

Draft

Health Impact
Assessment

Predicting Health Impacts of the Premium Outlet Mall on Community Health: Delaware, Ohio



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The Premium Outlet Mall Health Impact Assessment (HIA) was led by Susan Sutherland, R.S., MPH, Public Health Planner at the Delaware General Health District, Delaware, Ohio, in collaboration with the HIA Steering Committee. Throughout the course of this HIA, the Steering Committee, and the Berkshire Township Residents Advisory Group provided valuable technological and logistical assistance, information and expertise.

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**Predicting the Health Impacts of the
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Delaware, Ohio**

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CONTENTS

EXECUTIVE SUMMARY

- **BACKGROUND AND SCREENING..... 12**
 - What is a Health Impact Assessment?
 - Overview of Delaware County
 - Overview of the Study Area
 - Population Dynamics of the Study Area
 - Vulnerable Populations of the Study Area
 - HIA Timeline
- **SCOPING 25**
 - Geography and Population
 - Scoping Priorities of the Study Area
 - Berkshire Township Concerns
 - Research Questions
- **ASSESSMENT 28**
 - Presentation of Traffic and Physical Activity Community Data
 1. Understanding Current Traffic Levels, Injuries, Accidents, and Flow
 2. Predicting Changes in Traffic Levels, Injuries, Accidents, and Flow
 3. Understanding Current Physical Activity Levels, measuring walkability
 4. Predicting Changes in Physical Activity
 5. Predicting the Health Effects of Increased Physical Activity
- **FINDINGS 48**
 - Pedestrian Environmental Quality index (PEQI)
 - Bicycle Environmental Quality Index (BEQI)
- **RECOMMENDATIONS 51**
- **REPORTING, EVALUATION 7 MONTORING 57**
- **APPENDICES..... 58**
 - Appendix A: Trans Associates Engineering Consultants, Inc. Traffic Impact Study Conclusions and Recommendations
 - Appendix B: Engaging Stakeholders in the HIA Process Plan
 - Appendix C: 2010 Delaware County, Ohio Demographic Profile
 - Appendix D: Delaware General Health District’s 2013 Behavioral Risk Factor Surveillance Survey Summary
 - Appendix E: Delaware County, Ohio Environmental Health Profile Summary
 - Appendix F: Berkshire Township, Delaware County, Ohio Bikeway Map
 - Appendix G: Delaware County, Ohio Parks and Trails Map
 - Appendix H: HIA Screening Worksheet
 - Appendix I: HIA Scoping Worksheet
 - Appendix J: Pedestrian Environmental Quality Index Form
 - Appendix K: Bicycle Environmental Quality Index Form
 - Appendix L: Complete Streets Sample Policy
 - Appendix M: Traffic Calming Measures
 - Appendix N: Walkability Elements
- **REFERENCES, Appendices**

The purpose of the Health Impact Assessment (HIA), *Predicting Health Impacts on the Premium Outlet Mall Project on Community Health*, was to assess the potential health impacts to community health of the development of the Premium Outlet Mall in Berkshire Township, Delaware County, Ohio. Convened and facilitated by Delaware General Health District, and the Berkshire Township Residents' Advisory Group, the HIA process was supported by the HIA Steering Committee representing 17 organizations whose expertise assisted in providing input on community planning and design, economic and neighborhood development, open space, green space, transportation, bicycle, walking path infrastructure, storm water and waste water best practices.

This report will describe the Premium Outlet Mall HIA's 12-month process and its outcomes, with a focus on the scope of traffic and connectivity data, health policy recommendations, and monitoring and evaluating trends in the growth and development in this rural environment. It is a case study of a local public health department's health assessment of the Berkshire Township residents' concerns with traffic and connectivity regarding the development of the Premium Outlet Mall in their community.

THE CONNECTION BETWEEN HEALTH AND LAND USE

According to the World Health Organization, health is defined as a state of complete physical, mental and social well-being, not merely the absence of disease or infirmity. One of the leading public health problems in the 21st century is chronic disease (e.g., diabetes, cardiovascular problems, asthma).¹

A 2011 study conducted by the Urban Institute found that the U.S. health care system spends about \$238 billion per year on individuals who have preventable diseases including Type II diabetes, hypertension, stroke, and heart disease. By implementing environmental change, chronic diseases can be prevented, thereby decreasing medical costs, and improving overall worker productivity.²

Many of the risk factors for these chronic diseases can be traced on how cities have been built. Several pathways have been identified in the research linking built environments with travel patterns, physical activity levels, vehicle emissions, body weight, and associated health outcomes. Residential density, land use mix, and street connectivity have all been consistently associated with multiple outcomes related to health: per capita vehicle miles, air pollution emissions, physical activity rates, and obesity and body weights. By making neighborhoods more walkable, we not only can create converging health benefits, but environmental benefits and more equal access to jobs and opportunities. Emerging research on the

¹ Who.int, (2014). [online] Available at: <http://www.who.int/about/definition/en/print.html> [Accessed 15 May 2014] Robert Wood Johnson Foundation, 2011; Waidmann et al., 2011.

