2012

[MINNESOTA HEALTHY PLANNING: HOW-TO GUIDE]

The Minnesota Healthy Planning How-To Guide includes eight desired health goals to create a sustainable, healthy community and 20 built environment strategies for achieving those desired health goals. This How-To Guide is a set of recommendations, not requirements. Not all strategies are applicable to every setting. The suggested planning practices and strategies to achieve the desired health goals and outcomes provide guidance for communities and planners, and should be adapted to fit each unique community.

MINNESOTA
MDH
DEPARTMENT OF HEALTH

Minnesota Healthy Planning: How-To Guide

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INTRODUCTION

In 2010, the Minnesota Department of Health (MDH) received funds from the Centers for Disease Control and Prevention (CDC) to review the regional comprehensive planning process used for the Twin Cities metropolitan (metro) area. The purpose of the review was to determine if public health and climate change adaptation and mitigation are being addressed within the comprehensive plans (comp plans) for the seven-county metro area.

MDH reviewed 53 "Developed Community"[1] comprehensive plans to determine whether 23 health indictors are being addressed in the plans, and if so, how they are being incorporated. The inclusion of the health indicators, and thus the importance to public health, was supported by research on the association of the built environment, climate change, and health outcomes. In March 2012, MDH released the first report on 11 health indicators that were relevant to regional planning efforts and could be guided by the Metropolitan Council (Met Council). MDH presented the findings and recommendations from the first report to the Met Council's Community Development Committee on May 21, 2012. MDH asked the Met Council to support the findings and recommendations and include more guidance on health and climate change in the Regional Development Framework and Policy Plans.[2] Additionally, MDH reviewed the comp plans with 12 other health indicators that could be addressed through local planning processes and were outside the jurisdiction of the regional planning processes of the Met Council. The findings from the comprehensive plan review have been incorporated into a training presentation and this How-To Guide, designed for planners who are interested in addressing health and climate change issues in future comprehensive plans.

YOUR NEIGHBORHOOD DETERMINES YOUR HEALTH

Studies from the late 1960s and 1970s concluded that health care is not as large of an influence on our health outcome as previously thought.[3] Health care only accounts for about 10% of the contributing factors to premature death, while behavioral patterns, environmental exposure and social circumstances contribute 60% of the contributing factors to premature death.[4] A Blue Cross Blue Shield (BCBS) Foundation study from 2010, titled "The unequal distribution of health in the Twin Cities,"

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[1] The Met Council classifies each jurisdiction in the 7-county metro area as developed, developing or rural. Developed communities are the cities where more than 85% of the land is developed, infrastructure is well established, and effort must go toward keeping it in good repair. These communities have the greatest opportunities to adapt or replace obsolete buildings, improve community amenities, and remodel or replace infrastructure to increase their economic competitiveness and enhance their quality of life. Source: Met Council's 2030 Regional Development Framework.

[2] The Met Council's policy documents include the Transportation Policy Plan, the Water Resources Management Policy Plan, and the Regional Park Policy Plan.

[3] J. Michael McGinnis, Pamela Williams-Russo and James R. Knickman. 2002. The Case For More Active Policy Attention To Health Promotion. Health Affairs, 21, no.2 (2002):78-93. http://content.healthaffairs.org/content/21/2/78.full.html

[4] Braunstein S and Lavizzo-Mourey R. 2011. How The Health And Community Development Sectors Are Combining Forces To Improve Health And Well-Being. doi: 10.1377/hlthaff.2011.0838 *Health Aff November 2011 vol. 30 no. 11 2042-2051* http://content.healthaffairs.org/content/30/11/2042.abstract

confirms the earlier studies by showing that health status can be predicted by what zip code you live in, and also your race.[5] Mortality rates in the Twin Cities metro area are strongly correlated to the socioeconomic characteristics of your neighborhood, particularly the median income of your neighbors. "The relationship between an area's income and mortality is so striking that, on average, every $10,000 increase in an area's median income appears to buy residents another year of life."[6] And even after controlling for income, racial disparities among mortality rates still exist.

Recommendations from the BCBS study for increasing health in the region include targeting specific neighborhoods for everything "from creating more jobs and increasing public safety to improving access to healthy food and recreation." Increasing "educational attainment, and ultimately, household income," also will likely increase health of lower income groups. Both the problems and solutions identified are place-based and affected significantly by planning and the built environment.

STEPS IN THE PLANNING PROCESS

Addressing health in a comprehensive plan is more than adding a Public Health subchapter or mentioning physical activity in the Parks and Open Space chapter. Health can be part of every stage of the planning, as described below. Health can be incorporated into background data collection, visioning and goal setting, strategy development, and implementation.

STEP 1: BACKGROUND DATA COLLECTION

At the initial stage of background data collection, planners should incorporate data and trends from the local public health department's Community Health Assessment along with the traditional demographic and socioeconomic trends that are found in the Introduction and Community Profile of the comprehensive plan. Community Health Assessments "identify and describe factors that affect the health of a population, and factors that determine the availability of resources within the community to adequately address health concerns."[7] Working with local public health professionals to understand the ways the built environment contributes to health will facilitate planners partnering with local public health agencies to share resources and address issues. Comprehensive plans are more than plans to develop the correct number of housing units or build a road from point A to point B; they are plans for making the community a successful, livable place where housing instills pride and promotes health, and making the walk from your front door to the community pharmacy is a safe and inviting experience.

[5] Blue Cross Blue Shield. 2010. The unequal distribution of health in the Twin Cities. http://www.bcbsmnfoundation.org/pages-programs-tier4-Unequal_Distribution_of_Health_in_the_Twin_Cities?oid=11931
[6] Blue Cross Blue Shield. 2010. The unequal distribution of health in the Twin Cities. http://www.bcbsmnfoundation.org/pages-programs-tier4-Unequal_Distribution_of_Health_in_the_Twin_Cities?oid=11931
[7] Minnesota Department of Health. 2012. Community Health Assessment (website). Office of Performance Improvement. http://www.health.state.mn.us/divs/cfh/ophp/system/planning/cha/

The visioning and goal setting stage is the place to establish the vision for a healthy community and integrate health into some or all of the goals that realize the vision. This Healthy Planning How-To Guide consists of eight desired health goals that are important for creating a healthy community. Each health goal is associated with several desired health outcomes and a number of implementation strategies, as shown in the example below.
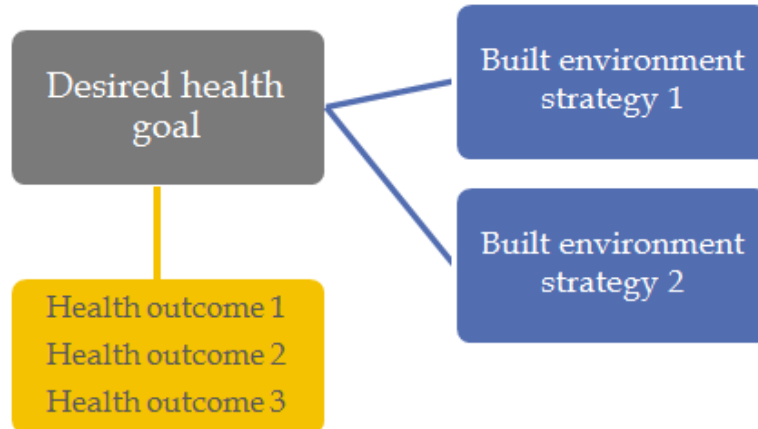
Section One of this guide describes the eight goals and associated health outcomes if each goal is achieved using the strategies. Section Two of this guide recommends specific implementation strategies for each goal. The eight health goals detailed in this How-To Guide include the following:

1. Healthy housing for all household sizes and incomes
2. Access to affordable healthy foods
3. Reduced exposure to air pollutants, hazardous materials, and/or nuisances,
4. Increased physical activity
5. Increased access to greenery
6. Increased safety of pedestrians, bicyclists and motorists
7. Increased personal safety and security
8. Climate resilient community

STEP 3: STRATEGY DEVELOPMENT

Following the introduction, community profile, and community engagement and visioning, a comprehensive plan will discuss the specific policies, strategies and implementation steps to achieve the goals and vision. This How-To Guide includes 20 built environment strategies for achieving the eight desired health goals. Section Two describes the strategies used to achieve the health goals and methods to implement the strategies. Each built environment strategy includes a definition, method(s) for calculating the characteristic, and multiple ways to implement the strategy in a comprehensive plan.

A goal may be partially achieved through the implementation of one or more of the strategies. A goal may be fully achieved through the implementation of all strategies. The specific health outcomes achieved will vary depending on the strategies implemented. Additionally, the strategies discussed in this How-To Guide are most effective when used in combination, not isolation. For example, increasing active transportation and public transit ridership is affected by density, the mix of land uses, street design and connectivity, and transit availability, but one strategy without the others will likely not achieve the desired outcome. Therefore, density will not achieve increased active transportation or public transit ridership if there is poor street connectivity, or existing transit does not serves popular destinations and activity centers.

STEP 4: IMPLEMENTATION

Local governments implement their comprehensive plans through regulatory tools such as updating zoning, adopting policies, or executing programs. Collaboration across departments and sectors, including local and state public health departments, can help implement the strategies provided in this How-To Guide and achieve the desired health goals and outcomes. For example, collaboration between local planners and local and state public health professionals is already happening through the Statewide Health Improvement Program (SHIP), Safe Routes to Schools (SRTS) and Community Transformation Grants (CTG). Local initiatives using SHIP money have set up farmers' markets and developed pedestrian and bicycle plans. SRTS increases the physical activity of children to combat the obesity epidemic. CTGs are being used to support active transportation implementation projects across the state.

It should be noted that this How-To Guide is a set of recommendations, not requirements, and not all strategies are applicable to every setting. The suggested planning practices and strategies to achieve the desired health goals and outcomes provide guidance for communities and planners, and should be adapted to fit with each unique community.

SECTION ONE: DESIRED HEALTH GOALS AND OUTCOMES

The following eight desired health goals portray the major areas in which the built environment affects health and the positive impacts a well-design built environment can have on a community. The health goals are linked to specific health outcomes, listed below, as determined by a literature review of public health research. The health goals are broad and can be achieved using a number of policies and planning strategies.

1. Healthy housing for all household sizes and incomes

   - Health outcomes:
     - Decreased exposure to lead, radon, carbon monoxide and mold
     - Increased income available for healthy food and health care
     - Decreased overcrowding, housing instability, and homelessness
     - Decreased energy and resource use and associated costs

2. Access to affordable healthy foods

   - Health outcomes:
     - Increased consumption of healthy food
     - Decreased obesity and diabetes
     - Increased local food production
     - Decreased food travel and fossil fuel use
     - Increased physical activity and mental health benefits from gardening
     - Increased community investment

3. Reduced exposure to air pollutants, hazardous materials, and/or nuisances

   - Health outcomes:
     - Decreased respiratory and cardiovascular disease and hospitalizations
     - Decreased cancer risk
     - Decreased deaths and health care costs
     - Decreased stress and negative mental health

4. Increased physical activity

   - Health outcomes:
     - Decreased obesity
     - Decreased diabetes, heart disease and other chronic diseases
     - Increased mental health

5. Increased access to greenery

- Health outcomes:
  - Improved mood and mental health
  - Increased air quality
  - Increased cognitive performance
  - Increased healing benefits and overall health
  - Increased property values
  - Decreased crime

6. Increased safety for pedestrians, bicyclists and motorists

- Health outcomes:
  - Decreased pedestrian, bicycle and motor vehicle injuries and deaths
  - Increased physical activity (and associated health outcomes)

7. Increased personal safety and security

- Health outcomes:
  - Decreased crime and violence
  - Increased physical activity (and associated health outcomes)

8. Climate resilient communities

- Health outcomes:
  - Decreased injuries and deaths from extreme weather events
  - Increased air quality
  - Decreased respiratory conditions
  - Decreased property and crop damage
  - Decreased waterborne disease outbreaks

By implementing strategies associated with each goal listed above, a community would experience a number of positive health outcomes. In turn, healthier community members can achieve better in school, be more successful at work, live longer fulfilling lives and contribute back to their community to reinforce a high standard of living.
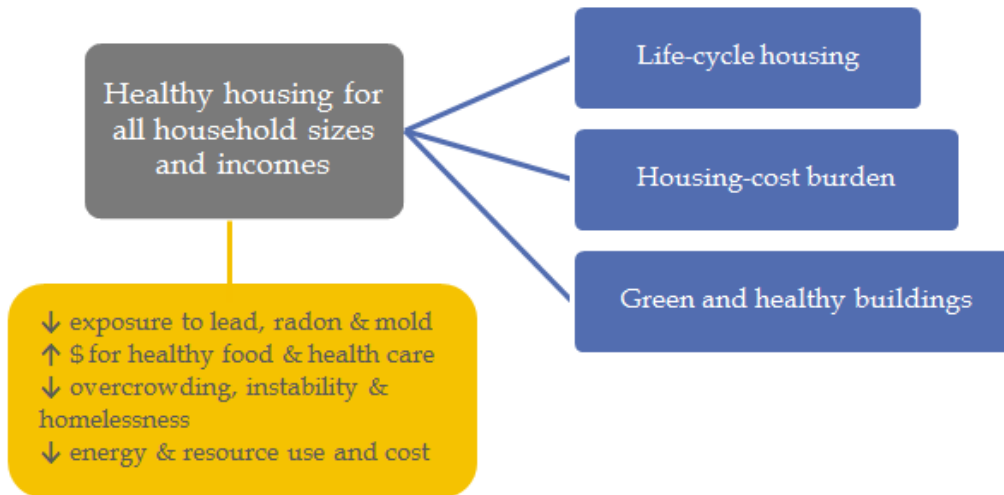
Healthy housing for all household sizes and incomes ensures that housing does not make residents sick, enables residents to afford other life necessities such as healthy food and health care, and provides the proper amount of space for all households from one person to a large family. In addition to promoting human health, healthy housing can be good for the environment by using the least amount of energy and resources to provide for the comfort of residents.

Housing should promote indoor air quality and not expose residents to lead, radon, mold or other hazards that could make residents sick. Homes built before 1978 are more likely to contain lead paint, which can cause learning, behavior and health problems in young children, and high blood pressure and kidney damage in adults.[8] Radon exposure also is an issue in Minnesota where local geology produces an ongoing supply of the harmful gas.[9] Homes at increased risk for radon exposure include homes with basements and homes that have negative air pressure, which creates a vacuum that pulls soil gases, such as radon, into the home. Exposure to radon damages the cells that line the lung and can lead to lung cancer with long term exposure. Humidity and moisture in a home can promote the growth of mold, which can be difficult to dry and clean up. Mold can aggravate allergies and affect persons with respiratory conditions.

Making healthy housing available to all income levels, especially low income earners, can free-up resources for purchasing nutritious food and affording health care costs. Quality, low-income housing can reduce housing instability, reduce overcrowding and/or homelessness, and reduce the stress associated with these issues. Housing should cost less than 30% of a household's income. The cost of housing should incorporate the cost of transportation as well. For example, an affordable single family home without reliable transit service may not be affordable to a person who cannot afford to purchase,

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[8] Minnesota Department of Health. 2012. Lead Poisoning Prevention.
[9] Minnesota Department of Health. 2012. Indoor Air Program.

operate and maintain a vehicle. Housing and transportation costs combined should consume less than 40% of a household's income. Additionally, for housing to be available to all income levels, it may be, but does not have to be, subsidized and/or rent-restricted, and can include new or renovated existing housing.

Housing should be available in all shapes and sizes for everyone, including young adults, growing families, empty-nesters and independent elderly. Household make up is changing rapidly. In Minnesota, the population 65 years old and older will double from 2010 to 2035,[10] which will create a demand for healthy housing for the aging population. At the same time Minnesota also is seeing an increase in immigrant families, which tend to be larger and need more space. Housing stock should be developed to meet the needs of the changing community.

Finally, housing should use minimal energy and resources (including water). Reduced energy consumption results in less fossil fuel extraction and combustion, which is good for land preservation, water quality, air quality and climate change. Lower energy and resource use can reduce operating costs of housing, which is especially important for low-income residents. One way to conserve energy costs is to design housing to optimize natural lighting, which reduces the need for artificial lighting, and therefore electricity consumption on bright, sunny days. In addition to energy conservation, sufficient day-lighting can provide mental health benefits from natural light, which has been shown to improve mood, focus and concentration.[11]

Comprehensive plans can promote healthy housing for all household sizes and incomes through the following built environment strategies (described in greater detail in Section 2):

- Life-cycle housing
- Housing-cost burden
- Green and healthy buildings

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[10] Minnesota State Demographic Center. 2007. Minnesota Population Projections 2005-2035. Available online at http://www.demography.state.mn.us/projections.html
[11] Edwards L and Torcellini P. 2002. A Literature Review of the Effects of Natural Light on Building Occupants. National Renewable Energy Laboratory. NREL/TP-550-30769.

II.   ACCESS TO AFFORDABLE HEALTHY FOODS
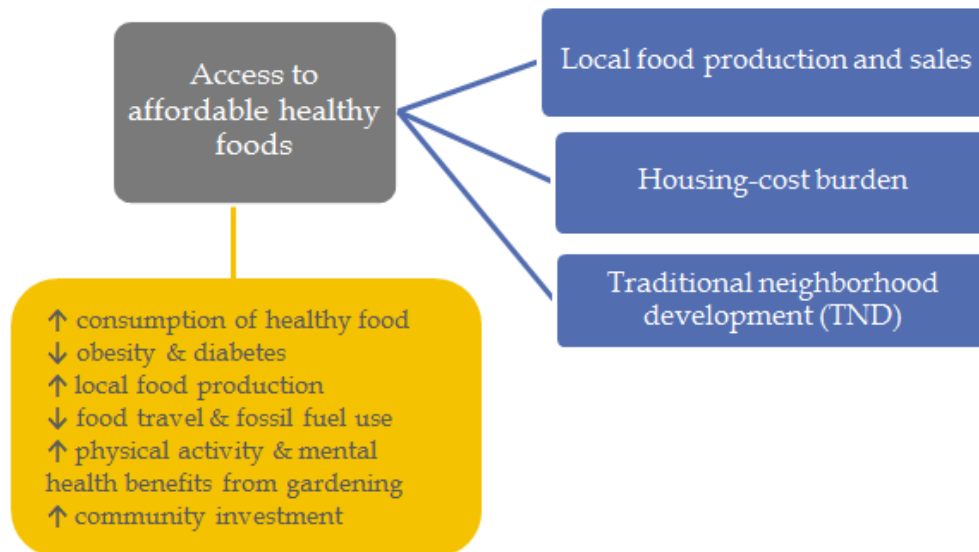
Consumption of healthy foods, including fresh fruit and vegetables, is important for maintaining proper nutrition and weight. The 2009 Behavioral Risk Factor Surveillance Survey (BRFSS) reported that 78.1% of Minnesotans do not consume the recommended number of daily servings of fruits and vegetables. The 2009 BRFSS also indicated that 63.3% of adult Minnesotans are overweight or obese. The built environment can influence the availability and access to healthy foods.

Studies have shown that people who live near grocery stores are more likely to eat recommended amounts of fruits and vegetables and less likely to be obese or have a diagnosis of diabetes.[12] Residents who lived more than 1.75 miles from a supermarket had a body-mass index (BMI) almost 0.8 kg/m^2 higher than residents who lived 1.75 miles or less from a supermarket.[13] Comprehensive plans do not specify the land use type of a parcel to the level of 'liquor store' versus 'supermarket', but there are goals, objectives and policies that can be incorporated into comprehensive plans to encourage walkable streets and neighborhood retail destinations.

The likelihood of healthy food consumption in a community can be predicted by proximity of healthy food and affordability.[14] While planners have less control over the price of foods than the location of healthy food retailers, there have been initiatives in recent years to promote the partnership of farmers' markets or community supported agriculture (CSA) with food assistance programs such as SNAP

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[12] California Center for Public Health Advocacy, PolicyLink, and the UCLA Center for Health Policy Research. 2008. Designed for Disease: The Link Between Local Food Environments and Obesity and Diabetes. Available online at http://www.healthpolicy.ucla.edu/pubs/Publication.aspx?pubID=250

[13] Inagami S, Cohen DA, Finch BK, Asch SM. 2006. You are where you shop: grocery store locations, weight, and neighborhoods. Am J Prev Med. 2006;31(1):10-7.

[14] Inagami S, Cohen DA, Finch BK, Asch SM. 2006. You are where you shop: grocery store locations, weight, and neighborhoods. Am J Prev Med. 2006;31(1):10-7.

