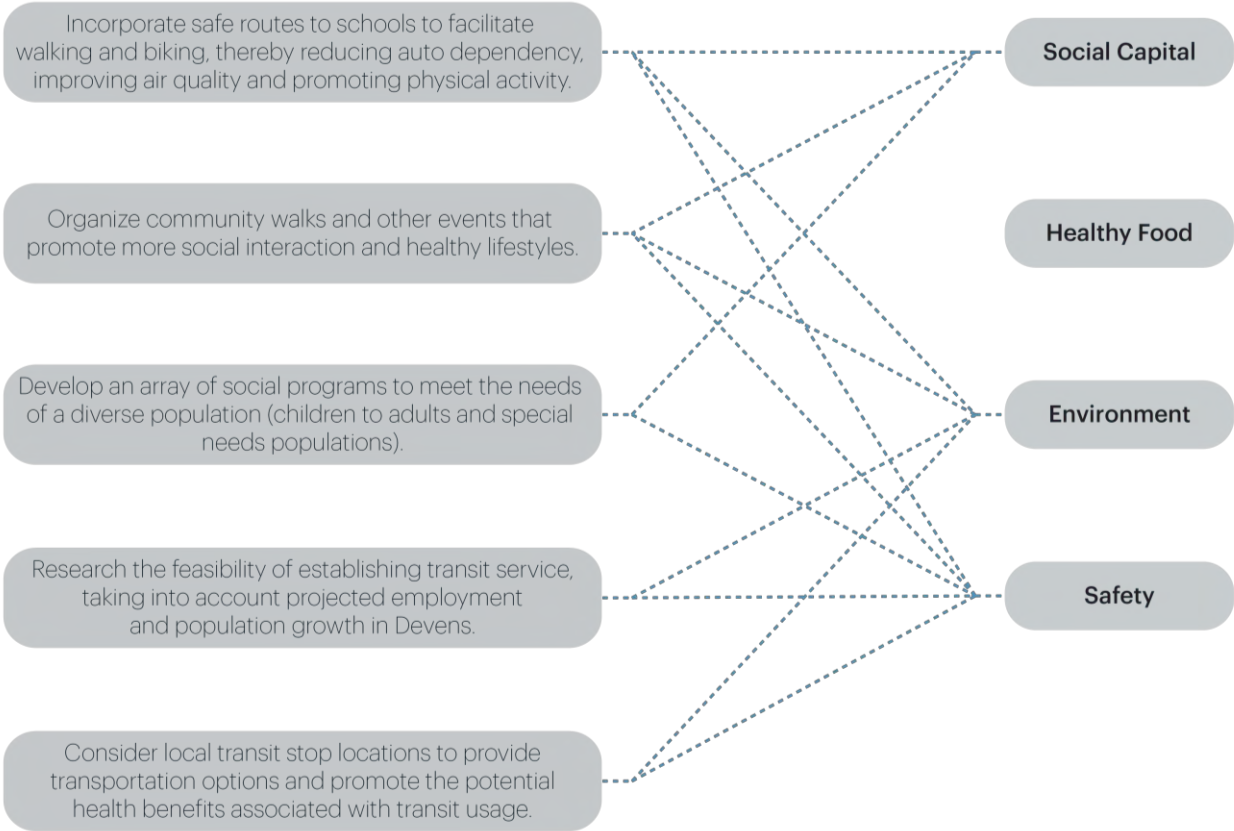


**Figure 5.2: Design Recommendations:**

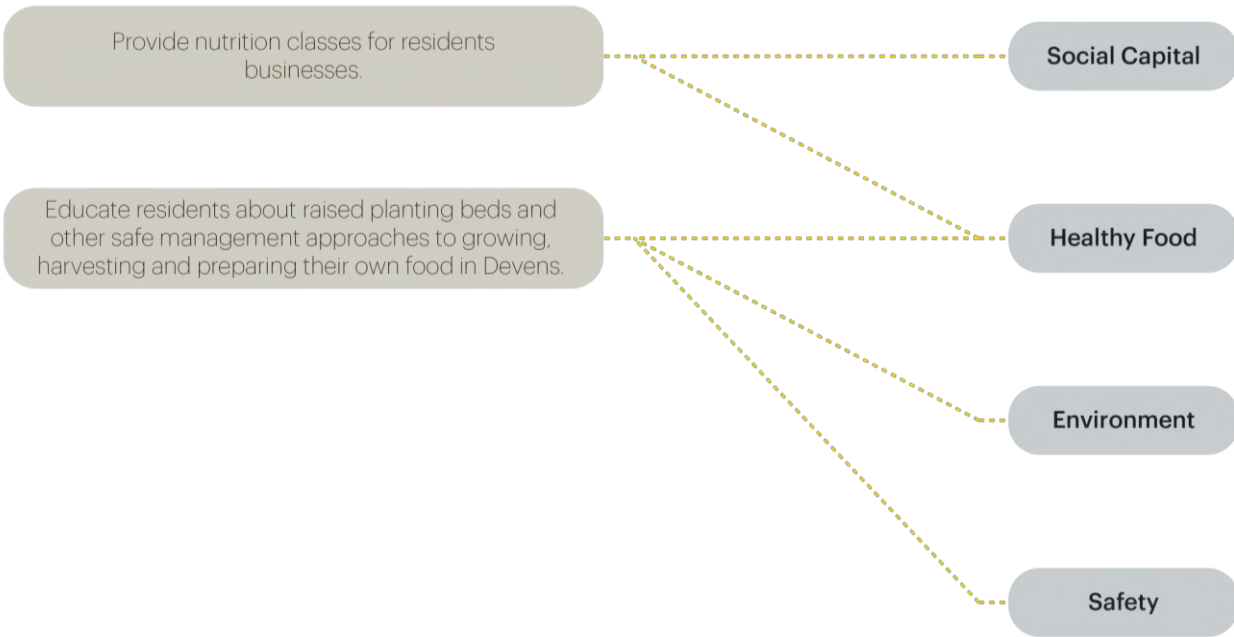




**Figure 5.3: Programming Recommendations:**



**Figure 5.4: Education Recommendations:**



Consideration of these recommendations will help strengthen the positive health impacts of future community design within the Grant Road housing area.

## 6.0 Conclusion

The DEC learned a great deal from conducting this Health Impact Assessment. The research linking the built environment and its associations with public health issues was eye-opening and makes a great case for designing communities that integrate the natural environment and consider people first. Linking the research to the findings from our workshop allows the DEC to make more informed decisions and help guide community design so that it produces more beneficial health outcomes. The interconnectedness of design decisions are well articulated in the recommendations section of this report.

One of the most important lessons of the Devens HIA is to instill health into the discussions of future redevelopment projects. This HIA was a valuable exercise for the entire community of Devens. Residents came together with local planning and public health professionals to discuss the existing conditions and common issues of concern as they relate to public health and quality of life in Devens. Participants were educated on the connections between neighborhood development, planning and public health issues, through the discussion of how regulations, policies and urban design choices can impact public health. In both redevelopment scenarios, workshop participants felt that public transportation and accessibility were important considerations for any future development in Devens. In addition residents expressed the need for future development to consider social engagement with residents through appropriate design and layout of public spaces, while preserving privacy.