(Supplemental Nutrition Assistance Program). In 2009, Detroit, MI launched a pilot program called Double Up Food Bucks, which not only enables SNAP users to use their food assistance benefits at local farmers' markets, but doubles the value of SNAP when spent at participating farmers' markets.[15] The pilot program saw a 368% increase in food assistance buying power compared to prior to the program onset, which contributed over $200K to local farmers' markets for local farmers and food businesses.

In addition to providing access to affordable, local, healthy foods, local food production can have the added benefits of:

- Reducing emissions from long-distance transport of foods[16,17]
- Physical activity of gardening[18,19]
- Mental health benefits of gardening[20,21,22,23]
- Community investment, which can deter crime and promote pride of place and social networks[24,25]

Comprehensive plans can promote consumption of healthy foods through the following built environment strategies (described in greater detail in Section 2):

- Local food production and sales
- Housing-cost burden
- Traditional neighborhood development (TND)

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[15] Fair Food Network. 2012. http://doubleupfoodbucks.org/

[16] Roberts, W. 2001. The way to a city's heart is through its stomach: Putting food security on the urban planning menu. Toronto: Toronto Food Policy Council. Viewed January 21, 2008, at www.toronto.ca/health/tfpc_hs_report.pdf.

[17] Brown, K.H., and A.L. Jameton. 2000. "Public health implications of urban agriculture." Journal of Public Health Policy, 21(1), 20-39.

[18] Mattson, R. H. "Prescribing Health Benefits Through Horticultural Activities," in Relf, op, cit.: 161-68.

[19] Wakefield S et al. 2007. Growing urban health: Community gardening in South-East Toronto. Health Promotion International, Volume 22, Number 2: 92-101

[20] Armstrong D. 2000. A survey of community gardens in upstate New York: Implications for health promotion and community development. Health & Place, Volume 6: 319-327.

[21] Maller C, Townsend M, Pryor A, Brown P, St. Leger L. 2005. Healthy nature healthy people: 'contact with nature' as an upstream health promotion intervention for populations. Health Promotion International 21(1):45-53.

[22] Wakefield S et al. 2007. Growing urban health: Community gardening in South-East Toronto. Health Promotion International, Volume 22, Number 2: 92-101

[23] Relf, D. The Role of Horticulture in Human Well-being and Social Development. A National Symposium. Portland, OR: Timber Press, 1991.

[24] Armstrong D. 2000. A survey of community gardens in upstate New York: Implications for health promotion and community development. Health & Place, Volume 6: 319-327.

[25] Twiss J et al. 2003. Community Gardens: Lessons learned from California healthy cities and communities. American Journal of Public Health, Volume 93, Number 9: 1435-1438.

III. REDUCED EXPOSURE TO AIR POLLUTANTS, HAZARDOUS MATERIALS, AND/OR NUISANCES
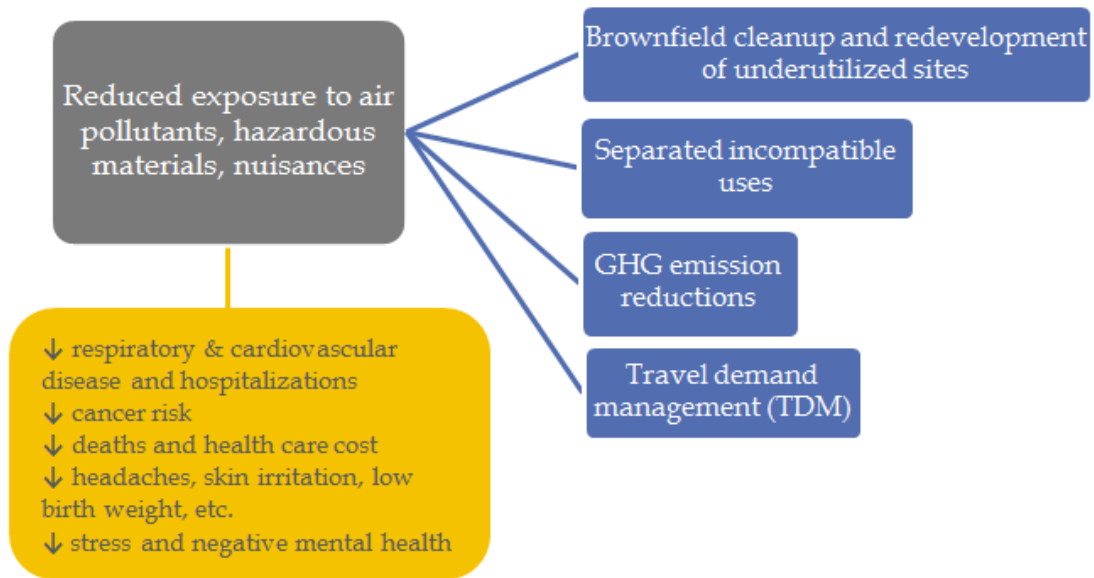
Exposure to air pollution, contaminated land or water, noise and odor, can pose very serious threats to community health and quality of life. Transportation related air pollution, brownfields and other contaminated sites, and inappropriate land use siting can contribute to potential negative health outcomes. The following paragraphs describe the potential negative health impacts in detail, noting that in some cases planning interventions have had proven positive health impacts.

The U.S. transportation system is fossil-fuel based and driving contributes to deleterious health effects from air pollution, climate change, automobile accidents, and physical inactivity. While air pollutants from mobile sources disperse when released from a tailpipe, concentrations of pollutants are still found near emissions sources, such as major roads and highways. In addition to pollutants like carbon dioxide (CO_2) and volatile organic compounds (VOCs), motor vehicles emit "air toxins" including benzene, formaldehyde, and diesel particulate matter (PM). Mobile source air toxins are responsible for 30% of the overall average cancer risk.[26] One study found a 50% increase in lung cancer risk for populations heavily exposed to traffic-related air pollution.[27] A 1995 study demonstrated that air pollution from automobile emissions costs the nation's health approximately 50-70 million days with restricted levels of activity, 20,000 to 46,000 cases of chronic respiratory illness, and 40,000 premature deaths.[28] A

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[26] U.S. Environmental Protection Agency (EPA). 2009. National-Scale Air Toxics Assessment for 2002 - Fact Sheet. Available online: http://www.epa.gov/ nata2002/factsheet.html. Accessed July 2011.

[27] Nyberg F, Gustavsson P, Jarup L, Bellander T, Berglind N, Jakobsson R, Pershagen G. 2000. Urban air pollution and lung cancer in Stockholm. Epidemiology, Sep;11(5):487-95.

[28] U.S. Environmental Protection Agency (EPA). 2001. Vehicle travel: Recent trends and environmental impacts. Our Built and Natural Environments: A Technical Review of the Interactions Between Land Use, Transportation, and Environmental Quality. Chapter 3. U.S. Environmental Protection Agency. http://www.epa.gov/dced/built.htm

comprehensive study by University of California-Davis on the social costs of motor-vehicle use estimated annual costs of $244.3 to $450 billion (1991$) in human mortality and morbidity and $3.3 to $5.7 billion in crop damage due to motor-vehicle related air pollution alone.[29]

There are quantifiable health benefits of improved air quality. A 2012 study on air quality and physical activity-related health benefits from reduced car travel in the Midwest[30] found that eliminating short car trips (less than or equal to 2.5 miles) and completing 50% of them by bicycle would result in 608 fewer deaths due to improved air quality and $4.94 billion/year in net health benefits due to reductions in particulate matter ($PM_{2.5}$) and ozone. [31] The study estimated additional net health benefits from the physical activity of increased bicycling.

Siting residential areas near industrial areas can cause a number of health issues. Health effects of residence near hazardous waste landfill sites may include certain types of cancer, skin irritation, low birth weight, birth defects, fatigue, sleepiness, and headaches.[32] Industrial sites, agricultural activities, automotive shops, etc., can create livability and health hazards for adjacent residential uses from exposure to chemicals, petroleum products, fertilizers, pesticides, odors, noise and dust.

Brownfield sites[33] pose the risk of exposure to hazardous materials, create neighborhood blight/property value loss, foster crime and often impact disadvantaged communities. However, brownfields and other vacant or underutilized sites provide opportunities for urban infill projects that can revitalize disadvantaged neighborhoods. Some brownfield redevelopments have resulted in reduction of food deserts, increased affordable housing, economic development and local jobs.[34]

Noise and other nuisances can cause stress and impact the health of nearby residents. A common noise pollutant is traffic.[35] Industrial noise is another cause of noise pollution. The direct health impacts of exposure to noise pollution are hearing impairment and tinnitus (ringing in the ears).[36] Indirect health impacts of exposure to noise pollution include mental stress, hypertension, and heart conditions.[37,38] Communities of color and of lower socioeconomic status are more often exposed to environmental

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[29] Delucchi, M. et al. The Annualized Social Cost of Motor-Vehicle Use in the U.S., based on 1990-1991 Data, June 1997. Converted into 1999 dollars. (UCD-ITS-RR-96-3).
[30] Midwestern study area included the urban areas of Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin.
[31] Grabow ML, Spak SN, Holloway T, Stone B, Mednick AC, Patz JA. (2012) "Air Quality and Exercise-Related Health Benefits from Reduced Car Travel in the Midwestern United States." Environmental Health Perspectives, Vol. 120, Number 1.
[32] Vrijheid M. (2000) "Health Effects of Residence Near Hazardous Waste Landfill Sites: A Review of Epidemiologic Literature." Environmental Health Perspectives, Vol. 108: Supplement 1.
[33] The Environmental Protection Agency defines a Brownfield as "real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant."
[34] American Planning Association. 2011. Policy Guide on Planning and Climate Change. Adopted April 27, 2008; updated April 11, 2011. Accessed online: http://www.planning.org/policy/guides/pdf/climatechange.pdf
[35] Passchier-Vermeer W, Passchier WF, 2000 Noise Exposure and Public Health. Environ Health Perspect 108(s1): doi:10.1289/ehp.00108s1123
[36] Passchier-Vermeer W, Passchier WF, 2000 Noise Exposure and Public Health. Environ Health Perspect 108(s1): doi:10.1289/ehp.00108s1123
[37] Stansfeld SA, Matheson MP. Noise pollution: non-auditory effects on health. Br Med Bull. 2003;68:243-257.
[38] Passchier-Vermeer W, Passchier WF, 2000 Noise Exposure and Public Health. Environ Health Perspect 108(s1): doi:10.1289/ehp.00108s1123

pollution, including noise pollution.[39] Chronic road or airport noise can affect the performance of children in school, including reduced performance on cognitive tasks, decreased attention to a task, poorer reading ability, and impaired long-term memory.[40,41]

Comprehensive plans can reduce exposure to air pollutants, hazardous materials, and/or nuisances through the following built environment strategies (described in greater detail in Section 2):

- GHG emission reductions
- Separated incompatible uses
- Brownfield cleanup and redevelopment of underutilized sites
- Travel demand management (TDM)

[39] Brulle RJ and Pellow DN. 2006. Environmental Justice: Human Health and Environmental Inequalities. Annu. Rev. Public Health. 27:103–24. doi: 10.1146/annurev.publhealth.27.021405.102124

[40] Passchier-Vermeer W, Passchier WF, 2000 Noise Exposure and Public Health. Environ Health Perspect 108(s1): doi:10.1289/ehp.00108s1123

[41] London Health Commission. Noise and health: Making the Link. London Health Commission, 2003. http://www.phel.gov.uk/hiadocs/noiseandhealth.pdf
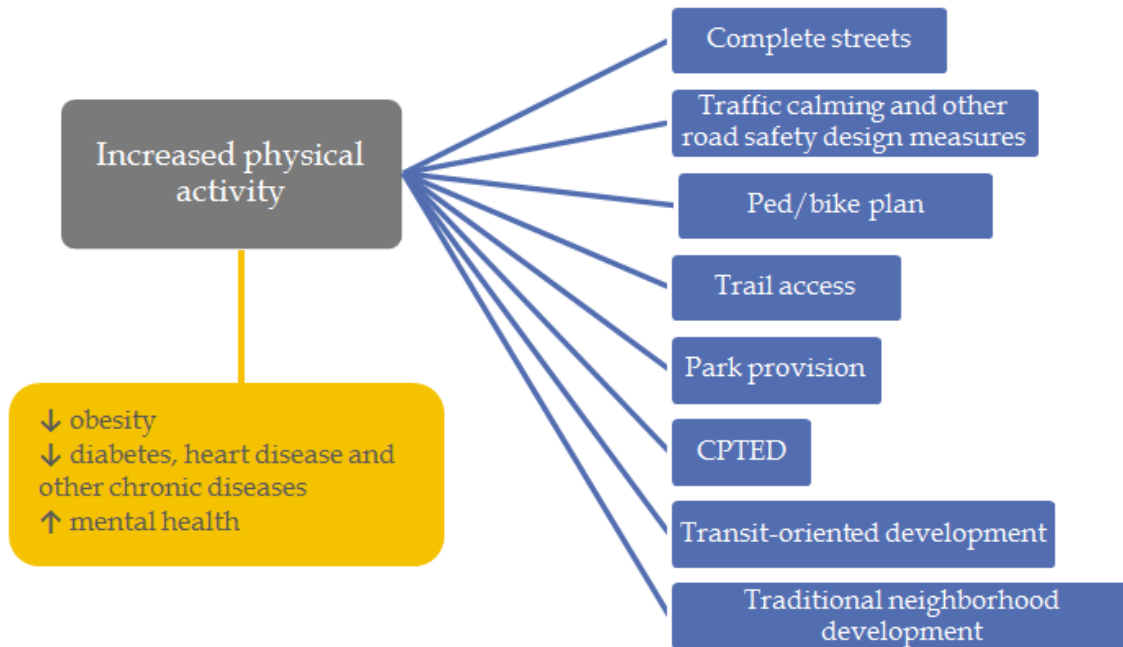
Research suggests that the built environment, including parks and trails, can positively influence physical activity.[42,43] Promoting physical activity among children and adults is a national health priority in the United States, especially given the correlation between physical activity and rates of obesity. In Minnesota, 25% of the adult population is considered obese and 47% does not achieve the weekly physical activity recommendations.[44] Regular physical activity is an important strategy for lowering obesity rates in both children and adults. Increased physical activity and lower obesity rates can reduce the risk of diabetes, heart disease and other chronic diseases. Additionally, physical activity can have positive mental health benefits, including use as treatment of depression and improving mental well-being in the general public.[45] There are a number of ways to increase physical activity in Minnesota communities.

Access to parks and trails promotes physical activity. Facilities located close to where people live are more likely to be used. One study showed that the percentage of park area (that included nature trails and bicycle paths) located near residential housing, was associated with higher levels of physical activity

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[42] Committee on Physical Activity, Health, Transportation, and Land Use (2005), "Does the Built Environment Influence Physical Activity? Examining the Evidence," Transportation Research Board, Institute of Medicine of the National Academies. Accessed online August 2011: http://onlinepubs. trb.org/onlinepubs/sr/sr282.pdf.

[43] Heath GW, Brownson RC, Kruger J, et al. (2006), "The effectiveness of environmental and policy interventions to increase physical activity: a systematic review." Journal of Physical Activity and Health, 3(Suppl 1): S55–S76.

[44] Behavioral Risk Factor Surveillance System (BRFSS). (2009), Accessed online August 2011: http://apps.nccd.cdc.gov/ BRFSS/.

[45] Fox KR. 1999. The influence of physical activity on mental well-being. Public Health Nutr. Sep;2(3A):411-8.

among young children.[46] A study in Minneapolis found a sharp decline in trail use among bicyclists who had to travel 1.5 miles or further to access a trail.[47]

In order to promote physical activity and healthy lifestyles, physical activity needs to be made as safe as possible. That means making walking and biking safe for pedestrians and bicyclists. Strategies to make communities safer for physical activity include traffic calming and Complete Streets. See Health Goal VI: Increased safety of pedestrians, bicyclists, and motorists for further discussion and related strategies.

Physical activity also can be promoted through the design of a community, such as Traditional Neighborhood Development (TND) and transit-oriented development (TOD). TND communities have relatively high density of residential uses near a variety of neighborhood commercial uses, walkable street network, and safe walking infrastructure, which encourages walking and biking to destinations. TOD supports mixed-use development that promotes walking and biking in addition to promoting use of public transit which has been shown to increase walking.[48] TOD reduces reliance on the automobile, which may in turn reduce vehicular accidents and injuries, and improve air quality.

Comprehensive plans can promote increased physical activity through the following built environment strategies (described in greater detail in Section 2):

- Park provision
- Trail access
- Traffic calming and other road safety measures
- Complete streets
- Traditional neighborhood development (TND)
- Transit-oriented development (TOD)

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[46] Roemmich JN, Epstein LH, Raja S, et al. (2006), "Association of access to parks and recreational facilities with the physical activity of young children." American Journal of Preventive Medicine, 43(6): 437–441.
[47] Krizek KJ, El-Geneidy A and Thompson K (2007), "A detailed analysis of how an urban trail system affects cyclists' travel." Transportation, 34: 611–624.
[48] Besser L, Dannenberg A. 2005. Walking to Public Transit: Steps to help meet physical activity recommendations. American Journal of Preventative Medicine. Volume 29, Number 4: 273-280.

V.   INCREASED ACCESS TO GREENERY
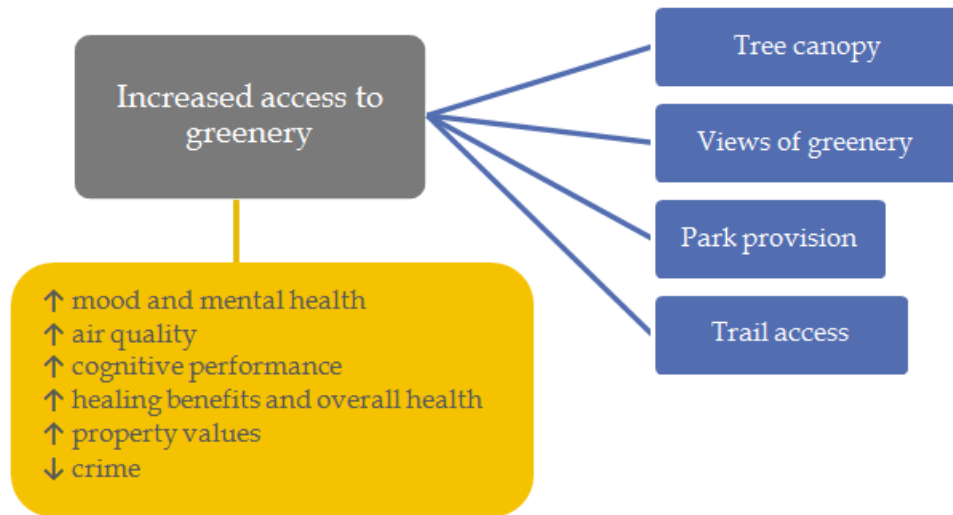
Several studies demonstrate the positive psychological and physiological benefits of viewing nature (i.e., trees and vegetation) on people in a range of different settings including offices, educational institutions, and hospitals.[49,50,51] These studies found that a view of nature can improve overall satisfaction with a job, reduce number of physical aliments, improve test scores, shorten post-operative hospital stays, and decrease use of pain medication. The presence of forests, trees and other vegetation has been shown to improve adult recovery from mental fatigue and reduce behavior problems among children.[52,53,54]

Roger Ulrich, a professor at Texas A&M University, in a seminal and oft-cited 1984 study, found that patients who had a view of trees out the window of their hospital room needed less medication and recovered more quickly from surgery than patients without a view.[55] Since that study, research has mounted showing a positive overall effect of nature. Simply viewing trees can provide mental restorative benefits. Experiencing nature by visiting gardens, forests and parks provides healing benefits as well.

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[49] Kaplan R. 1993. The role of nature in the context of the workplace. Landscape and Urban Planning, 26: 193-201.

[50] Tennessen C.M, Cimprich B. 1995. Views to nature: effects on attention. Journal of Environmental Psychology, 15: 77-85.

[51] Ulrich RS. 1984. View through a window many influence recovery from surgery. Science, 224: 420-421.

[52] Hansmann R, Hug SM, Seeland K. 2007. Restoration and stress relief through physical activities in forests and parks. Urban Forestry & Urban Greening. 6(4):213-225.

[53] Taylor AF, Kuo FE, Sullivan WC. 2001. Coping With ADD: The Surprising Connection to Green Play Settings. Environment and Behavior. 2001;33(1):54-77.

[54] Wolf K. 1998. Urban Nature Benefits: Psycho-Social Dimensions of People and Plants. Center for Urban Horticulture, College of Forest Resources, University of Washington, Fact Sheet #1. Seattle, WA.

[55] Ulrich RS. 1984. View through a window may influence recovery from surgery. Science, 224: 42-421.