While much of the research is not conclusive and there is no one-size fits all solution, it is certain that the places where we work, play and live directly and indirectly influence overall public health. Knowledge of the potential health impacts of certain development/design considerations might allow for their mitigation in future redevelopment initiatives in the Grant Road district and beyond. It is in everyone's best interest for planning and public health professionals to work with community leaders, developers and local residents to share knowledge and learn from each other and remind us that everyone can contribute to making a change for healthier living.

# References:

Aggarwal, A., Cook, A.J., Jiao, J., Seguin, R.A., Vernez Moudon, A., Hurvitz, P.M., Drewnowski A. (2014). "Access to Supermarkets and Fruit and Vegetable Consumption." *Am J Public Health*, 104(5):917-23.

Bell, J., and L. Cohen. (2009). "The Transportation Prescription: Bold New Ideas for Healthy." *Equitable Transportation Reform in America*. Convergence Partnership. Available at: <http://www.convergencepartnership.org>

Bellefleur, O. and Gagnon, F. (2011). "Urban Traffic Calming and Health: A Literature Review. Montréal: National Collaborating Centre for Healthy Public Policy." Available at: [http://www.ncchpp.ca/175/publications.ccnpps?id\\_article=686](http://www.ncchpp.ca/175/publications.ccnpps?id_article=686)

Black, C., Moon, G., Baird, J. (2014). "Dietary inequalities: What is the evidence for the effect of the neighborhood food environment?" *Health and Place*, 27:229-242.

Cannuscio, C.C., Tappe, K., Hillier, A., Buittenheim, A., Karpyn, A., Glanz, K. (2013). "Urban food environments and residents' shopping behaviors." *American Journal of Preventative Medicine*, 45(5):606-614.

Congress for New Urbanism Report: "Residential Street Typology and Injury Accident Frequency (1997); Swift, P., Painter, D., Goldstein, M. Available at: <http://massengale.typepad.com/venustas/files/SwiftSafetyStudy.pdf> .

Cooper, C.H.V., Fone, D.L., Chiaradia, A.J.F. (2014). "Measuring the impact of spatial network layout on community social cohesion: a cross-sectional study." *International Journal of Health Geographics*, 13:11.