One study showed that residents of neighborhoods with extensive green space enjoyed better health than neighborhoods without green space.[56] Research also shows that people have a more positive outlook and higher life satisfaction when in proximity to nature.[57] Exposure to natural environments enhances the ability to cope with and recover from stress, and observing nature can restore concentration and improve productivity.[58]

Trees and vegetation provide additional benefits such as habitat for birds, insects, and other living species. Also, urban trees and vegetation have been linked to reduced crime and increased property values.[59,60]

Providing trees, green spaces and view sheds of greenery may be challenging in the built environment, considering building heights, existing infrastructure and manmade barriers. However, communities can implement design standards and zoning to regulate building heights and preserve areas for green space to improve public health and mental wellbeing.

Comprehensive plans can promote increased availability of greenery through the following built environment strategies (described in greater detail in Section 2):

- Views of greenery
- Tree canopy maintenance and preservation
- Park provision
- Trail access

[56] Maas, J., R.A. Verheij, P.P. Groenewegen, S. de Vries, and P. Spreeuwenberg. 2006. Green Space, Urbanity, and Health: How Strong is the Relation? Journal of Epidemiology and Community Health 60:587–592.

[57] Maller C, Townsend M, St. Leger L, Henderson-Wilson C, Pryor A, Prosser L, Moore M. 2009. Healthy Parks, Healthy People: The Health Benefits of Contact with Nature in a Park Context. The George Wright Forum, Vol 26, Num 2: 51-83.

[58] Maller C, Townsend M, St. Leger L, Henderson-Wilson C, Pryor A, Prosser L, Moore M. 2009. Healthy Parks, Healthy People: The Health Benefits of Contact with Nature in a Park Context. The George Wright Forum, Vol 26, Num 2: 51-83.

[59] Kuo FE, Sullivan WC. 2001. Environment and crime in the inner city: does vegetation reduce crime? Environment and Behavior. 33(3):343-367.

[60] Des Rosiers F, Theriault M, Kestans Y, Villeneuve P. 2002. Landscaping and House Values: An Empirical Investigation. Journal of Real Estate Research. 23(1):139-162.

VI.   INCREASED SAFETY OF PEDESTRIANS, BICYCLISTS, AND MOTORISTS

Increased safety of pedestrians, bicyclists and motorists

↓ pedestrian, bicyclist, motorist injuries and deaths
↑ physical activity

Traffic calming and other road safety design measures

Complete Streets

Transit oriented development

Traditional neighborhood development

TDM
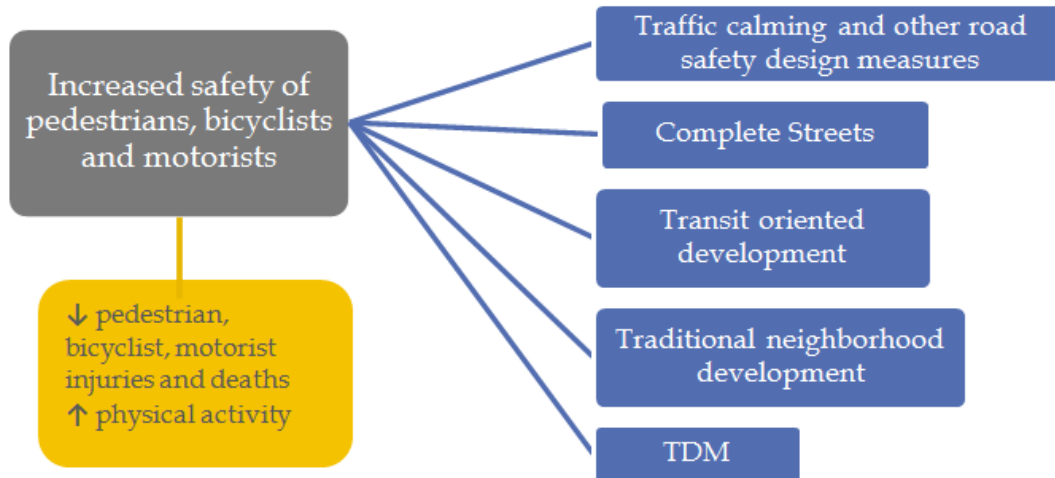
Traffic crashes are the leading cause of death of people from ages 1 to 34.[61] In Minnesota in 2010, there were 808 vehicular crashes that involved a pedestrian that was either killed or injured by a motor vehicle. These crashes resulted in 824 injured pedestrians and 36 pedestrian deaths. Also, there were 898 bicycle crashes, in which 882 bicyclists were injured and 9 bicyclists were killed. Of the 882 bicyclists injured, 448 (50.8%) were 24 years of age or younger.

The number of pedestrian and bicyclist injuries and fatalities continues to reinforce the importance of designing safer pedestrian and bicycle infrastructure. Research has shown that alternative design methods, including traffic calming techniques, can help reduce the number of conflicts between automobiles, bicyclists and pedestrians. Traffic calming and other road safety design measures help slow the speed of vehicles and include strategies such as sidewalk bump-outs, speed bumps, roundabouts, narrowed lanes, and enforcement of speed reduction.

Designated or signed bicycle infrastructure improves safety for bicyclists by encouraging more riders and alerting motor vehicles to bicyclists' presence. Increases in the volume of bicyclists and pedestrians are associated with increases in bicyclist and pedestrian safety.[62,63] Cities with high rates of bicycling have lower risk of fatal and severe crashes for all road users due to street network design and the presence of a large number of bicyclists, which help reduce vehicle speeds.[64] Successfully calming traffic reduces the number of accidents and improves both the actual and perceived safety of all users.

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[61] Minnesota Department of Public Safety, Office of Traffic Safety. Minnesota Motor Vehicle Crash Facts 2010. Accessed online: https://dps.mn.gov/divisions/ots/educational-materials/Documents/CRASH-FACTS-2010.pdf.

[62] Jacobsen PL. 2003. Safety in numbers: More walkers and bicyclists, safer walking and bicycling. Injury Prevention 9:205-209.

[63] Leden L. 2002. Pedestrian risk decreases with pedestrian flow: A case study based on data from signalized intersections in Hamilton, Ontario. Accident Analysis and Prevention 34:457-464.

[64] Garrick, Norman and Wesley Marshall (2011), "Evidence on Why Bike-Friendly Cities Are Safer for All Road Users," Environmental Practice, Version 13, Number 1: 16-27.

Street connectivity is a key part of the safety of community design. A Canadian study found that up to one in five street injuries in youth (defined as a medically treated injury in the street/road/parking lot) was potentially attributable to whether the youth lived in a low-connectivity area versus a high connectivity area.[65] Connectivity was measured in three ways: intersection density, average block length and connected node ratio.

Using modes other than a personal automobile and reducing the number of vehicles on the road also increase safety for pedestrians, bicyclists and motorists. The American Public Transportation Association reported that the fatality rate associated with transportation-related injuries in public transportation is approximately 1/25th that associated with automobiles.[66] The World Health Organization (WHO) recognizes that the fewer motor vehicles on the road and the shorter the trips, the lower the injury risk for both motorists and non-motorists.[67] Community design, transit-oriented development (TOD), and travel demand management (TDM) strategies to reduce vehicle-miles traveled are key strategies to achieve safer streets for all users.

Comprehensive plans can promote increased safety of pedestrians, bicyclists and motorists through the following built environment strategies (described in greater detail in Section 2):

- Traffic calming and other road safety design measures
- Complete streets
- Transit oriented development (TOD)
- Traditional neighborhood development (TND)
- Travel demand management (TDM)

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[65] Mecredy G, Janssen I, Pickett W. 2011. Neighbourhood street connectivity and injury in youth: a national study of built environments in Canada.
[66] American Public Transportation Association. 2007. Public transportation: benefits for the 21st century. Washington, DC: APTA
[67] World Health Organization (WHO). 2004. World report on road traffic injury prevention. Available online at:
http://www.who.int/violence_injury_prevention/publications/road_traffic/world_report/en/index.html
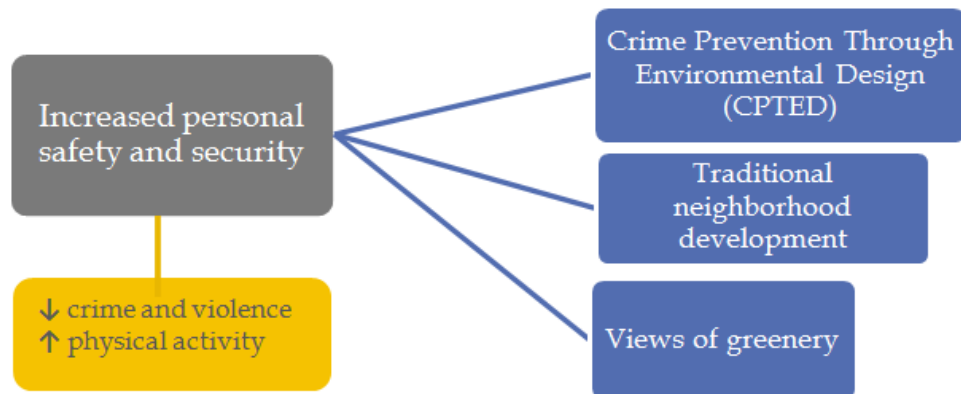
Feeling safe and secure is a leading factor in determining whether community residents will be physically active.[68,69] Community design can play a significant role in creating environments where residents feel safe to walk for leisure or as a means to get to destinations, such as the corner store or school. There are many design strategies to increase community security. For instance, integrating lighting into public spaces and along sidewalks provides pedestrians the opportunity to see others in the distance during nighttime hours.

Jane Jacobs, a pioneer in the planning field, stressed a number of design components that create safer communities. In her book, "The Death and Life of Great American Cities," (1961) Jacobs emphasizes design techniques that create active streetscapes by orienting buildings to the street, increasing density, providing clearly marked public and private spaces, and integrating street amenities, such as benches and lights. These measures are important from a public health perspective as they create secure environments, build social cohesion and improve mental health.

One infamous example of how not to design a public space is Bryant Park in New York City. The area now called Bryant Park, public property since 1686, went through a major redesign in 1934 based on "a classical scheme of a large central lawn, formal pathways, stone balustrades, allées of London Plane trees, and at the west end, an oval plaza containing the Josephine Shaw Lowell Memorial Fountain."[70] The park was raised and set back from the street level. The "allées of London Plane trees" created a screen from public view, and very quickly the park became known for crime, drug dealing and other negative activities.[71] In the 1980s, NYC set about redeveloping the park. Successful strategies, including opening the park up for sight-lines, increasing park maintenance, providing space for kiosks and food

[68] Bennett GG, McNeill LH, Wolin KY, Duncan DT, Puleo E, et al. 2007. Safe to walk? Neighborhood safety and physical activity among public housing residents. PLoS Med 4(10): e306. doi:10.1371/journal. pmed.0040306
[69] Handy SL, Boarnet MG, Ewing R, Killingsworth RE. 2002. How the Built Environment Affects Physical Activity: Views from Urban Planning. American Journal of Preventative Medicine 2002;23(2S):64 –73.
[70] Bryant Park Corporation. 2012. Park History. Accessed 8/6/2012 at: http://www.bryantpark.org/about-us/born.html
[71] Projects for Public Spaces. 2001. Bryant Park. Accessed 8/6/2012 at:
http://www.pps.org/great_public_spaces/one?public_place_id=26

vendors, and programing numerous activities to draw large crowds, have rejuvenated the park and made it a positive example of use of public space.[72]

Crime Prevention Through Environmental Design (CPTED) provides a multi-disciplinary approach to creating environments that help reduce criminal activity. CPTED originated with a book by Ray Jeffrey in 1971. According to Jeffrey, "The two basic aims of CPTED are, first, to reduce opportunities for crime that often are inherent in the structure of buildings and the layout of neighborhoods, and second, to promote changes in attitudes among the population at risk. By reducing the apparent opportunity for crime, people should be less fearful of moving freely about their environment."[73]

There are four primary principles of CPTED[74]:

1) **ACCESS CONTROL:** This involves designing streets, sidewalks, building entrances, and neighborhood gateways to clearly indicate transitions from the public environment to semi-private and private areas.

2) **SURVEILLANCE:** A design principle that maximizes the visibility of people, parking areas, vehicles, and site activities. Strategies involve the strategic placement of windows, doors, walkways, parking lots, and vehicular routes.

3) **TERRITORIAL REINFORCEMENT:** Sidewalks, landscaping, and porches help distinguish between public and private areas. This helps users display signs of "ownership" that send "hands off" messages to would-be offenders.

4) **MAINTENANCE:** This addresses management and maintenance of space. Proper upkeep (mowing grass, trimming trees and landscaping, picking up trash, repairing broken windows and light fixtures, and painting over graffiti) helps signal that a location or facility is well cared for and therefore would be inhospitable to a criminal. It also signals that an owner, manager, or neighbor is watching out for the property and could spot illegal behavior.

Traditional neighborhood development (TND) may also increase community safety. Communities with increased connectivity, destinations, and density tend to have more people on the streets throughout the day. Heavy pedestrian traffic provides the "eyes on the street" promoted by Jacobs and enhances safety of users. In addition to TND, planners should promote safety measures, such as streetscaping, including views of greenery, street lighting and regular maintenance to ensure visibility and a cared-for appearance.

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[72] Bryant Park Corporation. 2012. Park History. Accessed 8/6/2012 at: http://www.bryantpark.org/about-us/born.html
[73] Kaplan HM, Helfer Palkovitz L, Pesce EJ. 1978. Crime Prevention Through Environmental Design Final Report on Residential Demonstration Minneapolis, Minnesota. Westinghouse Electric Corporation. Archived by National Criminal Justice Reference Service, U.S. Department of Justice.
[74] National Crime Prevention Council, *Best Practices for Using Crime Prevention Through Environmental Design in Weed and Seed Sites*, 2009

Comprehensive plans can promote safe communities through the following built environment strategies (described in greater detail in Section 2):

- Crime Prevention Through Environmental Design (CPTED)
- Traditional neighborhood development (TND)
- Views of greenery

VIII.   CLIMATE RESILIENT COMMUNITIES
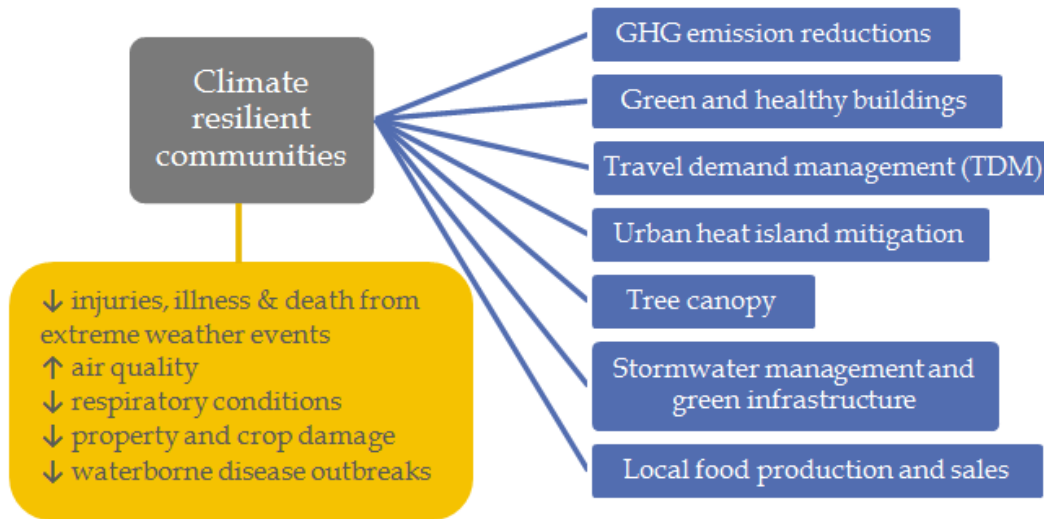
Regional and local climate changes (e.g., temperature, precipitation) are expected to have substantial impacts on public health, including increases in morbidity and mortality attributed to extreme heat events, extreme weather events (e.g., floods, hurricanes), air pollution, and vector-borne and other infectious diseases. There is scientific consensus that GHG emissions resulting from human activities are the leading cause of anthropogenic climate change.[75] Climate resilient communities can prevent the worst public health and economic impacts of climate change by effectively adapting the built environment to climate change and reducing GHGs to mitigate the impacts of climate change.

In Minnesota, the majority of GHG emissions come from the transportation and buildings sectors, therefore strategies targeting vehicle efficiency, reducing vehicle miles traveled (VMT), and increasing energy efficiency of buildings may help reduce GHG emissions. There are co-benefits[76] to reducing GHG emissions. Reductions in mobile and stationary source emissions can reduce particulate matter and ozone formation to improve air quality. If reductions come from increased trips by walking or biking, people will benefit from additional physical activity.

In Minnesota, higher temperatures and likely increases in the number of days with high dew point temperatures (>70 degrees Fahrenheit) may drive the development of more summer-time extreme heat events.[77] Heat-related illnesses affect everyone, especially elderly, children and persons with pre-existing health conditions. Extreme heat events can cause death; between 2000 and 2010 there were 35

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[75] Oreskes N. 2005. The scientific consensus on climate change. Science, 3 December 2004: 1686. DOI:10.1126/science.1103618
[76] Co-benefits are "the benefits of policies that are implemented for various reasons at the same time including climate change mitigation acknowledging that most policies designed to address greenhouse gas mitigation also have other, often at least equally important, rationales (e.g., related to objectives of development, sustainability, and equity)." EPA Glossary of Climate Change Terms. Accessed 8/6/2012. http://www.epa.gov/climatechange/glossary.html
[77] Seeley M. 2012. Climate Trends Associated with Precipitation in Minnesota (presentation). Available online http://climate.umn.edu/seeley/

heat-related deaths in MN.[78] Extreme heat events may be worse in urban areas due to the urban heat island effect. Urban heat islands can raise urban temperatures more than surrounding areas by 5°F during the day and 20°F at night.[79] Increasing tree canopy coverage to shade buildings and impervious surfaces, and increasing vegetation overall can help reduce temperatures in urban areas.

Rising temperatures combined with existing levels of air pollution emissions from power plants and motor vehicles have the potential to increase the development of ground-level ozone, which can have severe health effects on persons with asthma or other respiratory conditions, as well as, persons without preexisting respiratory conditions.[80] Reducing both mobile emissions and the urban heat island effect can help reduce the formation of ozone on hot, stagnant air days.

An increase in the intensity and frequency of precipitation events may result in increased flooding and flash floods, which cause injury or loss of life, property and infrastructure damage (e.g., land transport systems, buildings, power supplies, etc.), displacement from damaged homes, water-borne disease outbreaks, and disruption of crop production.[81] Runoff from impervious surfaces often contains contaminants, such as pathogens, metals, sediment, and chemical pollutants, that can degrade water quality and potentially impact ecological and human health.[82] Stormwater runoff can be reduced and managed through a number of strategies, including green infrastructure, such as vegetated buffers surrounding surface waters. Vegetated buffers filter as much as 75 to 100% of sediment, capture nutrients, degrade pollutants into less toxic forms, and remove up to 60% of some pathogens.[83] Green infrastructure utilizes valuable ecosystem services to maintain a healthy environment and can be integrated into planning. Ecosystem services of the natural environment include air and water purification, flood and climate regulation, biodiversity, and scenic landscapes.[84]

More incidences of these localized, heavy precipitation events can simultaneously result in flooding and drought due to the localized nature of storms leaving some areas drenched and other areas dry. Additionally, reduced snow pack, earlier spring thaw, and longer dry spells between significant rainstorms can cause water shortages.[85] Using both standard and innovative stormwater best management practices (BMP) to increase infiltration water may help to recharge groundwater supplies and can help manage the uncertainty of potential increases and decreases in precipitation.

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[78] Minnesota Department of Health, Minnesota Environmental Public Health Tracking Program (personal communication, March 7, 2012).

[79] U.S. Environmental Protraction Agency (EPA). 2012. Heat Island Effect. Accessed online http://www.epa.gov/hiri/

[80] Union of Concerned Scientists. 2011. Climate Change and Your Health: Rising Temperatures, Worsening Ozone Pollution. Available online at www.ucsusa.org/climateandozonepollution

[81] Karl TR, Melillo JM, and Peterson TC, (eds.) 2009. Global Climate Change Impacts in the United States. Cambridge University Press. Available online: http://downloads.globalchange.gov/usimpacts/pdfs/climate-impacts-report.pdf

[82] Gaffield SJ, Goo RL, Richards LA, Jackson RJ. 2003. Public Health Effects of Inadequately Managed Stormwater Runoff. Amerocam Journal of Public Health. September; 93(9): 1527–1533.

[83] Grismer et al. 2006. Vegetative Filter Strips for NonPoint Source Pollution Control in Agriculture. University of California. Publication 8195. http://ucanr.org/freepubs/ docs/8195.pdf

[84] US Department of Agriculture Forest Service. Ecosystem Services. Accessed 8/6/2012 at: http://www.fs.fed.us/ecosystemservices/

[85] Environment Minnesota Research and Policy Center. 2012. When It Rains, It Pours: Global Warming and the Increase in Extreme Precipitation from 1948 to 2011.

Global changes in temperature and precipitation can affect crop production and therefore food security for countries and regions that rely on certain regions of the world for agricultural imports. Investing in food production at the local level can not only increase food security, but also help stabilize or even grow the local economy.

Comprehensive plans can promote climate resilient communities through the following built environment strategies (described in greater detail in Section 2):

- GHG emission reductions
- Green and healthy buildings
- Travel demand management (TDM)
- Urban heat island mitigation
- Tree canopy maintenance and preservation
- Stormwater management and green infrastructure
- Local food production and sales

SECTION TWO: PLANNING STRATEGIES TO ACHIEVE DESIRED HEALTH GOALS

Section Two describes in detail the built environment strategies to achieve the desired health goals. Each strategy includes a definition, recommended instructions for calculating the strategy, and implementation methods. Table 1 demonstrates how strategies can be used to achieve multiple health goals, demonstrating the interconnectedness of actions to create a healthy community.

Table 1: Health Goals and Related Strategies Matrix

	Healthy housing for all household sizes and incomes	Access to affordable healthy foods	Reduced exposure to air pollutants, hazardous materials, and/or nuisances	Increased physical activity	Increased access to greenery	Increased safety of pedestrian, bicycle, motorists	Increased personal safety and security	Climate resilient communities
Housing-cost burden	X	X						
Life-cycle housing	X							
Green & healthy buildings	X							X
Traditional neighborhood development (TND)		X		X		X	X	
Brownfield cleanup and redevelopment of underutilized sites			X					
Separated incompatible land uses			X					
Complete Streets				X		X		
Transit-oriented development (TOD)				X		X		
Traffic calming and other road safety measures				X		X		
Bicycle and pedestrian plan				X		X		
Travel demand management (TDM)			X			X		X
Trail access				X	X			
Tree canopy maintenance and preservation					X			X
Views of greenery					X		X	
Park provision				X	X			
Crime Prevention Through Environmental Design (CPTED)				X			X	
Local food production and sale		X						X
Urban heat island mitigation								X
GHG emission reductions			X					X
Stormwater management								X

HOUSING-COST BURDEN

DEFINITION

The housing-cost burden reflects the percentage of household income spent on housing. Housing-cost burden also should incorporate the cost of transportation to employment opportunities, goods and services. Housing is affordable when a family with a moderate or low income pays no more than 30-40% of its monthly income for housing and transportation. The Twin Cities Metro region's Area Median Income (AMI) in 2010 was $84,000.[86] That means 50% of households make less than $84,000 per year and 50% of households make more than $84,000 per year. To ensure all persons have quality, healthy housing, housing must be affordable and desirable to a variety of incomes.

HOW TO CALCULATE

Below are recommended steps on how to calculate housing-cost burden. However your community chooses to calculate housing-cost burden, make sure the method is consistent over time to enable comparison of one year to another.

- Determine the community make-up
    - Identify the community's area median income
        - For communities in the metro area, data is compiled by the Met Council[87]
        - For communities outside the metro area, data can be collected from the Census Bureau American Community Survey
    - Note that 50% of households make less than the area median income
        - For example, in Coon Rapids, AMI in 2010 was $60,900
        - Thirty percent of a household's monthly income making AMI would be around $1,500, the level of affordable monthly housing costs
    - Identify the percentage of the community living at or below poverty.
        - For communities in the metro area, data is compiled by the Met Council[88]
        - For communities outside the metro area, data can be collected from the Census Bureau American Community Survey
        - In 2010, a household of four (two adults, two children) would be considered living in poverty if they made $22,113 or less per year. Thirty percent of a household's monthly income making $22,113 would be around $550, the level of affordable monthly housing costs.
    - Identify the affordability of new housing units added for both rental units and owner-occupied units
        - For communities in the metro area, data is compiled by the Met Council[89]

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[86] Met Council. 2011. Affordable Housing Production in the Twin Cities Region. Metro Stats November, 2011. Available online: http://stats.metc.state.mn.us/stats/pdf/AffordableHousing_MS2010.pdf
[87] AMI data is made available by Met Council under Community Profiles "Income and Poverty" tab: http://stats.metc.state.mn.us/profile/Default.aspx
[88] Poverty percentages are made available by Met Council under Community Profiles "Income and Poverty" tab: http://stats.metc.state.mn.us/profile/Default.aspx

- For communities both inside and outside the metro area, this data may be available through the local planning office, assessor's office, or housing and redevelopment authority (HRA)
  - ¤ Consider how household incomes and poverty match housing market rates in the community
    - For example, in Coon Rapids, median gross rent was $890 per month[90]
  - ¤ Consider how the community is projected to grow or change over the next 20 years and whether the existing and planned housing will meet the needs of the population
- Additional tools/resources:
  - ¤ Calculate "true affordability" with the **Housing & Transportation Affordability Index** for the community and determine whether there are enough affordable housing units for the demand: http://htaindex.cnt.org/

IMPLEMENTATION STRATEGIES

Implementation will involve targeting many types of housing, including new, renovated and redeveloped housing, to address community needs. The following strategies are recommended:

- Include a goal to collaborate with community land trust or other non-profit organization to identify redevelopment opportunities for new housing stock
- Identify local programs or incentives for renovation of existing housing. Examples include the following:
  - ¤ A home improvement loan or grant program
  - ¤ A home improvement resource center
  - ¤ A local tool-sharing center or program
  - ¤ A combined lead abatement and weatherization program to make housing healthier and less expensive to heat and cool
- Support the utilization of official controls to achieve affordable housing, such as the following:[91]
  - ¤ Density bonuses, inclusionary housing requirements or some other innovative zoning approach
  - ¤ Variances, rezoning, special use or conditional permits or similar variations from the standards set forth in the community's zoning ordinance for the purpose of facilitating a specific affordable housing development
  - ¤ Local design requirements for public improvement that may reduce the cost of public services to residential properties
  - ¤ Public service standards or requirements that include streets, curbs, gutter, sewer and water hookups, street lighting and other required public improvements in order to reduce development costs to increase affordability in a new residential development

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[89] Affordability of New Units Added are made available by Met Council under Community Profiles "Housing" tab: http://stats.metc.state.mn.us/profile/Default.aspx

[90] Median housing values and median gross rent are made available by Met Council under Community Profiles "Housing" tab: http://stats.metc.state.mn.us/profile/Default.aspx

[91] Source: Metropolitan Council Housing Performance Guidelines, 2012. Available online: http://www.metrocouncil.org/housing/HousingPerformanceGuidelines2012.pdf

- ¤ Reduced standards that can increase the cost of new housing development, such as the required street right-of-way, or surfacing width or depth design for residential street, or the size of sewer or water service lines to new housing
- ¤ Accessory housing ordinance that permits the addition or creation of accessory housing units
- Promote funding sources and other financial incentives to achieve affordable housing, such as the following:
  - ¤ Tax-increment financing (TIF)
  - ¤ Community Development Block Grant (CDBG) funds
  - ¤ Livable Communities Act – Local Housing Incentive Account
    - Grants to help create and preserve affordable rental and ownership housing throughout the region for low- and moderate-income households at all of life's stages, and to support residential reinvestment and redevelopment to achieve economically health and livable communities.
      http://www.metrocouncil.org/services/livcomm.htm
- **Additional Resources:**
  - ¤ Housing and Health: New Opportunities for Dialogue and Action
    http://changelabsolutions.org/sites/changelabsolutions.org/files/Health%20%20Housing%20New%20Opportunities_final.pdf

LIFE-CYCLE HOUSING

DEFINITION

Life-cycle housing provides appropriately sized housing for all stages of life including young professionals, families, empty-nesters, and elderly. Life-cycle housing should be complemented with housing for a variety of incomes to ensure that households of varying sizes can afford a home that meets their needs. Overcrowding may be an issue in communities with growing populations of families. Overcrowding has proven health impacts, including physical health, mental health and personal safety.[92] The U.S. Department of Housing and Urban Development (HUD) uses multiple definitions of overcrowding, the most common definition being more than 1.5 persons per room or more than 2 persons per bedroom. Additionally, the growing elderly population may desire smaller housing units, housing without stairs, and housing closer to services that increases accessibility.

HOW TO CALCULATE

Below are recommended steps on how to calculate life-cycle housing. However your community chooses to calculate life-cycle housing, make sure the method is consistent over time to enable comparison of one year to another.

- Determine the community make-up
  - ¤ Identify the number or percentage of overcrowded households (more than 1.5 occupants per room) from the U.S. Census Bureau American Community Survey[93]
  - ¤ Identify the number or percentage of households that are 1-person, 2-persons, 3-persons, and 4-persons or more[94]
  - ¤ Identify the number or percentage of households that are elderly (65 years old and older) living alone[95]
  - ¤ Consider how the breakdown of household overcrowding and composition matches the housing supply in the community
  - ¤ Consider how the community is projected to grow or change over the next 20 years and whether the existing and planned housing will meet the needs of the population

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[92] U.S. Department of Housing and Urban Development (HUD). 2007. Measuring Overcrowding in housing. Available online: http://www.huduser.org/publications/pdf/Measuring_Overcrowding_in_Hsg.pdf

[93] U.S. Census Bureau. American Community Survey. Data accessible through FactFinder: http://factfinder2.census.gov/. Search for Topics – "Housing Occupancy Characteristics – Household Size" and select or search for your community in Geographies. "S2501 - Occupancy Characteristics" will provide the percentage of households that have 1.5 or more occupants per room for renter-occupied households, owner-occupied households, and all occupied households combined.

[94] U.S. Census Bureau. American Community Survey. Data accessible through FactFinder: http://factfinder2.census.gov/. Search for Topics – "Housing Occupancy Characteristics – Household Size" and select or search for your community in Geographies. "S2501 - Occupancy Characteristics" will provide the percentage of households that are 1-person, 2-persons, 3-persons, or 4-persons or more for renter-occupied households, owner-occupied households, and all occupied households combined.

[95] U.S. Census Bureau. American Community Survey. Data accessible through FactFinder: http://factfinder2.census.gov/. Search for Topics – "Housing Occupancy Characteristics – Household Size" and select or search for your community in Geographies. "S2501 - Occupancy Characteristics" will provide the percentage of households that persons 65 years old or older living alone [Household type, Nonfamily households, Householder living alone, Householder 65 years and over].

IMPLEMENTATION STRATEGIES

Housing goals or policies to support the construction or rehabilitation of variety of housing styles, types and densities, both rental and owner-occupied, that are affordable to low and median income buyers and also for the 'move-up' buyers, include the following:

- The Shoreview comprehensive plan included a section within their housing plan on "changing demographics." The section included the following language:
    - ¤ *"When considering housing policies and strategies, the City must take into consideration the shifting demographics and changing needs of our residents. The residential development pattern primarily consists of detached single-family homes, which have been generally designed to meet the needs of young families. Additional housing opportunities must be provided to address the needs of our aging population while attracting and retaining younger households. Life-cycle housing policies support the construction of rental and owner-occupied units that are affordable to low and median income buyers and also for the move-up buyer. These policies also support a variety of housing styles, types and densities that provide housing options for individuals as they move through different stages in life."*[96]
- Support goals and objectives to approve and permit proposed housing developments in light of population forecasts, existing housing stock, and current and future community and regional needs, as appropriate[97]
- Consider adoption of ordinances that increase flexibility to promote lifecycle housing; for example, increase designated amount of multi-family use/zoning, reduce front and interior setback requirements, adopt cluster development ordinances, etc.[98]
- Encourage the preservation of existing neighborhoods and expansion of housing choices within the city[99]
- Plan for and guide infill development, redevelopment, and adaptive reuse of structures to diversify housing in existing neighborhoods[100]
- See official controls, funding sources and financial incentives from Housing-Cost Burden section, page 30
- **Additional Resources:**

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[96] Shoreview Comprehensive Plan, available online: http://www.shoreviewmn.gov/resources/comprehensive-plan
[97] Adapted from the Met Council 2030 Regional Development Framework, available online: http://www.metrocouncil.org/planning/framework/Framework.pdf
[98] Adapted from the Met Council 2030 Regional Development Framework, available online: http://www.metrocouncil.org/planning/framework/Framework.pdf
[99] Adapted from the Met Council 2030 Regional Development Framework, available online: http://www.metrocouncil.org/planning/framework/Framework.pdf
[100] Adapted from the Met Council 2030 Regional Development Framework, available online: http://www.metrocouncil.org/planning/framework/Framework.pdf

¤   Housing and Health: New Opportunities for Dialogue and Action
http://changelabsolutions.org/sites/changelabsolutions.org/files/Health%20%20Housin
g%20New%20Opportunities_final.pdf

GREEN AND HEALTHY BUILDINGS

DEFINITION

Green and healthy buildings should use less energy and resources throughout their life-cycle (from construction through maintenance and demolition) than conventional designs and promote indoor air quality. Exposure to lead from homes built before 1978, radon from homes with cracks in the foundation, and mold from homes with moisture problems can have serious health impacts on residents.

Energy efficient buildings include more than just efficient lights and appliances internal to the building, it also encompasses building orientation and design to capture natural light, provision of shading during hot summer days, and incorporation of water conservation strategies inside the building and out on the grounds. Additionally, buildings are only as green and healthy as their site allows. Proper siting includes consideration of adjacent uses, walkability, and past uses that may pose potential health hazards.

HOW TO CALCULATE

Below are recommended steps on how to calculate green and healthy buildings. However your community chooses to calculate green and healthy buildings, make sure the method is consistent over time to enable comparison of one year to another.

- Determine risk of unhealthy homes in the community
    - ¤ Radon: one in three homes has radon levels that pose a significant health risk, and nearly 80% of the counties are rated High Radon zones. See the radon brochure by the Minnesota Department of Health (MDH) for more information: http://www.health.state.mn.us/divs/eh/indoorair/radon/index.html
    - ¤ Lead: determine the percentage of homes built before 1978 in your community and the percentage of children tested for blood lead with elevated blood lead levels at the Minnesota Public Health (MNPH) Data Access portal: https://apps.health.state.mn.us/mndata/lead
    - ¤ Mold resources for renters and homeowners: http://www.health.state.mn.us/divs/eh/indoorair/mold/index.html
- Measure energy performance of the community's buildings:
    - ¤ Obtain energy use data from local utilities (electric and gas) by building sector, including residential, commercial and industrial
    - ¤ Use trend data to determine whether energy use is going up or down
    - ¤ If data is available, normalize energy use with total square footage by building sector to determine whether buildings are using less energy over time
- For green and healthy building siting, see the following three sections: traditional neighborhood development (TND), brownfield cleanup and redevelopment of underutilized sites, and separated incompatible land uses

Implementation of green and healthy housing will involve the coordination of many resources. The following strategies are recommended:

- Support goals or the creation of local programs to combine weatherization, lead abatement, radon testing and mold removal for qualifying households, with a focus on those with limited incomes
- Promote education on lead, radon and mold exposure and prevention
- Promote green building programs (projects may not be required to complete certification, due to expense of certification):
  - ¤ EPA's Energy Star program -- http://www.energystar.gov/index.cfm?c=business.bus_index
  - ¤ U.S. Green Building Council's Leadership in Energy and Efficiency Design (LEED) and LEED – Neighborhood Design programs -- http://www.usgbc.org/LEED
- Support the use of energy efficient/green building codes, such as the following:
  - ¤ ASHRAE 90.1 code (American Society of Heating, Refrigerating and Air-Conditioning Engineers) -- http://www.ashrae.org/
  - ¤ International Code Council
    - International Energy Conservation Code -- www.iccsafe.org
    - International Green Construction Code (IGCC) – http://www.iccsafe.org/cs/igcc/pages/default.aspx
      - ¤ If the IGCC is adopted as an appendix chapter to the Minnesota building code, cities will have the option to adopt it locally as the standard
- Set a goal for the percentage of buildings (residential, commercial/industrial, and/or civic) that will be green and healthy buildings by 2040
- Adopt a policy that all future civic development and redevelopment and private projects with city funding or financial incentives include green and healthy building practices
- Example green building policies, Mahtomedi:
  - ¤ *Objective CF-2.1: Where feasible, incorporate sustainable building techniques into City facilities.*
    - *Policy CF-2.1.a: Develop and implement a plan to ensure that new construction and renovations pertaining to City facilities, where feasible, follow LEED (Leadership in Energy and Environmental Design) or B3 ((Buildings, Benchmarks and Beyond (originally called the Minnesota Sustainable Design Guide)) standards. (Note: It is not the intent of this policy to require that all City facilities be LEED 'certified', though the City may choose to do so.)*
    - *Policy CF-2.1.b: Develop and implement a plan to reduce the amount of conventionally maintained lawns associated with City facilities. Where appropriate promote native landscaping that reduces the use of chemical fertilizers, herbicides, pesticides, irrigation and fossil fuel use.*
  - ¤ *CITY FACILITIES AND SERVICES PLAN*
    - *City Hall*
      The City will strive to make City Hall a showcase facility that simultaneously considers economic, social, and environmental factors. For example, the City will

continue to make cost-effective improvements to City Hall that will conserve energy. The City will explore ways to enhance the City Hall site by implementing low impact design storm water techniques, low maintenance native landscaping, and similar techniques that are cost-effective, attractive, and environmentally sound. The City will also explore opportunities to implement an environmental preference purchasing program that will save the City money and that will be healthier for all.

- *Public Works*
  In 2008, the City replaced the existing public works building on Long Lake Road with a new, energy-efficient, green building. The Public Works Department will build on the success of that project by continuing to identify opportunities to provide cost-effective, safe, and environmentally sound City vehicles and equipment.
- *Energy Conservation*
  The City will explore ways to reduce its energy consumption. For example, the City will strive to replace inefficient lighting in City facilities with more efficient lighting, to replace inefficient City vehicles with more efficient vehicles, and to use green building techniques in new and renovated City buildings.
  The City will explore opportunities to partner with other public or private resources (such as the Center for Energy and Environment (CEE), Renew Minnesota!, and the International Council on Local Environmental Issues (ICLEI)) to promote an awareness and understanding of energy conservation efforts and to seek grants to implement energy conservation measures.
  The City will update its ordinances to address energy conservation issues that affect community facilities as well as other types of development. For example, the City will update or create (as needed) ordinances dealing with solar access and wind energy.

- The APA Policy Guide on Climate Change and Planning supports urban and building design for alternative sources of energy and energy efficiency through four policies:
  - *Energy Policy 5: Design for Alternative Sources of Energy*
    Support urban design strategies that maximize use of renewable, sustainable, active and passive sources of energy design in architecture. Increase and/or extend tax credits for the use of active energy generation in building design and construction practices.
  - *Energy Policy 11: Renewable Energy Systems and Energy Efficiency in Public Facilities*
    Construct and renovate public facilities to serve as demonstrations of energy efficiency improvements and green building practices and include (where possible) renewable energy systems such as photovoltaic electricity or solar hot water panels.
  - *General Green Development Policy A: The American Planning Association, its Chapters and Divisions, and planners support the implementation of green development design standards and incentives that reduce the carbon footprint and enhance the climate adaptive capabilities of new and existing buildings and developments.*
  - *Green Development Policy 1: Green Building Standards*
    Support the continued development and application of green building standards. Develop and promote the means and standards to reach carbon neutral buildings by 2030. Incorporate green building and energy efficiency standards in all public facilities.

- **Additional Resources:**
  - ¤ Sustainable Sites Initiative: http://www.sustainablesites.org/products/
  - ¤ Healthy General plans, p.73:
    http://changelabsolutions.org/sites/changelabsolutions.org/files/Healthy_General_Plans_Toolkit_Updated_20120517_0.pdf
  - ¤ Center for Energy and Environment: http://www.mncee.org/

TRADITIONAL NEIGHBORHOOD DEVELOPMENT (TND)

DEFINITION

At the most basic level, TND is characterized by moderately high densities, diverse land uses and often civic or public spaces. TND mimics the compact development of older neighborhoods prior to the boom of the personal automobile, which developed to ensure walkability as the primary mode of transportation. This section includes detailed descriptions of mixed land uses, density and connectivity of street network that characterize TND.

Mixed land uses

Mixed land use may include more than one compatible use in a building or group of buildings that allows people to live, work, play and shop in one place. Particularly for developed communities, mixed use districts may be an effective way to accommodate growth, including higher density housing, as well as promoting jobs and housing balance.