Design for Health. (2008). *Health Impact Assessment Threshold Analysis Version 4.0*. Available at: [www.designforhealth.net](http://www.designforhealth.net)

Donovan, H., Micheal, Y.L., Butry, D.T., Sullivan, A.D., Chase, J.M. (2010). "Urban trees and the risk of poor birth outcomes." *Health & Place*, 17:390-393.

Fan, Y., Das, K.V., Chen, Q. (2011). "Neighborhood green, social support, physical activity, and stress: assessing the cumulative impact." *Health Place*, 17(6):1202-11.

Gibson, D. (2011). "The neighborhood food environment and adult weight status: Estimates from longitudinal data." *Am J Public Health*, 101:71-78.

- Jones, C. and Kammen, D.M. (2014). "Spatial Distribution of U.S. Household Carbon Footprints Reveals Suburbanization Undermines Greenhouse Gas Benefits of Urban Population Density." *Environ. Sci. Technol*, 48(2):895–902.
- Gustafson, A., Christian, J.W., Lewis, S., Moore, K., Jilcott, S. (2013). "Food venue choice, consumer food environment, but not food venue availability within daily travel patterns are associated with dietary intake among adults, Lexington Kentucky 2011." *Nutrition Journal*, 12:17.
- Kaplan, S. (1995). "The Restorative Benefits of Nature: Toward An Integrative Framework." *Journal of Environmental Psychology*, 15(3):169-182.
- Kawachi, I. and Berkman, L.F. (2000). "Social Cohesion, Social Capital, and Health: A Contextual Analysis." *American Journal of Public Health*, 89 (8):1187-1193.
- Kawachi, I., Kennedy, B.P., Lochner, K., Prothrow-Stith, D. (1997). "Social capital, income inequality, and mortality." *Am J Public Health*, 87(9):1491-8.
- Keely, L., van Ark, B., Levanon, G., Burbank, J. (2012). "The shifting nature of U.S. housing demand." New York City, NY. Demand Institute. Available at: <http://www.demandinstitute.org/>.
- Kemm, J., Parry, J., Palmer, S. (2004) *Health Impact Assessment: Concepts, theory, techniques and applications*, Oxford: Oxford University Press.
- NHTSA (2013). *Traffic Safety Facts 2012*. Washington, DC: US Department of Transportation; publication no.DOT-HS-811-856
- Quigley, R. and Thornley, L. (2011). "Literature review on community cohesion and community severance: Definitions and indicators for transport planning and monitoring." Wellington: Quigley and Watts Ltd.
- Reardon, T. (2010). "Vehicle Miles Traveled in Massachusetts: Who is driving and where are they going?" Boston (MA): Metropolitan Area Planning Council. Available at: [http://willbrownsberger.com/wp-content/uploads/2010/04/MAPC\\_Reardon\\_Climate-Change-Committee-4\\_13\\_10.pdf](http://willbrownsberger.com/wp-content/uploads/2010/04/MAPC_Reardon_Climate-Change-Committee-4_13_10.pdf)
- Seligman, H.K., Laraia, B.A., Kushel, M.B. (2009). "Food Insecurity Is Associated with Chronic Disease among Low-Income NHANES Participants." *Journal of Nutrition*, 140(2):304-310.
- Stone, B. (2008). "Urban sprawl and air quality in large US cities." *Journal of Environmental Management*, 86:688–698.
- Talen, E. (2000). "Measuring the Public Realm: A Preliminary Assessment of the Link Between Public Space and Sense of Community." *Journal of Architectural and Planning Research*, 17:344-60.



Treuhaft, S. and Karpyn, A. (2010). The grocery gap: who has access to healthy food and why it matters. Oakland (CA): PolicyLink and the Food Trust.

Tu, J., Xia, Z., Clarke, K., Frie A. (2007). "Impact of urban sprawl on water quality in eastern Massachusetts, USA." *Environmental Management*, 40:183–200.

Voicu, I. and Been, V. (2008). "The Effect of Community Gardens on Neighboring Property Values". *Real Estate Economics*, pp.241-283.

Wakefield, S., Yeudall, F., Taron, C., Reynolds, J., Skinner, A. (2007). "Growing urban health: community gardening in the South-East Toronto." *Health Promot Int*, 22(2):92-101.

World Health Organization (1999). Brussels: Health Impact assessment: Main Concepts and suggested approach. Gothenburg Consensus Paper. Brussels.

Wood, L., Shannon, T., Bulsara, M., Pikora, T., McCormack, G., Giles-Corti, B. (2008). "The anatomy of the safe and social suburb: An exploratory study of the built environment, social capital and residents' perceptions of safety." *Health & Place*, 14:15–31

Zheng, Y. (2008). "The benefit of public transportation: physical activity to reduce obesity and ecological footprint." *Prev Med*, 46(1):4–5.