Density

The purpose of density is to ensure that development is compact enough to encourage walking. Mixed use land will not promote walking if there is only one dwelling unit or establishment per acre, or ½ mile walking. Also, density can conserve land by clumping uses together more efficiently.

The Met Council Regional Development Framework sets an overall minimum residential density standard of 3 to 5 units per acre in developed communities where urban services are available. A minimum density of 3 units per acre assures the efficient use of regional systems. Furthermore, housing at higher densities may help communities reach their affordable housing goals.

Connectivity of street network

Connectivity in this context is the measure of the street network or grid. The more connected the grid, the more intersections and the more walkable the environment is for pedestrians. Connectivity is important to promote the effectiveness of density and mixed land uses. A community can be dense and include a mix of land uses, but without frequent intersections it will be less walkable. Many suburban or gated-community developments are dense, but contain a network of cul-de-sacs that twist and turn and dead-end, making it difficult to efficiently walk from one place to another within the neighborhood.

TND can work for both developed and developing/rural communities. In developed communities, TND may work best in areas that are ripe for redevelopment and reinvestment. This may include areas that are economically depressed, areas that have high rates of pedestrian conflicts, or areas that have become a mix of non-conforming or conditional uses that need to be rezoned to foster growth. In

developing or rural communities, TND may work best in areas that are undeveloped but adjacent to existing development to foster growth of livable communities.

HOW TO CALCULATE

Below are recommended steps on how to calculate TND through mixed land uses, density and connectivity. However your community chooses to calculate TND, make sure the method is consistent over time to enable comparison of one year to another.

Mixed land uses

The Dubuque Sustainability Progress Report 2012 includes a method for measuring the level of mixture of six types of land uses on a scale of 0 to 100. The six land uses are single-family residential, multi-family residential, offices, retail, education, and entertainment. The city was randomly divided into ½ mile by ½ mile study areas. A score of 100 indicates that all six land uses are present in equal amounts in each of the study areas. A score of 0 indicates that in each ½ mile by ½ mile study area, only one land use is present. Thus, higher scores indicate higher levels of land-use mixture. See page 28 of the following Sustainability Report: http://www.cityofdubuque.org/DocumentCenter/Home/View/15189

Measuring mixed use can be modified as desired by a community. For example, it may be more effective for a community to deliberately divide up into study areas, not randomly as Dubuque did. This could be done by neighborhood boundary or buffers around retail centers, transportation hubs, etc.

Additional calculations may include the following:

- Determine a certain percentage (e.g., 50%) of residential buildings within a designated area are within ¼ mile of a certain number of non-residential uses (e.g., library, restaurant, corner store) or a certain number of diverse uses (e.g., 1 library and 5 restaurants would count as 2 diverse uses).
- Utilize GIS departments or staff that can undertake more complicated measures of mixed use than the number of uses within a ½ mile by ½ mile square, which does not provide the mix of uses, but rather the number of diverse uses.

Density

Density will vary based on whether the community is a central city or rural area. For example, in Minneapolis there are four levels of residential density ranging from low-density residential (less than 20 dwelling units per acre) to very-high density residential (more than 120 units per acre). As comparison, Shoreview, another developed community, allows up to 4 units per acre in the low-density residential land use, and 8 to 12 units per acre in the high-density residential. Up to 45 units per acre are allowed for senior residential through a planned unit development (PUD). Commercial and industrial density will vary by community as well.

To achieve transit service, density must serve a certain threshold of residents or workers. Design for Health[101] provides the following chart demonstrating a range of density minimums for transit service based on the type of transit:

Minimum Service Level	Residential Density Thresholds (housing units per gross acre)	Employment Center Thresholds
1 bus/hour	4-6 dwelling units/gross acre	5-8 million sq. ft. commercial/office space
1 bus/30 minutes	7-8 dwelling units/acre	8-20 million sq. ft. commercial/office space
Light rail and feeder buses	9 dwelling units/acre	35-50 million sq. ft. commercial/office space

*Note: Net acres are often referenced in zoning codes and consider only the area developed for housing or employment. Gross acres are total land areas, which may include streets, parks, water features, and other land not used directly for residential or employment-related development.

USGBC's LEED-ND program provides suggested density minimums for transit and non-transit corridors:

- Transit corridor density minimum: 12 or more dwelling units per acre of residential uses within ¼ mile of transit station/stop; 0.80 floor-area ratio (FAR) or greater for non-residential uses within ¼ mile of transit station/stop
- Non-transit corridor density minimum: 7 or more dwelling units per acre of residential uses; 0.50 FAR or greater for non-residential uses

Similar to the mixed land use calculation, to calculate density it may be helpful to break the community down into neighborhoods or unique area nodes and then calculate the density of residential and nonresidential development in those different parts of the jurisdiction. In areas that are below desired densities, seek strategies to effectively increase density to achieve desired outcomes (e.g., transit service or walkability).

Connectivity of street network

Determine the walkability of the community.

- Consider the following two questions:
  - ¤ What are the block lengths in different areas of the community?

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[101] Design for Health (DFH). 2007. Key Questions: Accessibility. Available online: http://designforhealth.net/general-health-issues/accessibility/

- ¤ What is the street intersection density or the street network density in different parts of the community? Note: USGBC LEED-ND recommends at least 140 intersections per square mile
- Map existing sidewalks and identify gaps or super blocks that impede the walkability of the community
- Use existing tools to determine community connectivity:
  - ¤ Minnesota Department of Health Let's Go for a Walk community walkability assessment http://www.health.state.mn.us/divs/hpcd/chp/cdrr/physicalactivity/communities/communitiesgoforawalk.html
  - ¤ Walk Score - http://www.walkscore.com/; the "Street Smart" Walk Score will calculate the number of intersections per square mile
  - ¤ Centers for Disease Control and Prevention (CDC) Worksite Walkability Audit Tool -- http://www.cdc.gov/nccdphp/dnpao/hwi/toolkits/walkability/audit_tool.htm

IMPLEMENTATION STRATEGIES

The following recommended strategies will be most effective when implemented in combinations that promote mixed land uses, density and connectivity together:

- Promote mixed land uses (vertical or horizontal) of residential and neighborhood commercial in areas that lack mixed uses through the following strategies:
  - ¤ Mixed use (MU) zoning districts
  - ¤ Allowing residential uses as conditional use in neighborhood/local commercial zones, or vice versa, allowing neighborhood/local commercial uses in residential zones (could be limited to medium or high density residential)
    - Example language, Minneapolis: *Urban Neighborhood (UN) land use - Predominantly residential area with a range of densities, with highest densities generally to be concentrated around identified nodes and corridors. May include undesignated nodes and some other small-scale uses, including neighborhood-serving commercial and institutional and semi-public uses (for example, schools, community centers, religious institutions, public safety facilities, etc.) scattered throughout.*
  - ¤ TND zoning districts (described below)
  - ¤ TOD zoning districts
- Encourage mixed land use redevelopment through policy statements and density and FAR bonuses/up-zoning
  - ¤ Example policy statement, Robbinsdale: *The City will continue to review ordinances and development standards that promote mixed-use development, transit oriented development, planned unit development, and overlay districts.*

- ¤ Example of density and FAR bonuses/up-zoning, Burnsville: *Density bonus & FAR bonuses are allowed for Planned Unit Developments, MIX (Mixed-Use) and HOC (Heart of the City) in the zoning code.*
    - ▪ *Chapter 22C: MIX Mixed use District, subsection (K) Residential Density Bonuses: Multiple-family housing, as part of a mixed use development or freestanding, may pursue an increase in density up to twenty five percent (25%) through a reduction in the required lot area per unit, based on the following bonus features and square foot reductions:*
        - ¤ *Underground parking*
        - ¤ *Registered green building (USGBC)*
        - ¤ *Public transit*
        - ¤ *Recreation, indoor (and/or social room)*
- ▪ Encourage density increases through development or redevelopment policy statements, density and FAR bonuses/up-zoning
    - ¤ Example policy statement, Minneapolis: *Promote standards that help make commercial districts and corridors desirable, viable, and distinctly urban, including: diversity of activity, safety for pedestrians, access to desirable goods and amenities, attractive streetscape elements, density and variety of uses to encourage walking, and architectural elements to add interest at the pedestrian level.*
- ▪ Connectivity of street network is already encouraged through Comprehensive Plan Requirements (from Met Council Transportation Policy Plan Chapter 9: Bike and Pedestrian) *Pedestrian and bicycle elements of local comprehensive plans shall:*
    - ¤ *Provide connections to adjacent (local and county) jurisdictions and their walkway and bikeway systems*
    - ¤ *Fill gaps and remove barriers in the existing local, county or regional walkway/bikeway systems*
    - ¤ *Design and locate walkways and bikeways to serve both travel and leisure purposes*
    - ¤ *Provide pedestrian and bicycle facilities to and within high activity nodes, especially commercial and transit centers*
- ▪ Include goals for citywide walkable grid system
    - ¤ Example, St. Louis Park: *Goals for the Pedestrian and Bicycle System –*
        - ▪ *Establish a citywide grid-system of sidewalks every ¼-mile.*
        - ▪ *Establish a citywide grid-system of bicycle facilities every ½-mile.*
        - ▪ *Close gaps in neighborhoods' existing sidewalk networks.*
- ▪ Include street network standards in mixed use, TOD and TND zoning and planned unit development guidance
- ▪ Include objective(s) to complete sidewalk gaps across the community
- ▪ Consider accessibility for a variety of users (e.g., physical disabilities, strollers, etc.) when developing policies for connectivity
- ▪ TND ordinance or overlay district

- ¤ Mix of residential, commercial, civic, and open-space areas, allowing residents to live within one quarter mile or a five-minute walk from these uses
- ¤ Uses may include food services, such as neighborhood grocery stores, butcher shops, bakeries, and restaurants; cafes and coffee shops; neighborhood bars or pubs
- ¤ TND often promote pedestrian-friendly environments and may exclude drive-throughs and other auto-oriented uses explicitly. This may also discourage development of fast-food establishments.
- ¤ May regulate floor area ratio (FAR), building heights and setbacks, prohibited uses, design and parking requirements
- Example ordinance, St. Paul:[102] *St Paul Traditional Neighborhood (TN) districts are intended to foster the development and growth of compact, pedestrian-oriented urban villages. All four districts are intended to encourage a compatible mix of commercial and residential uses within buildings, sites and blocks; new development in proximity to major transit streets and corridors; and additional choices in housing.*
  - ¤ *TN1: The T1 traditional neighborhood district is intended to provide for compact, pedestrian-oriented mixed-use areas of limited size, with a variety of residential, office and service uses that primarily serve neighborhood needs. It is also intended to serve as a transitional use of land along major thoroughfares, between commercial or industrial districts and residential districts or other less intensive land uses.*
  - ¤ *TN2: The T2 traditional neighborhood district is designed for use in existing or potential pedestrian and transit nodes. Its intent is to foster and support compact, pedestrian-oriented commercial and residential development that, in turn, can support and increase transit usage. It encourages, but does not require, a variety of uses and housing types, with careful attention to the amount and placement of parking and transitions to adjacent residential neighborhoods.*
  - ¤ *TN3: The T3 traditional neighborhood district provides for higher-density pedestrian- and transit-oriented mixed-use development. It is designed for development or redevelopment of land on sites large enough to support:*
    - *(a) A mix of uses, including residential, commercial, civic and open space uses in close proximity to one another;*
    - *(b) A mix of housing styles, types and sizes to accommodate households of varying sizes, ages and incomes;*
    - *(c) A system of interconnected streets and paths that offer multiple routes for motorists, pedestrians and bicyclists, and are connected to existing and future streets;*
    - *(d) A system of open space resources and amenities; and incorporation of environmental features into the design of the neighborhood.*

    The T3 district is also intended for smaller sites in an existing mixed-use neighborhood center where some of the above elements already exist, or in an area identified in the

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[102] St Paul zoning code. Accessed 8/7/2012. http://library.municode.com/index.aspx?clientId=10061

comprehensive plan as a potential "urban village" site. The above elements may be found within the T3 district or adjacent to it; the intent is that all would be present within a reasonable walking distance.

¤ *TN4 (new, developed in response to proposed Central Corridor overlay district): The T4 traditional neighborhood district provides for high-density, transit-supportive, pedestrian-friendly mixed-use development. It is particularly intended for use near transit stops along fixed rail transit (including commuter rail, light rail and trolley) corridors, where a greater reliance on transit makes high-density mixed-use development possible and desirable.*

BROWNFIELD CLEANUP AND REDEVELOPMENT OF UNDERUTILIZED SITES

DEFINITION

Land that is underutilized and potentially contaminated contributes to blight, loss of property values and may adversely affect public health. Reuse of remediated Brownfields can fill a gap within an existing community and relieve pressure on the development of undeveloped land, thereby increasing connectivity for active transportation, reducing vehicle miles traveled, and preserving "greenfields" (i.e., undeveloped land) for local food production or ecosystem services, such as flood protection.[103]

HOW TO CALCULATE

Below are recommended steps on how to calculate brownfields and underutilized sites. However your community chooses to calculate brownfields and underutilized sites, make sure the method is consistent over time to enable comparison of one year to another.

Successful cleanup and redevelopment of brownfield sites includes more than just identification of contaminants and their potential health impacts. Redevelopment should bring a needed good or service to the community. For that reason, brownfield redevelopment should begin with a combination of community visioning and site identification. Consider specific community needs for appropriate redevelopment, such as, grocery/healthy food store, community/recreation center, or green job incubator or workforce development center.

For site identification, create a map of brownfields and underutilized sites. Planners can work with the Environmental Protection Agency and local jurisdictions to identify and create a list of brownfield sites in the community. Public lists, property titles, aerial photographs, and Sanborn maps (historic records of land use from 1867 to 1970; available at public and academic libraries) are all good sources for identifying potentially contaminated land. Additionally, the Minnesota Pollution Control Agency (MPCA) hosts the interactive mapping application, "What's in my neighborhood?"[104]

IMPLEMENTATION STRATEGIES

Comprehensive plans should provide direction on how to identify these sites and recognize their potential health concerns and opportunities for redevelopment. The following strategies are recommended:

- Include policy statements supporting the cleanup and redevelopment of brownfields
- Promote educational resources for developers regarding the brownfield cleanup and development process and associated funding sources and other cleanup and development incentives

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[103] American Planning Association. 2011. Policy Guide on Planning and Climate Change. Adopted April 27, 2008; updated April 11, 2011. Accessed online: http://www.planning.org/policy/guides/pdf/climatechange.pdf
[104] http://www.pca.state.mn.us/index.php/data/whats-in-my-neighborhood/index.html

- Remove barriers to redevelopment (environmental hazards, contaminated soils, dilapidated buildings)
- Promote funding sources for Brownfield/contamination cleanup,[105] such as:
  - ¤ Environmental Protection Agency (EPA): http://www.epa.gov/brownfields/grant_info/index.htm
  - ¤ Minnesota Department of Employment and Economic Development (DEED) Contamination Cleanup/Investigation Grant Program: This program provides grant monies towards contamination investigations and the development of a Response Action Plan (RAP) or for the cleanup of contamination on sites, which will be redeveloped. The Contamination Cleanup grants address the growing need for uncontaminated, developable land. Grants are awarded to those sites where there is serious, imminent private or public development potential. http://www.positivelyminnesota.com/Government/Financial_Assistance/Site_Cleanup,_Redevelopment,_Transit_Funding/index.aspx
  - ¤ Met Council - Metropolitan Livable Communities Tax Base Revitalization Account Grants and low interest loans are awarded on a competitive basis from this fund to cities participating in the Metropolitan Livable Communities Housing Incentives Program. The purpose of the grants is to help clean up polluted lands to provide economic redevelopment and job growth opportunities. http://www.metrocouncil.org/services/livcomm/LCAresources.htm#TBRA
  - ¤ Hennepin County has two programs
    - Environmental Response Fund: http://tinyurl.com/Hennepin-ERF
    - Brownfields Cleanup Revolving Loan Fund: http://tinyurl.com/Hennepin-BCRLF
  - ¤ Tax Increment Financing (TIF): depending on the district being used (e.g., Redevelopment Districts, Renovation and Renewal Districts and Soils Condition District), TIF can generally be spent on the following uses:
    - Land acquisition
    - Site improvements
    - Public and on-site utilities
    - Demolition
    - Relocation
    - Cleanup of contaminated soils
    - Administrative costs
- **Additional Resources:**
  - ¤ CDC's Agency for Toxic Substances and Disease Registry: Leading Change for Healthy Communities and Successful Land Reuse
    - 9 case studies of innovative ways to clean up and reuse brownfield or underutilized sites http://www.atsdr.cdc.gov/sites/brownfields/
  - ¤ APA's REUSE: Creating community-based brownfield redevelopment strategies http://www.planning.org/research/brownfields/pdf/brownfieldsguide.pdf

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[105] Adapted from New Brighton comp plan

SEPARATED INCOMPATIBLE LAND USES

DEFINITION

Land uses are incompatible if they create a nuisance or public health threat, including but not limited to pollutants, noise, dust, odor and safety. Mixed land uses should be promoted while being conscious of the type of operations, chemicals, and waste removal and remediation activities on a site near residential development to prevent negative health and livability outcomes. To further foster healthy communities and work environments, industrial uses that have typically been seen as noxious should be held to a standard of livability for employees who work in them and people who recreate or live near these uses.

HOW TO CALCULATE

Below are recommended steps on how to calculate incompatible land uses. However your community chooses to calculate incompatible land uses, make sure the method is consistent over time to enable comparison of one year to another.

- Use the community's current and future land use maps to locate hazardous sites and determine their proximity to incompatible uses (e.g., residential)
- Also, see the previous strategy, brownfield cleanup and redevelopment of underutilized sites

IMPLEMENTATION STRATEGIES

Implementation of separated incompatible land uses should be sensitive to the potential conflict of simultaneously promoting mixed land uses to achieve other health goals. The following strategies are recommended:

- Promote the transition of land uses. For example, site industrial uses next to commercial/office uses, and use retail/mixed use to buffer residential from commercial/office uses.
- Support the use of zoning, buffers or set-backs
    - ¤ Performance-based zoning: "Performance-based zoning regulates land use based not on the proposed use, location and dimensions of the development, but on the basis of the actual impacts it will have on the neighboring residents and businesses. It allows any land use to locate adjacent to any other use, provided it satisfies predetermined performance standards (noise, dust, hours of operation, views, etc.). " [106]
    - ¤ Use natural buffers (landscaping, parks or other natural buffers) to provide additional benefits such as aesthetic, air quality improvements (noise and pollution), and mental health benefits from views of greenery.

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[106] Alexander D and Tomalty R. 2002. Smart Growth and Sustainable Development: challenges, solutions and policy directions. *Local Environment, Vol. 7, No. 4, 397–409.*

- For an example, see "Zoning a pollution buffer" in Healthy General plans, p.56: http://changelabsolutions.org/sites/changelabsolutions.org/files/Healthy_General_Plans_Toolkit_Updated_20120517_0.pdf

COMPLETE STREETS

DEFINITION

According to the Minnesota Complete Streets Coalition, "complete streets means that our streets are planned to be safe and accessible for pedestrians, transit riders, bicyclists, and drivers—all users, regardless of age or ability."[107] Complete Streets seeks to change traditional high-volume, high-speed, auto-oriented road design so that "pedestrian, bicycle, and transit accommodations are no longer seen as "amenities" to be included when "possible," but rather as core elements of road design and implementation, left out only if there is a truly compelling reason."[108] Not all roadways are appropriate for or used by all users, so complete streets should be implemented with local context and user input.

HOW TO CALCULATE

Below are recommended steps on how to calculate complete streets. However your community chooses to calculate complete streets, make sure the method is consistent over time to enable comparison of one year to another.

- Determine whether the community has adopted a local Complete Streets resolution and/or policy, and if so, whether it is being implemented

IMPLEMENTATION STRATEGIES

The following strategies are recommended to implement Complete Streets:

- Provide language supporting the adoption and implementation of a complete streets resolution, policy and design for all local road construction projects
  - ¤ Example of language supporting adoption and implementation of complete streets, Richfield:
    "Richfield should establish a hierarchy of streets with those of primary importance being designated and designed as "complete streets". Complete streets are those that by design, accommodate the needs of pedestrians and bicyclists in addition to vehicles. Compete streets also include enhanced landscaping."
- Include goals for incorporating complete street practices into street improvements and updates
  - ¤ Example of supporting goal and strategy, Bloomington:
    Goal 1: Create a sustainable, multi-modal transportation system focused on mobility and community renewal.
    Strategy 1.1: Improve the existing pedestrian and cycle infrastructure.

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[107] Minnesota Complete Streets Coalition: http://www.mncompletestreets.org/
[108] Minnesota Complete Streets Coalition and Blue Cross Blue Shield. 2010. Complete Streets local toolkit. Available online: http://www.mncompletestreets.org/gfx/MnCSLocalGovtToolkit.pdf

Consider all users and modes, including pedestrians, cyclists, motorists and transit users, when planning and designing transportation systems and reviewing development proposals with the intent of creating a "Complete Streets" transportation system."

- Identify barriers to adopting or implementing complete streets resolution, policy or practices and create goals to overcome those barriers
- 2030 Transportation Policy Plan: Policy 18 - Providing Pedestrian and Bicycle Travel Systems
    - ¤ *"Strategy 18e. Complete Streets: Local and state agencies should implement a multimodal roadway system and should explicitly consider providing facilities for pedestrians and bicyclists in the design and planning stage of principal or minor arterial road construction and reconstruction projects with special emphasis placed on travel barrier removal and safety for bicyclists and pedestrians in the travel corridor."*
- **Additional Resources:**
    - ¤ National Complete Streets Coalition http://www.completestreets.org/
    - ¤ Minnesota Complete Streets Coalition http://www.mncompletestreets.org/
    - ¤ Minnesota Complete Streets Law http://www.mncompletestreets.org/gfx/MNCompleteStreetsLaw.pdf
    - ¤ Model Comprehensive Plan Language on Complete Streets http://changelabsolutions.org/publications/comp-plan-language-cs
        - **Section I** suggests language for a transportation vision statement that sets out a vision of streets that are safe for travel by pedestrians, bicyclists, and public transportation riders of all ages and abilities.
        - **Section II** sets out a complete streets policy package, designed to be included in the comprehensive plan's transportation or streets chapter.
        - **Section III** provides additional language on complete streets tailored for other chapters of a comprehensive plan, in order to integrate the idea of complete streets into different arenas and encourage interagency planning.

TRANSIT-ORIENTED DEVELOPMENT (TOD)

DEFINITION

Transit-oriented development (TOD) is compact, mixed-use, walkable development surrounding a transit (bus, light-rail, train, park-and-ride) station. See Traditional Neighborhood Development (TND) section, page 39, for a discussion of mixed land uses, density and connectivity.

HOW TO CALCULATE

Below are recommended steps on how to calculate TOD. However your community chooses to calculate TOD, make sure the method is consistent over time to enable comparison of one year to another.

- Identify the community's major transit routes, stations, park-n-ride, or other transit-related facilities
- If the community has significant transit routes or related facilities, determine whether the adjacent land is guided toward higher-density, mixed land uses, and walkable development. This could be TOD zoning, overlay district, or future land use map showing higher density, mixed land uses and highly connective street network.
- See TND for methods to calculate mixed land uses, density and connectivity

IMPLEMENTATION STRATEGIES

The following strategies are recommended to implement TOD:

- Include goals or policy statements to apply regulatory controls to support TOD, such as:
    - ¤ Goal or policy to adopt a TOD zoning district
    - ¤ Goal or policy to adopt a TOD overlay zone to apply around existing or planned transit hubs
    - ¤ Goal or policy to adopt a Transit Planned Urban Development (based on the concept of PUD)
- Example of a TOD overlay zone, Fridley: *In spring 2011, the City Council approved boundaries and code language for a Transit Orientated Development (TOD) overlay zoning district around the Fridley Northstar Station. The goal of the TOD area is to create more, and safer, walking and cycling traffic between the train station and the commercial corridor along 57th Avenue, strengthening the retail opportunities in that area of the City. Read the zoning text amendment in city code* Section 205.33 O-8.
- Support TOD through density bonuses, relaxation (or complete elimination) of parking standards, infill and redevelopment
- Support TOD through grant funding and financial incentives
    - ¤ Example of recent TOD funding incentives is the Met Council Livable Communities Act 2012 TOD funding opportunity, see
    http://www.metrocouncil.org/services/livcomm/LCAresources.htm#TOD

- Allow flexibility in TOD regulations. For example, do not require vertical mixed use if economically and politically infeasible; a horizontal mix of land uses around transit nodes in some communities may be more effective
- Other strategies to include in comprehensive plans to support TOD may include land assembly, infrastructure provision, strategic investments to improve neighborhood image, and expedited development review processes[109]
- Example of general language supporting TOD, Columbia Heights:
  While Columbia Heights does not have a TOD zoning district, the city uses its mixed use, central business, general business and R-3 residential districts along with strong goal-oriented language to encourage TOD.
    - *Goal: Provide convenient access to mixed land use developments to encourage more trips via non-motorized modes of travel and less by automobile.*
      - *1. Place mixed use land uses adjacent to transit with convenient pedestrian access. Ensure design review standards and ordinance requirements support pedestrian, biking and other alternative modes of transportation.*
    - *Future Land Use: The plan identifies opportunities for reinvestment in the community, areas for mixed use and transit oriented development to respond to the needs of the aging population and to create vibrant transit-oriented neighborhood centers, and new areas of medium and high density housing to promote reinvestment in existing neighborhoods.*
- **Additional Resources:**
    - TOD Database: thousands of existing and proposed stations and thousands of economic and demographic variables to inform planners on strategic planning for TOD: http://toddata.cnt.org/
    - *Transit-Oriented Development in the United States: Experiences, Challenges, and Prospects*: http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_102.pdf

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[109] Federal Transit Administration. 2004. TCRP Report 102 – Transit-Oriented Development in the United States: Experiences, Challenges and Prospects. Available online: http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_102.pdf

TRAFFIC CALMING AND OTHER ROAD SAFETY DESIGN MEASURES

DEFINITION

Traffic calming techniques support safety by slowing traffic and increasing infrastructure for and visibility of pedestrians and bicyclists. Other road design safety measures include creating barriers between motorists, bicyclists and pedestrians, such as grade separation, dedicated lanes; reducing the risk of intersection collisions, such as roundabouts; and improving signage and markings, such as rumble strips and retro-reflective material for night-time visibility.

HOW TO CALCULATE

Below is a recommendation on how to calculate roadways that may benefit from traffic calming and other road safety design measures. However your community chooses to calculate traffic calming and other road safety design measures, make sure the method is consistent over time to enable comparison of one year to another.

- Obtain crash data from the Minnesota Department of Public Safety to identify unsafe intersections and major roads for pedestrians, bicyclists and motorists: http://www.dot.state.mn.us/trafficeng/safety/data/index.html

IMPLEMENTATION STRATEGIES

Local governments may not have control over the infrastructure on all roads that traverse their community. Therefore, coordination with county and state departments may support expanded implementation of traffic calming and road safety design measures. The following strategies are recommended:

- Support implementation of traffic-calming techniques and road safety design measures including but not limited to sidewalk bump-outs that narrow the street and provide shorter distances for pedestrians to cross, speed bumps, roundabouts, narrowed lanes, grade separation and enforcement of speed reduction
- Example of traffic calming and road safety design, Richfield: *Goal 1 - Improve non-motorized and pedestrian travel in the City.*
    - ***Strategies:***
    - ¤ *Construct additional, wider sidewalks that are set back farther from the street for increased safety.*
    - ¤ *Reduce roadway widths to allow for sidewalk and/or bike lanes. This may also reduce vehicular speeds.*
    - ¤ *Create safe road crossings in high traffic areas. Such crossings may include the use of skyways, if appropriate.*
    - ¤ *Use traffic-calming measures to discourage through traffic on local streets.*
    - ¤ *Identify pedestrian/bike trails to connect with adjacent/surrounding communities.*
- Examples of roadway design for safety measures, Anoka:

- *Goal 1 -- Safety: Develop and maintain a transportation network that promotes the safety of its users by:*
  - *Maintaining infrastructure*
  - *Reviewing geometric improvements annually*
  - *Working with MnDOT to evaluate and set appropriate speeds*
- *Goal 5 -- Environment: The City of Anoka's transportation system will be maintained and developed in a manner that is sensitive to the City's cultural, historic and natural resources and neighborhoods by:*
  - *Using traffic-calming techniques when and where they are appropriate while preserving safety*
- **Additional Resources:**
  - Traffic calming strategies
    - Healthy General plans, p.61: http://changelabsolutions.org/sites/changelabsolutions.org/files/Healthy_General_Plans_Toolkit_Updated_20120517_0.pdf

PEDESTRIAN AND BICYCLE PLAN

DEFINITION

Unlike Complete Streets, traffic calming, and other road safety design measures that address location-specific issues related to the transportation system to improve conditions for users, a pedestrian and bicycle plan looks at the transportation system of origins and destinations to ensure that there is a complete network of infrastructure for pedestrians and bicyclists. The strategies intersect when a pedestrian and bicycle plan may incorporate location-specific strategies for conflict areas identified in the plan's assessment.

HOW TO CALCULATE

Below are recommended steps on how to conduct an assessment for the development of a pedestrian and bicycle plan. However your community chooses to calculate the pedestrian and bicycle assessment, make sure the method is consistent over time to enable comparison of one year to another.

- Assess existing conditions and needs:
    - ¤ Map the community's existing system of pedestrian and bicycle infrastructure, including sidewalks, trails, bike lanes, marked bike routes, etc.
        - Identify whether existing infrastructure connects residents to destinations, such as employment, goods and services
        - Identify whether access is provided from origins and destinations to infrastructure (see Trail access section, page 60, for more details)
        - Identify gaps in the infrastructure network
    - ¤ Obtain crash data from the Minnesota Department of Public Safety to identify unsafe intersections and major roads for pedestrians, bicyclists and motorists: http://www.dot.state.mn.us/trafficeng/safety/data/index.html
    - ¤ Conduct a community Walk Score and highlight areas for improvement in the comprehensive plan: http://www.walkscore.com/

IMPLEMENTATION STRATEGIES

The pedestrian and bicycle plan may be as lengthy and detailed as the community has resources for it. The purpose of the plan is to support comprehensive pedestrian and bicycle access community-wide. The following strategies are recommended:

- Met Council Local Planning Handbook, Section 4: Transportation, states:
  In order to be eligible to apply for federal transportation funds to construct bicycle and pedestrian facilities, municipalities must include in their transportation plans:
    - ¤ *a description of the municipality's policies and plans regarding bicycle and pedestrian systems and programs*
    - ¤ *a map showing on-road and off-road bikeways such as signed routes, striped on-street bicycle lanes, and off-road bicycle or multi-use paths*
    - ¤ *a description of bicycle and pedestrian accessibility to transit corridors and transit facilities*

- Plan for and build pedestrian and bicycle facilities near or along *"travel corridors that link major bicycling and walking destinations such as central business districts, transit centers, schools or college campuses, shopping centers, residential areas, office parks and regional parks."* From the Met Council 2030 Transportation Policy Plan
- Example community pedestrian and bicycle plan, Willmar: In 2012, the City of Willmar drafted and adopted a Trails and Pedestrian Plan Addendum to the city's Comprehensive Plan.
  - ¤ Focused on four main objectives:
    - *Provide a transportation system (street, rail, air, pedestrian & bike trails) which complements land use development and reinforces a staged growth approach to future development*
    - *Encourage street and trail systems which maximize accessibility to places of employment, recreation, shopping, entertainment, and all developed portions of the City*
    - *Cultivate a healthy, walkable, bikeable city*
    - *Plan street, pedestrian, and trail systems that provide access to all developed portions of the City, connecting parks and open spaces*
  - ¤ And three main goals:
    - *Eliminate gaps in the trail system*
    - *Create links to major destinations*
    - *Identify and resolve safety issues on existing routes and at key intersections*
- Example language from a pedestrian and bicycle plan outlining how it is integrated within the comprehensive plan and other existing system plans, Rosemount:
  - ¤ *"This plan is a direct result of the Active Living Plan chapter of the 2030 Comprehensive Plan. It also coordinates sidewalk and trail goals and policies outlined in the Transportation and the Parks, Trails and Open Space System Chapters of the 2030 Comprehensive Plan. In addition, this Pedestrian and Bicycle Master Plan coordinates and builds on other efforts completed by the City of Rosemount, and Dakota County."*
- **Additional Resources:**
  - ¤ Example pedestrian and/or bicycle master plans:
    - Minneapolis: http://www.minneapolismn.gov/bicycles/projects/plan
    - Richfield: http://www.cityofrichfield.org/PublicWorks/bicycle_master_plan.htm
    - Rosemount: http://ci.rosemount.mn.us/index.aspx?NID=452
    - St. Paul: http://www.stpaul.gov/index.aspx?NID=4604

DEFINITION

Travel demand management (TDM) includes a collection of strategies that focus on reducing the number of single-occupancy trips and providing users more mode choices. TDM is often used to reduce congestion and improve health, safety and livability.

HOW TO CALCULATE

Below is a recommendation on how to calculate TDM. However your community chooses to calculate TDM, make sure the method is consistent over time to enable comparison of one year to another.

- Determine whether the comp plan mentions or supports TDM specifically or TDM-related strategies

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IMPLEMENTATION STRATEGIES

The following strategies are recommended to implement TDM:

- *"Support strategies including Travel Demand Management (TDM), transit investments and land use changes, to reduce future demand on the Metropolitan Highway System."* (Met Council 2030 Transportation Policy Plan)
- Include goals or policy statements supporting the adoption of TDM strategies such as public transit, carpooling, flexible work-hours, telecommuting, bicycle parking, bike/ped infrastructure, and traffic calming techniques
- Provide policy statements supporting traffic impact analysis for major development projects. Traffic impact analyses calculate the projected traffic impact of a proposed development; can be submitted or required with a permit application.
- Support the requirement of a travel demand management plan for any project that conducts a traffic impact analysis and demonstrates a significant impact on traffic.[110] TDMPs describe the generation of traffic to and from the site and outline the strategies the project will utilize to mitigate and/or reduce traffic.
- Support community involvement in transportation management organizations. TMOs provide workers and employers resources to make different travel choices rather than single-occupancy trips. Local examples of TMOs include Commute Solutions Anoka County TMO, St. Paul Smart Trips, 494 Commuter Services, and Commuter Connections (Minneapolis).
- The APA Policy Guide on Climate Change and Planning included the following policy supporting the use of TDM for climate change:
  - ¤ *Transportation Policy 21: Transportation Demand Management and Systems Strategies Create and implement local and regional Transportation Demand Management Strategies that result in more efficient use of transportation resources and reduce vehicle miles traveled (VMT). Support local and regional transportation systems management*

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[110] See Golden Valley comp plan for an example TDMP

strategies that reduce greenhouse gas emissions associated with the use and operation of transportation systems.

- ¤ *Reasons to support:*

  Transportation demand management (TDM) strategies focus on changing travel behavior — trip rates, trip length, travel mode, time-of -day, etc. — to reduce the number of vehicle trips and increase mobility options. Most TDM projects and programs reduce emissions through trip or VMT reductions or by shifting trips from peak periods to less congested periods. TDM strategies can achieve public goals such as reduced traffic congestion, improved air quality, and decreased reliance on non-renewable energy consumption, in addition to reducing greenhouse gas emissions.

- ¤ *Transportation system management (TSM) improves vehicle flow on the roadway system by focusing on changing the operation of the transportation system. Tools to reduce traffic congestion include HOV lanes, synchronized signals, incident management, variable message signs, wayfinding signs, and other forms of intelligent transportation systems (ITS). Some strategies focus directly on encouraging changes in driving behavior through educational information, incentives, or restrictions on driving speeds, operating patterns, and idling. TSM techniques can help reduce greenhouse gas emissions by discouraging driving during peak periods, when congestion and slow traffic speeds reduce fuel efficiency and increase emissions.*

- ■ **Additional Resources:**
  - ¤ Victoria Transport Policy Institute, Online TDM Encyclopedia
    http://www.vtpi.org/tdm/index.php

TRAIL ACCESS

DEFINITION

For the purposes of this report, trails include recreational trails, commuter trails, or other bike/pedestrian designated facility. Trail access means that pedestrian trails should be within ¼ mile of residential or commercial destinations and bicycle trails should be within one mile.

HOW TO CALCULATE

Below are recommended steps on how to calculate trail access. However your community chooses to calculate trail access, make sure the method is consistent over time to enable comparison of one year to another.

- Metro area communities can take the following steps to calculate trail access --
  1. Go to the Met Council's Make-A-Map interactive web mapping tool:
     http://giswebsite.metc.state.mn.us/maps/Default.aspx
  2. Select Community Planning Theme folder, then select the Bikeways and Regional Trails layers
  3. Or, use the Regional Bikeways Maps and Data:
     http://www.metrocouncil.org/planning/transportation/Bikeways/Maps.htm
  4. Determine whether there is sufficient trail access within the community,
     a. Consider whether the trail connects places, such as origins (residences) and destinations (employment, goods and services, etc.), not just a loop for recreation
     b. Determine access to points to the trail – origins and destinations should be within one mile for a bicycle trail and within a ¼ mile for a walking trail
     c. Note where gaps in trail access may exist
- Communities inside and outside the metro area may choose to use local trail maps from the planning or GIS offices to identify existing trails and potential gaps

IMPLEMENTATION STRATEGIES

The following strategies are recommended to implement trail access:

- Include goals to connect trails to residential areas that reach destinations such as commercials areas, offices, parks, and other popular places
- Include goals to connect local trails to regional trails and local trails in adjacent communities
- Create a parks/trails master plan and identify specific future trail improvements to make expansions and upgrades to the community's current system
- Promote policies to encourage or require developers to provide trails or access to proximate trails

- ¤ Example policy language, Coon Rapids: Policy 3-1 for the trail system states *"The City will require developers to dedicate land for trails when the developed land contains an identified trail corridor. The developers will also be required to provide access from new subdivisions to those trails."*
- Met Council 2030 Parks Policy Plan includes the following statement:
  "Local trails typically provide connectivity between community destinations, such as schools, libraries and community centers. The Council encourages local trail connections to the regional trail network where appropriate. While the local recreational open space areas are not covered in this plan, the facilities and services they offer are taken into consideration when master plans of the regional system are prepared and reviewed."
- **Additional Resources:**
  - ¤ Design for Health Planning Information Sheet: Supporting Physical Activity Opportunities through Comprehensive Planning and Ordinances
    http://208.106.193.160/pdfs/Information_Sheet/BCBS_ISPhysicalAct_082407.pdf
  - ¤ ChangeLab Solutions, Urban Trails Fact Sheet
    http://changelabsolutions.org/publications/urban-trails

PARK PROVISION

DEFINITION

Providing neighborhood and larger regional parks and play areas in a community is important for helping residents socialize, enjoy the outdoors and achieve their recommended daily levels of physical activity. Population size and demographic characteristics are good measures to determine the specific needs for park space, proximity, access and community facilities that serve as the foundation for park systems.

HOW TO CALCULATE

Below are recommended steps on how to calculate park provision. However your community chooses to calculate park provision, make sure the method is consistent over time to enable comparison of one year to another.

- Assess community recreational needs based on population composition and feedback from community members and stakeholders
- Communities inside and outside the metro area may choose to use local park and recreation maps from the planning, parks and recreation or GIS offices to identify existing parks and potential gaps
- For communities in the metro area, identify gaps in park amenities using the Met Council's Make-A-Map interactive web mapping tool: http://giswebsite.metc.state.mn.us/maps/Default.aspx
- Define the appropriate distance between the population and parks, based on the type of park. The National Recreation and Park Association (NRPA) has previously provided guidelines on the number and distance to parks by type and size to ensure access for residents. Residents should have mini-parks of up to 1 acre and neighborhood parks between 1 and 5 acres within ¼ to ½ mile walking distance. Community and regional parks of larger size may serve several communities and will not be within walking distance of all residents.

IMPLEMENTATION STRATEGIES

The following strategies are recommended to support provision of parks:

- Support policies to promote development and maintenance of parks
  - ¤ Example language, Fridley: *"The City will continue to maintain all park and recreation areas to a high level of safety and cleanliness."*
- Consider policy language to encourage developers to dedicate park space in every residential and commercial development, or require a park dedication fee in place of dedicated park space

- ¤ Example language, Fridley: *"The City should continue to require park dedication of land or cash when land is developed or redeveloped for residential, commercial, or industrial purposes."*
- Consider parks as an option for infill development or brownfield redevelopment. See Brownfield cleanup and redevelopment of underutilized sites section, page 46, for more information
- Create a parks master plan, using the community participation process to identify the wants and needs of the community for recreation
- Update parks plan periodically with input from community members on facility use, needs and programming wants
  - ¤ Example language, Apple Valley: "*The City will review and update this chapter [Parks and Active Living] periodically to reflect new and current trends, new development criteria, unanticipated population densities and any other pertinent factors that affect park and recreation goals, policies and future direction of the system."*
  - ¤ Example language, Brooklyn Center: *"Base park and recreation planning on the needs and demands of all segments of the City's population.*
    - *The Park and Recreation System consist of a mix of facilities to provide a mix of opportunities for persons of all ages and abilities.*
    - *New park and recreation services and facilities will be considered where recreational opportunity is deficient or nonexistent, and where appropriate, they will be provided in cooperation with local school districts and the private sector.*
    - *Citizen surveys and interviews will be conducted periodically to evaluate the effectiveness of existing facilities and programs and system deficiencies."*
- **Additional Resources:**
  - ¤ National Recreation and Park Association (NRPA): http://www.nrpa.org/research-papers/
    - See "Rejuvenating Neighborhoods and Communities Through Parks – A Guide to Success" http://www.nrpa.org/uploadedFiles/nrpa.org/Publications_and_Research/Research/Papers/Rejuvenating-Neighborhoods-White-Paper.pdf
  - ¤ Active Living Research: Community Park Audit Tool http://www.activelivingresearch.org/node/12700

DEFINITION

The tree canopy is the layers of leaves, branches, and stems of trees that shade the ground when viewed from above. Preserving a healthy tree canopy can serve a number of public health benefits. For instance, trees provide shade during hot days,[111,112] reduce heat island effects,[113,114] improve air quality,[115] improve water quality,[116] improve livability,[117] provide mental health benefits,[118,119,120] and serve as a refuge for wildlife. Trees have been shown to improve the aesthetic character of an area and enhance property value.[121] Studies conducted by American Forests that adequate tree canopy could save up to $2.8 million per year in home cooling costs in the Atlanta region.[122] In New York City, the urban tree canopy diverts nearly 890 million gallons of rainwater each year from runoff into storm sewers, saving the city an estimated $35 million annually in stormwater management costs.[123] See the Urban heat island mitigation and Stormwater management and green infrastructure sections for additional information.

HOW TO CALCULATE

Below are recommended steps on how to calculate tree canopy. However your community chooses to calculate tree canopy, make sure the method is consistent over time to enable comparison of one year to another.

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[111] Huang J, Akbari H, Taha H. (1990). "The Wind-Shielding and Shading Effects of Trees on Residential Heating and Cooling Requirements." ASHRAE Winter Meeting, American Society of Heating, Refrigerating and Air-Conditioning Engineers. Atlanta, Georgia.

[112] Kurn D, Bretz S, Huang B, Akbari H. (1994). "The Potential for Reducing Urban Air Temperatures and Energy Consumption through Vegetative Cooling." ACEEE Summer Study on Energy Efficiency in Buildings, American Council for an Energy Efficient Economy. Pacific Grove, CA.

[113] McPherson EG, Simpson JR. (2000). "Carbon Dioxide Reduction through Urban Forestry: Guidelines for Professional and Volunteer Tree Planters." PSW GTQ-171. USDA Forest Service, Pacific Southwest Research Station.

[114] Simpson JR, McPherson EG. (2001). "Tree planting to optimize energy and CO2 benefits." In: Kollin, C. (ed.). Investing in Natural Capital: Proceedings of the 2001 National Urban Forest Conference. September 5-8., 2001, Washington D.C.

[115] Nowak DJ. (2000). "The Effects of Urban Trees on Air Quality." USDA Forest Service: Syracuse, NY. Retrieved August 29, 2011 from http://www.coloradotrees.org/benefits/Effects%20of%20Urban%20Trees%20on%20Air%20Quality.pdf

[116] Xiao Q, McPherson EG, Simpson JR, Ustin SL. (1998). "Rainfall Interception by Sacramento's Urban Forest." Journal of Arboriculture. 24(4):235-244.

[117] Kuo FE, Sullivan WC. (2001). "Environment and crime in the inner city: does vegetation reduce crime?" Environment and Behavior. 33(3):343-367.

[118] Kaplan R. (1993). "The role of nature in the context of the workplace." Landscape and Urban Planning, 26, 193-201.

[119] Tennessen C.M, Cimprich B. (1995). "Views to nature: effects on attention." Journal of Environmental Psychology, 15, 77-85.

[120] Ulrich RS. (1984). "View through a window many influence recovery from surgery." Science, 224, 420-421.

[121] Des Rosiers F, Theriault M, Kestans Y, Villeneuve P. (2002). "Landscaping and House Values: An Empirical Investigation." Journal of Real Estate Research. 23(1):139-162.

[122] American Forests. 2001. Urban Ecosystem Analysis: Atlanta Metro Area: Calculating the Value of Nature (August 2001).

[123] PJ Peper, EG McPherson, JR Simpson et al., "New York City, New York: Municipal Forest Resource Analysis," Center for Urban Forest Research, USDA Forest Service, and Pacific Southwest Research Station (2007), http://www.urbanforestrysouth.org/resources/library/new-york-city-new-york-municipal-forest-resource-analysis

- Conduct an urban tree canopy assessment to estimate the amount of tree canopy currently present in the community and the amount of tree canopy that could potentially be added
  - ¤ Partner with a local foundation, organization or institution to conduct a highly technical remote-sensing based urban tree canopy assessment, or
  - ¤ Approximate tree canopy by printing an aerial image of the community, drawing a grid on the map, identifying tree canopy (excluding tree shadow and other vegetation) and estimating the percentage of tree canopy cover
    - More detailed description of the low-tech process is here: http://www.urban-forestry.com/assets/documents/Head_EstimatingTreeCanopyCover.pdf

IMPLEMENTATION STRATEGIES

The following strategies are recommended to implement maintenance and preservation of tree canopy:

- Include goals, objectives and policies to support a healthy urban tree canopy
  - ¤ Example objective, Wayzata: "*Objective 5: Support a healthy tree coverage*
    1st Tier Priority Tree Coverage and Streetscape Policies
    - *5.1 Review and modify, if necessary, the Municipal Tree Ordinance to ensure that the tree removal, replanting, and tree care standards for development projects and construction processes are clear, prohibits clear-cutting, and properly specifies appropriate replacement of dead trees or trees that must be removed for development.*
    - *5.2 Require all development proposals to indicate the location, type, and condition of existing vegetation, and preserve existing trees wherever feasible.*
    - *5.3 Utilize the Design Standards to implement streetscaping and landscaping standards for all development projects which require Design Review.*
    - *5.4 Preserve and protect existing stands of mature trees on public and private property when at all possible.*
    - *5.5 Establish green corridors and entrances to the City that are identified by tree-lined boulevards, signage, landscaping buffers, and other appropriate features.*"
- Support the creation and adoption of a municipal/community tree ordinance or urban forestry master plan
  - ¤ See Healthy General plans, p.70: http://changelabsolutions.org/sites/changelabsolutions.org/files/Healthy_General_Plans_Toolkit_Updated_20120517_0.pdf
- Describe how boulevard and shade trees will be incorporated into municipal or community design standards
- Consider joining the Tree City USA program: http://www.arborday.org/treecityusa
- APA Policy Guide on Climate Change and Planning, *Section 3.6 Natural Resource. Ways to promote conservation of agricultural and forest areas and natural ecosystems include:*

- ¤ *Urban forests — Planting trees and other vegetation in urban areas can have a significant impact on greenhouse gas sequestration and reducing energy use in cooling buildings.*
- **Additional Resources:**
  - ¤ Minnesota Shade Tree Advisory Committee, A Guide to Developing a Community Tree Preservation Ordinance http://www.mnstac.org/RFC/preservationordguide.htm
  - ¤ Society of Municipal Arborists http://www.urban-forestry.com/
  - ¤ St. Paul Tree Canopy Assessment http://www.stpaul.gov/index.aspx?NID=4581
  - ¤ Minneapolis Tree Canopy Assessment http://www.minneapolismn.gov/sustainability/action/canopy/sustainability_mplsurbantreecanopymap

VIEWS OF GREENERY

DEFINITION

Preserve sightlines, views or vistas of greenery and important community assets (e.g., Mississippi River, lakes, bluffs, etc.) from public spaces (schools, recreational paths, parks, overlooks) and residential and commercial buildings. Offering views of greenery can help reduce stress levels and provide a connection to nature.[124] Providing trees, green spaces and vistas may be challenging in the urban environment, considering building heights, existing infrastructure and manmade barriers. There may be conflicts between promoting views of greenery and strategies to promote other positive health outcomes.

HOW TO CALCULATE

Below are recommended steps on how to calculate views of greenery. However your community chooses to calculate views of greenery, make sure the method is consistent over time to enable comparison of one year to another.

- Define what 'views of greenery' means for your community. Views of greenery can include views of community parks, tree canopy, lawns and other green spaces, water bodies, or significant sightlines of community assets, such as the Mississippi River.
- Determine whether public facilities and institutions such as schools and hospitals have sufficient views of greenery from windows
- Create a map or list of important existing sightlines and views of greenery that should be preserved in the community (see St. Paul map below)
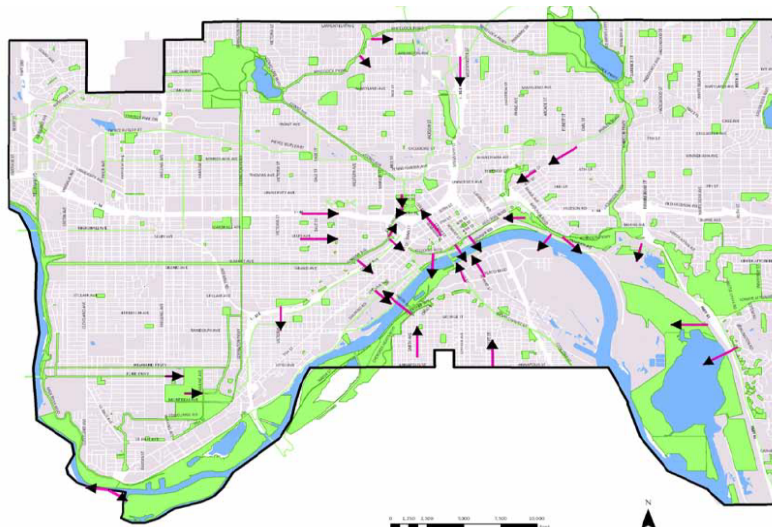
[124] Maller C, Townsend M, Pryor A, Brown P, St. Leger L. 2005. Healthy nature healthy people: 'contact with nature' as an upstream health promotion intervention for populations. Health Promotion International 21(1):45-53.

Preserving sightlines and vistas may conflict with other strategies to support a healthy urban environment. However, views of tree canopy from a sidewalk or a flower box from a window can support views of greenery. The following strategies are recommended:

- Support preservation of views through standards that regulate such impacts as height, bulk, scale, and view corridor (site distances)
    - ¤ Example language, Long Lake: *Multiple Family Residential -- "In addition to the regulations for density and building type described below, building height is regulated to preserve views from and to the lake, and maintain a small town character. Building height of multiple family dwellings should not exceed three stories on properties north of Wayzata Boulevard and four stories on the south side."*
    - ¤ Example language, Newport: Site Development Guidelines --*"Reduce visual impacts and protect views of the river and from the river and its shoreline areas by establishing maximum building heights for the bluff line and riverfront preservation areas as follows:*
        - *within 100 feet from the bluffline – 30 feet*
        - *within 200 feet from the river – 30 feet*
        - *greater than 200 feet from the river – reference most restrictive of the City ordinance and Critical Area policy and ordinance."*
- Support policies that develop additional views of green spaces for important institutions such as schools and hospitals
    - ¤ Policies may include site design guidelines for development and redevelopment that ensure windows overlook trees and landscaping rather than parking lots or other intensive uses

CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN (CPTED)

DEFINITION

Crime Prevention Through Environmental Design (CPTED) provides a multi-disciplinary approach to creating environments that help deter crime. "The two basic aims of CPTED are, first, to reduce opportunities for crime that often are inherent in the structure of buildings and the layout of neighborhoods, and second, to promote changes in attitudes among the population at risk. By reducing the apparent opportunity for crime, people should be less fearful of moving freely about their environment."[125]

HOW TO CALCULATE

Below is a recommendation on how to calculate CPTED. However your community chooses to calculate CPTED, make sure the method is consistent over time to enable comparison of one year to another.

- Does the community support and utilize CPTED?
    - ¤ Four principles of CPTED:
        1. Access control (clear transitions from public to semi-private and private areas)
        2. Surveillance (maximize visibility)
        3. Territorial reinforcement (physical division of public and private areas – sidewalks, landscaping, porches, etc.)
        4. Maintenance (functional and aesthetic upkeep signals regular activity, watchfulness)

IMPLEMENTATION STRATEGIES

The following strategies are recommended to implement CPTED:

- Include goals, objectives or policy statements to adopt CPTED in land use, housing, and/or parks and community facilities chapters
    - ¤ Example language from land use chapter, Burnsville: Future Land Use Guide Plan -- *"Add Development Review guidelines to promote transit oriented development, connectivity, crime prevention through design, and healthy living components as part of the general development review process."*
    - ¤ Example language from open space and parks chapter, Minneapolis: Safety, Community Health, and Recreation – *"7.1.2 Ensure safety in open spaces by encouraging Crime Prevention through Environmental Design strategies."*
    - ¤ Example language from urban design chapter, Minneapolis:

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[125] Kaplan HM, Helfer Palkovitz L, Pesce EJ. 1978. Crime Prevention Through Environmental Design Final Report on Residential Demonstration Minneapolis, Minnesota. Westinghouse Electric Corporation. Archived by National Criminal Justice Reference Service, U.S. Department of Justice.

- Landscaping -- *"10.19.4 Landscaped areas should be maintained in accordance with Crime Prevention Through Environmental Design (CPTED) principles, to allow views into and out of the site, to preserve view corridors and to maintain sight lines at vehicular and pedestrian intersections."*
- Crime Prevention Through Environmental Design (CPTED) – *"**Policy 10.22: Use Crime Prevention Through Environmental Design (CPTED) principles when designing all projects that impact the public realm, including open spaces and parks, on publicly owned and private land.***
  - ¤ *10.22.1 Integrate "eyes on the street" into building design through the use of windows to foster safer and more successful commercial areas in the city.*
  - ¤ *10.22.2 Orient new housing to the street to foster safe neighborhoods.*
  - ¤ *10.22.3 Design the site, landscaping, and buildings to promote natural observation and maximize the opportunities for people to observe adjacent spaces and public sidewalks.*
  - ¤ *10.22.4 Provide on-site lighting at all building entrances and along walkways that maintains a minimum acceptable level of security while not creating glare or excessive lighting of the site.*
  - ¤ *10.22.5 Locate landscaping, sidewalks, lighting, fencing and building features to clearly guide pedestrian movement on or through the site and to control and restrict people to appropriate locations.*
  - ¤ *10.22.6 Use innovative building designs and landscaping to limit or eliminate the opportunity for graffiti tagging.*
  - ¤ *10.22.7 Locate entrances, exits, signs, fencing, landscaping, and lighting to distinguish between public and private areas, control access, and to guide people coming to and going from the site."*

- **Additional Resources**
  - ¤ Crime Prevention Through Environmental Design
    - Healthy General plans, p.61: http://changelabsolutions.org/sites/changelabsolutions.org/files/Healthy_General_Plans_Toolkit_Updated_20120517_0.pdf
  - ¤ National Crime Prevention Council, CPTED Training Program: http://www.ncpc.org/training/training-topics/crime-prevention-through-environmental-design-cpted-

LOCAL FOOD PRODUCTION AND SALES

DEFINITION

Local food production and sales includes fresh produce and healthy foods from community gardens, agriculture and urban farms, as well as supermarkets and other retail outlets that sell fresh produce.

HOW TO CALCULATE

Below are recommended steps on how to calculate local food production and sales. However your community chooses to calculate local food production, make sure the method is consistent over time to enable comparison of one year to another.

- Map the location of farmers markets, community gardens and grocery stores that offer healthy foods within the community and evaluate their proximity to residential areas. This exercise was completed for the St. Louis Park Comprehensive Plan Health Impact Assessment (HIA) (see Figure 1) and has helped begin discussions on how access to healthy foods plays a role in community planning efforts.
- Other assessment tools include:
    - ¤ Community Food Security Assessment Toolkit, developed by the U.S. Department of Agriculture's Economic Research Service (USDA ERS)
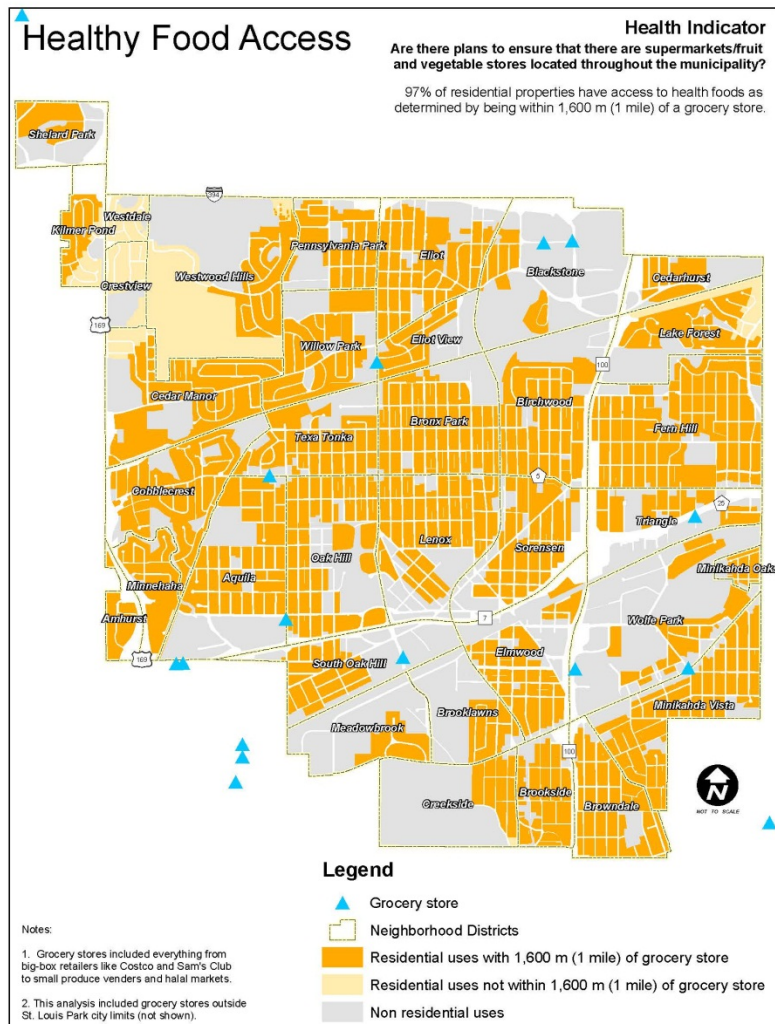

Figure 1: St. Louis Park Comprehensive Plan HIA

- ¤ The Reinvestment Fund Limited Supermarket Access widget: http://www.trfund.com/TRF-LSA-widget.html
- ¤ See the Dubuque Sustainability Report for an example of how to calculate gaps (page 40): http://www.cityofdubuque.org/DocumentCenter/Home/View/15189

IMPLEMENTATION STRATEGIES

The following strategies are recommended to implement local food production and sales:

- Include a goal to develop an urban agriculture policy plan
    - ¤ Example language, Minneapolis: http://www.minneapolismn.gov/cped/planning/plans/cped_urban_ag_plan
- Support policies to preserve agricultural land using zoning, transferable development rights, conservation easements, etc.
- Support policies that incentivize/remove regulatory barriers to allow healthy food retailers, farmers markets and community gardens to areas that lack sufficient access
    - ¤ Support land-use policies that allow neighborhood retail near residential areas
- Support policies to remove regulatory barriers to the distribution, consumption and purchase of locally produced food
- Support new zoning designed to limit fast-food restaurants in overburdened communities
- Support creation of financial or technical assistance such as low-interest loans or seed grants to retail developments with grocery stores
- Incorporate community gardens into the Parks chapter of the comprehensive plan
- Support the adoption of ordinances/permit processes for community gardens, raising of chickens and other farm animals
    - ¤ Minneapolis: Keeping of bees and fowl (chickens, ducks, and turkeys) is allowed. A permit is required and 80% of property owners within 100 feet of the applicant's property much provide signatures supporting the permit.
    - ¤ St. Paul: Animals permitted include: more than one rabbit; and/or one or more hoofed animals, pig, ferret, mink, chicken, turkey, duck, goose, pigeon or similar small animal or bird; any chinchilla, hamster, gerbil, white rat, mouse, or guinea pig which is not kept as a pet; bees; wild or exotic animals; more than three (3) cats; and more than three (3) dogs. A permit is required and written approvals from 75% of owners and/or renters of privately and/or publicly owned real estate within 150 feet
- Explicitly link existing healthy food retailers to residents through transportation, especially public transit, and pedestrian and bicycle infrastructure
- Support policies to reduce barriers to mobile vending carts/food carts that sell local food products
- Promote farm to school programs to provide students with access to local produce

- ¤ Example language, Mahtomedi: *Policy CF-2.1.c: Develop and implement a plan to provide community gardens on City property or partner with Mahtomedi institutions (the School District, Century College, and religious institutions) to provide community garden space where feasible.*
- The APA Policy Guide on Planning and Climate Change supports the preservation of agricultural land and production of local food through the following policies:
  - ¤ *Land Use Policy 13: Agricultural Land Uses and Practices*
    Support agricultural land uses, including forestry, through agricultural zoning regulations, preservation easements, and incentives. Support local food and local biofuel production initiatives. Assist farmers with implementation of best management practices for CO2 and other greenhouse gas sequestration and management.
  - ¤ *Reasons to Support:*
    Agricultural land uses (from crops to forestry) represent important carbon sequestration resources, including afforestation, forest preservation, conservation tillage practices, managing livestock waste to reduce CH4 and N2O emissions, and biofuel production from crops such as switchgrass.
    Additionally, agricultural land uses for local consumption, whether it be local foods, local fuels, or urban gardening, reduces transport distances and thus GHG emissions. Consequently, the preservation or establishment of such land uses, along with sound management practices, have the potential for substantial climate change mitigation effects.
  - ¤ *Natural Resources Policy 3: Local Food and Energy Production*
    Include consideration of the local production of food in comprehensive plans and local regulations. Remove regulatory barriers to the distribution, consumption and purchase of locally produced food. Encourage institutional procurement of local foods.
  - ¤ *Reasons to support:*
    Local food production can reduce "food miles" — the distance that food must travel – and consequently greenhouse gas emissions. Food in a grocery store typically travels 1,000 miles or more while the typical food in a farmers market travels less than 1/10th of that distance. Planning for land used for community farming can help protect and ensure the retention of these properties for local food production. The result will help minimize VMT by limiting food transport and avoiding regional imports of consumer goods that can be produced locally, helping the local economy. Locally produced foods can enhance regional security in the event of shortages resulting from climate impacts such as drought, extreme weather incidents, or floods.

- **Additional Resources:**
  - ¤ American Planning Association (APA) 2007 Community and Regional Food Planning Policy paper includes 7 general policies to support healthy food access: http://www.planning.org/policy/guides/adopted/food.htm

- ¤ Design for Health, Promoting Food Access with Comprehensive Planning and Ordinances: http://208.106.193.160/pdfs/Information_Sheet/BCBS_ISFood_090107.pdf
- ¤ USDA Operating a CSA and SNAP Participation: http://www.fns.usda.gov/snap/ebt/pdfs/CSA.pdf
- ¤ Grocery Store Attraction Strategies: A Resource Guide for Community Activists and Local Governments (Policy Link): http://www.policylink.org/site/apps/nlnet/content2.aspx?c=lkIXLbMNJrE&b=5136581&ct=6994695
- ¤ The Robert Wood Johnson Foundation is funding a National Scan and Evaluation of Local Comprehensive Plans, inventorying comprehensive and sustainability plans with food access goals and policies. Research results will be published in a report in 2012. See: http://planning.org/research/foodaccess/index.htm

URBAN HEAT ISLAND MITIGATION

DEFINITION

The urban heat island effect is characterized by an urban area that is significantly warmer than the surrounding rural areas where natural ground cover has been replaced with pavement, buildings, or other materials (impervious surfaces) that tend to absorb and retain heat. Urban heat islands exacerbate extreme heat events in even small urban areas, and can result in increased summer air conditioning demand and negative health outcomes.

HOW TO CALCULATE

Below is a recommendation on how to calculate urban heat island. However your community chooses to calculate the urban heat island, make sure the method is consistent over time to enable comparison of one year to another.

- Identify areas of impervious surfaces on the University of Minnesota's interactive statewide map of Land Cover and Impervious Surface Area from 2000.
  http://land.umn.edu/maps/impervious/landbrowse.php

IMPLEMENTATION STRATEGIES

The following strategies are recommended to implement urban heat island mitigation:

- Include policies to increase urban green space city-wide and especially in areas identified with high concentrations of impervious surfaces. Policies may include promoting the shading of parking lots, sidewalks, buildings and other impervious surfaces.
  - ¤ Example language, Minneapolis: *"Develop regulations to further reduce the heat island effect in the city by increasing green urban spaces for parks and open spaces, including shading of parking lots, sidewalks and other impervious surfaces, promoting installation and maintenance of green roofs and utilization of highly reflective roofing and paving materials."*
  - ¤ See the tree canopy maintenance and preservation section for additional implementation strategies related to increasing urban greenery
  - ¤ Support the adoption of a parking lot shade ordinance or design guidelines that require 50% shading of new or rehabbed parking lots from trees
- Promote goals that encourage green roofs and white roofs on private buildings and require them on city buildings
  - ¤ Example language, Osseo: *"Incorporate rooftop gardens on public buildings, minimizing heat-island effects, creating outdoor living areas, and infiltrating storm waters."*
  - ¤ Support policies that combine weatherization funds and other energy efficiency dollars with opportunities to install green or white roofs

- ¤ Support adoption of an "eco-roof" density bonus like Portland, OR – See http://www.portlandonline.com/bes/index.cfm?a=399920&c=58846 (page 20)
- Support policies and/or design guidelines that encourage use of pervious pavers in parking lots, alley ways, and other areas to promote stormwater management and lower urban temperatures
- Consider providing an inventory of air conditioned public spaces, community pools, splash pads or parks for the public to find relief from hot summer days in the Parks or Public/Community Services and Facilities chapters
- The APA Policy Guide on Climate Change and Planning supports the following policy on the urban health island effect:
  - ¤ *Green Development Policy 9: Heat Island Effects*
    Design communities, neighborhoods and individual development projects using techniques that reduce heat absorption throughout the community and region.
  - ¤ *Reasons to support:*
    While the resulting warmer temperatures may be benign or even welcome during colder times of the year, any such benefits are greatly outweighed by the negative impacts during hotter summer months when heat island effects significantly contribute to increased human health risk and increased use of air conditioning, resulting in greater energy use and greenhouse gas emissions.
- **Additional Resources:**
  - ¤ EPA – Reducing Urban Heat Islands: Compendium of Strategies http://www.epa.gov/heatisld/resources/compendium.htm
  - ¤ Georgetown Climate Center – Adapting to Urban Heat: A Tool Kit for Local Governments http://www.georgetownclimate.org/adaptation-tool-kit-urban-heat
  - ¤ Cool Roofs and Cool Pavements Toolkit http://www.coolrooftoolkit.org/

GREENHOUSE GAS (GHG) EMISSION REDUCTIONS

DEFINITION

Greenhouse gases (GHGs) are gases in the atmosphere that absorbs and emit radiation from the sun, which influence the temperature and climate of the atmosphere, and make the Earth habitable for humans; GHGs include carbon dioxide, nitrous oxide, methane and water vapor. Extensive scientific evidence suggests that the accumulation of human-induced increases in GHGs in the atmosphere is causing climate change.[126,127,128] Reducing GHGs may slow the impacts of climate change on communities world-wide. Mitigation of GHG emissions can have additional benefits to public health by reducing the adverse health effects of local air pollution.

HOW TO CALCULATE

Below are recommended steps on how to calculate GHG emissions. However your community chooses to calculate GHG emissions, make sure the method is consistent over time to enable comparison of one year to another.

- Develop a Greenhouse Gas Inventory
  - ¤ Identify sources of GHG emissions in the community, including but not limited to the following:
    - City fleet
    - City buildings
    - Residential and commercial buildings
    - Local industry and power generation
    - Motor vehicle traffic
    - Waste and recycling
  - ¤ Note potential inefficiencies in the various sectors identified
- EPA "Developing a Greenhouse Gas Inventory"
  http://epa.gov/statelocalclimate/local/activities/ghg-inventory.html
- ICLEI's Cities for Climate Protection (CCP) developed the first version of a standardized local government GHG emissions inventory in 2009 and is currently working on an update to the original inventory, see http://www.iclei.org/index.php?id=10828

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[126] Oreskes N (2004) "The scientific consensus on climate change," Science Vol 306.

[127] Hegerl, G.C., F. W. Zwiers, P. Braconnot, N.P. Gillett, Y. Luo, J.A. Marengo Orsini, N. Nicholls, J.E. Penner and P.A. Stott, 2007: Understanding and Attributing Climate Change. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

[128] American Meteorological Society. 2012. Climate Change: An Information Statement of the American Meteorological Society. Available online http://www.ametsoc.org/policy/2012climatechange.html

The following strategies to implement GHG emission reductions include general strategies, and strategies focused specifically on the building sector and transportation sector:

- Support the creation of a local Climate Action Plan to reduce GHG emissions including specific reduction targets by sector, strategies to achieve reduction targets, and a plan for monitoring and reporting progress
- Support policies that encourage the purchase and/or use of energy efficient products, design standards, etc. when conducting regular replacement, upgrading and maintenance throughout the community
- Support a goal to converting community facilities, fleets and operations toward carbon neutrality

Strategies focused on the building sector:
- Promote public and private energy audits through utilities and potential local programs
- Advertise rebates and tax credits for energy efficient appliances, weatherization, high-efficiency vehicles, etc.
- Support goals to integrate renewable energy into the energy mix (e.g., wind, solar)
- Include policies that support energy-efficient buildings (see Green and healthy buildings section)
- Partner with other public or private resources (such as the Center for Energy and Environment (CEE) and the International Council on Local Environmental Issues (ICLEI)) to promote an awareness and understanding of energy conservation efforts and to seek grants to implement energy conservation measures.
    - ¤ Center for Energy and Environment: http://www.mncee.org/
    - ¤ ICLEI: http://www.iclei.org/

Strategies focused on the transportation sector:
- Promote the use of public transit, ride-share, biking, walking, etc.
- Support the reduction of congestion and single occupancy vehicle trips (see Travel demand management (TDM) section)

- Example comp plan language, Mahtomedi:
    - ¤ The city signed the U.S. Mayors Climate Protection Agreement and is a member of the International Council on Local Environmental Initiatives (ICLEI). Plan language supporting the reduction of fossil fuels and GHGs includes the following:
    - ¤ *"The overarching goals of this Plan follow the American Planning Association (APA) Policy Guide on Planning for Sustainability, which is based on The Natural Step framework, and includes the following goals:*
        1. *Reduce our dependence on fossil fuels, extracted underground metal, and minerals;*

2. *Reduce our dependence on chemicals and other manufactured substances that can accumulate in nature;*
3. *Reduce our dependence on activities that harm life-sustaining ecosystems; and*
4. *Meet present and future human needs fairly and efficiently.*

¤ *"The City will strive to update its zoning ordinances and subdivision regulations to provide opportunities to integrate these [solar equipment, wind energy conversion systems, geothermal and similar] technologies into development while respecting neighboring property rights and preserving neighborhood character."*

¤ *"Policy CF-2.2.c: Develop and implement strategies to reduce the use of fossil fuel in City vehicles and equipment. Consider the use of hybrid vehicles, alternative fuel efficient conventional vehicles and other types of vehicles that reduce fossil fuel use. Also, develop and implement strategies that reduce the number of vehicle miles traveled for City business using fossil fuel vehicles."*

▪ **Additional Resources:**
¤ Met Council 2030 Transportation Policy Plan. Policy 8: Energy and Environmental Considerations in Transportation Investments
1. *Strategy 8e. Reduction of Greenhouse Gas Emissions: The Council will support and implement initiatives to reduce greenhouse gas emissions including programs that reduce the impact of transit on energy usage and the environment such as Metro Transit's "Go Greener" initiative* http://metrotransit.org/go-greener.aspx

¤ University of Minnesota Climate Action Plan
http://rs.acupcc.org/site_media/uploads/cap/812-cap_5.pdf

¤ Minneapolis Climate Action Plan
http://www.minneapolismn.gov/sustainability/climate/index.htm

¤ Duluth, MN Energy Action Plan 2011
http://www.duluthmn.gov/downloads/Duluth%20CITY%20OPERATION%20Energy%20Action%20Plan_FINAL_May%2010%202011.pdf

¤ Ely, MN Energy Action Plan 2010
http://www.arrowheadplanning.org/documents/Ely%20Energy%20Action%20Plan/Ely%20Energy%20Action%20Plan_FINAL_November%202010.pdf

STORMWATER MANAGEMENT AND GREEN INFRASTRUCTURE

DEFINITION

Climate change is causing more of the annual rainfall to come in large storm events, and the largest storm events are getting larger.[129] Increases in impervious surfaces due to growth and development combined with heavier storm events can increase stormwater runoff, reduce infiltration, and potentially contaminate surface water and groundwater sources.[130] At the same time, Minnesota is experiencing lake level and groundwater aquifer decline in some areas, such as White Bear Lake.[131] Stormwater management systems can be used to plan for increases in rain falling as thunderstorms or very heavy precipitation events and potential increases or decreases in total annual precipitation. Green infrastructure relies on inherent ecosystem services and natural hydrologic features to manage stormwater, water quality and water quantity.

HOW TO CALCULATE

Below is a recommendation on how to calculate stormwater management and green infrastructure. However your community chooses to calculate stormwater management and green infrastructure, make sure the method is consistent over time to enable comparison of one year to another.

- Does the community's watershed management organization (WMO) plan for increased severe rain events and/or promote increased infiltration? Check with the municipality or WMO for design criteria. (Note that in some places infiltration may not be desirable, such as on a brownfield or where the water table is high.)

IMPLEMENTATION STRATEGIES

The following strategies are recommended to implement stormwater management and green infrastructure:

- Utilize the opportunities provided by the development of a stormwater plan and/or erosion ordinance to increase infiltration, decrease runoff and overall protect the water quality and quantity for the community
- Adopt new numbers of two-, 10-, and 100-year storm events. In 1961, when Technical Paper 40 (TP-40) Rainfall Frequency Atlas of the United States was released, a 100-year 24-hour rainfall in

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[129] Environment Minnesota Research & Policy Center. 2012. When It Rains, It Pours: Global Warming and the Increase in Extreme Precipitation from 1948 to 2011.
[130] Met Council. 2005. Water Resources Management Policy Plan. Available online:
http://www.metrocouncil.org/planning/environment/WRMPP/WRMPP2005.htm
[131] U.S. Geological Survey. Minnesota Water Science Center Newsletter. Summer 2012. Available online:
http://mn.water.usgs.gov/about/newsletter/summer2012/index.html

Minnesota was between 5-6 inches.[132] In 2012, NOAA Atlas 14 will provide updated rainfall frequency for the state and enable planners and engineers to develop stormwater management plans with more accurate and up-to-date information.

- ¤ NOAA's Precipitation Frequency Data Center
  http://hdsc.nws.noaa.gov/hdsc/pfds/index.html

- Adopt criteria such as those of the Nationwide Urban Runoff Program (NURP) criteria for wet detention basins to protect and improve stormwater runoff quality http://tinyurl.com/EPA-NURP

- Support the construction of rain gardens and other green infrastructure strategies to increase the opportunity for natural processes to treat stormwater and remove pollutants, increase stormwater infiltration and improve groundwater recharge
  - ¤ Example policy language, Mahtomedi: Policy CF-2.1.d: "*Continue to develop and implement storm water management plans for all City facilities. Lead by example by using rain gardens, rain barrels, and other techniques that others can use on their properties.*"

- Support community tree canopy as stormwater management strategy to increase infiltration (see the tree canopy maintenance and preservation section)

- Protect water quality through policy statements that support the establishment of vegetative buffer zones, shoreline ordinance, and preservation of native vegetation
  - ¤ Buffer zone ordinance: 50+ feet wide (25+ for stormwater management; 50+ for bird habitat preservation, protection from human encroachment and some protection for threatened, rare or endangered species, 100+ preferred) (MPCA, Chapter 4, 4.21-3)

- Include policy statements or goals to restrict development in shoreline, natural drainage ways, steep slopes and erodible soils

- Implement policies that decrease impervious surface and that decrease pipes, sewers and ditches while providing infiltration and protecting natural systems
  - ¤ Imperviousness: "While population density is important for many planning and zoning regulations, imperviousness and the way impervious surfaces drain should be considered the primary environmental planning tool, not density of units." (MPCA, 2000)
    Watersheds "can be stressed from 1 to 10% of impervious cover, impacted by 11 to 25% impervious cover, and degraded by 26 to 100% impervious cover (Schueler, 1994b)."

- Identify and adopt management practices such as those described in the Metropolitan Council's Urban Small Sites Best Management Practice Manual to reduce stormwater runoff http://www.metrocouncil.org/environment/water/bmp/manual.htm
  - ¤ One section focuses specifically on 'cold weather considerations' such as winter freezing reducing ground infiltration and contaminants in spring snowmelt.

- **Additional Resources**:

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[132] U.S. Department of Commerce. 1961. Technical Paper No. 40, Rainfall Frequency Atlas of the United States. Available online: http://www.nws.noaa.gov/oh/hdsc/PF_documents/TechnicalPaper_No40.pdf

- ¤ Low-impact development www.epa.gov/owow/NPS/lid/
- ¤ Burnsville Stormwater Retrofit study (case study of rain gardens)
  http://www.ci.burnsville.mn.us/DocumentCenter/Home/View/449
- ¤ Minnesota Pollution Control Agency (MPCA) Stormwater Best Management Practices
  Manual: http://www.pca.state.mn.us/water/pubs/sw-bmpmanual.html
- ¤ MPCA Model Erosion and Sediment Control Ordinance
  http://www.pca.state.mn.us/index.php/component/option,com_docman/task,doc_view/gid,7428
- ¤ U.S. EPA Water: Green Infrastructure
  http://water.epa.gov/infrastructure/greeninfrastructure/index.cfm#tabs-1

CONCLUSION

Conscientious planning for a healthy community results in healthy people, healthy environments and healthy economies. Planning and public health fields originated together as a response to disease outbreaks in urban areas. Over the years the fields became siloed; public health lost sight of the built environment origins of many chronic diseases and health disparities, and, without a health lens to their work, planners reinforced the built environment conditions that promoted the obesity epidemic and health disparities.[133] The figure below demonstrates the fields grew out of the original intent to support population health, including planning, engineering and public health.
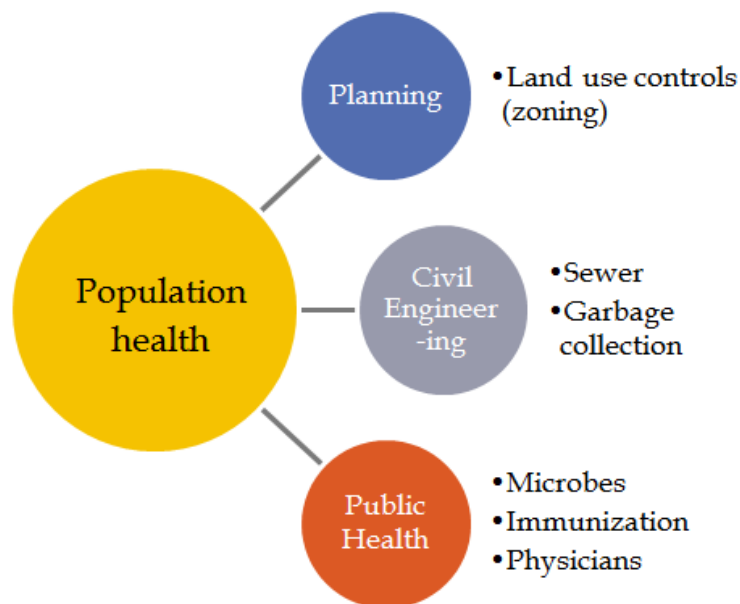
Source: Adapted from Colburn, 2004.

This How-To Guide demonstrates how standard planning practices, strategies and policies can be used to achieve significant positive health outcomes. The following three examples call out the numerous co-benefits of planning for healthier communities:

- Promoting walking and biking through compact, traditional neighborhood development practices can reduce the amount of public infrastructure to build and maintain, and therefore reduce costs for local governments;
- Using ecosystem services to manage flooding, improve water quality, moderate the local climate, and provide mental health benefits of greenery also saves local governments money on costly stormwater and waste water infrastructure, and energy for heating and cooling; and

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[133] Coburn, J. 2004. Confronting the challenges in reconnecting urban planning and public health. American Journal of Public Health: April 2004, Vol 94, No 4.

- Supporting clean and green housing that meets the household sizes and incomes of the population can promote physical health, reduce energy use, and overall lower the cost-burden on households, which could potentially lower health care expenses, bring some of the population out of poverty, and reduce reliance on social services. These outcomes may have the effect of reducing public costs and boost the economy overall.

Local governments may start small with just a few strategies in a 'pilot' demonstration of the community, or start bold by integrating all strategies city-wide, but the more strategies that are systematically adopted, the stronger the health outcomes.