² Robert Wood Johnson Foundation, 2011; Waidmann et. Al. 2011.

presence of sidewalks, cycling infrastructure, street design, and building placement and site design have been linked to various health and health-related travel behavior outcomes.³

The analysis of this HIA includes the impact that the Premium Outlet Mall project could have on the potential of creating opportunities for connectivity of the surrounding neighborhoods, schools, walking/biking trails and to existing or planned parks and green space. Connectivity to parks and green space has the potential to impact community health for the following reasons:

- *Increase physical activity.* About 30% of all physically active people report exercising in public parks, and most park users live within one mile of a park. Physical activity can prolong life; prevent diabetes, high blood pressure, and colon cancer; support weight control, and improve mobility for elders;⁴
- *Parks and open space improve general health.* Living in proximity to green space is associated with reduced self-reported health symptoms, better self-rated health, and higher scores on general health questionnaires.⁵
- *Improve environmental quality.* Parks and open space can filter dirty air and water, provide flood control, and lower fossil fuel energy demands.⁶ Unpaved parks and open space alleviate pressures on storm water management and flood control efforts by slowing and filtering water by removing polluted particulate matter and decreasing the area of impervious surfaces. Trees and green space remove pollution from the air, and increased vegetation dampens sound, thereby mitigating noise pollution.⁷
- *Transportation:* Improving connectivity in Berkshire Township would make it more likely that residents will walk or bike to new parks and open space. Availability of parking near parks will also impact park use.⁸

Recent studies show that in addition to the physical benefits associated with healthy communities, walkable communities can also provide economic and environmental benefits. In terms of physical health, a substantial body of evidence has shown that automobile centered communities with segregated land uses, low density, disconnected street networks, and insufficient pedestrian and bicyclist infrastructure are associated with reduced physical activity such as walking or exercise in outdoor spaces. In contrast, walkable communities with mixed land uses, higher density, connected street networks, rich physical activity resources, and pedestrian-friendly designs have been linked to increased physical activity in daily routines. This environment-physical activity relationship is especially important in the context that obesity has become a leading public health problem and physical inactivity is a significant contributing factor. Recent trends have shifted to a more comprehensive approach to

³ Frank, L. (2008). *The Built Environment and Health: A Review*. City of Calgary, Alberta.

⁴ Cdc.gov, (2014). *Physical Activity for Everyone: The Benefits of Physical Activity | DNPAO | CDC*. [online] Available at: <http://www.cdc.gov/physicalactivity/everyone/health/index.html> [Accessed 17 Jun. 2014].

⁵ Urban Forestry/Urban Greening Research. *Green Cities: Good Health* [online] Available at: http://depts.washington.edu/hhwb/Thm_Mental.html

⁶ Human Impact Partners. 2008. *Concord Naval Weapons Station Reuse Project Health Impact Assessment*. Oakland, California

⁷ Ibid.

⁸ Ibid.

targeting multi-level (personal, social and built environmental) factors. This shift came with the increasing popularity of the socioecological theory, which considers human behavior to be influenced by interactive factors on intrapersonal, interpersonal, institutional, community, and public policy levels. Community environments, in particular, have been increasingly recognized as important intervention venues, which may help promote sustainable, population level changes toward more physically active lifestyles.⁹

Specific environmental features identified in previous studies include pedestrian-friendly community layout and site design, rich and diverse natural features and open spaces, and mixed land uses providing diverse destinations. For example, a study reported a greater sense of community in Kentlands – a prototypic New Urbanist community with walkable environments, compared to a suburban, automobile oriented development. Kentlands features diverse natural features and open spaces, pedestrian-friendly community layout, and traditional architectural style, as well as many other walkable environmental features.¹⁰ Another study in Portland, Oregon found that residents’ sense of community was greater in a pedestrian oriented neighborhood than in an auto-oriented counterpart, and the perception of pedestrian environment is the most significant predictor of sense of community.¹¹

Growing trends in community development, such as New Urbanism, Smart Growth and Neo-traditional Development all advocate walkability as a guiding principle. The Green Building Council released the Leadership in Energy & Environmental Design for Neighborhood Development (LEED-ND) rating system to help guide the development of sustainable and walkable communities. The City of New York released *Active Design Guidelines* for promoting physical activities through design. Recent market studies have also shown growing demands for walkable communities. In practice, an increasing number of communities are using ‘design’ in addition to programs as the means to promote physical and social health. However, the actual health impacts of such design interventions are understudied.¹²

Mueller is an exemplary project by the City of Austin, Texas to use a series of innovative policies to create a model for walkable, sustainable and equitable communities. Mueller is a LEED-ND certified mixed-use community designed to support walking and other outdoor activities. The results from this study provided solid evidence that residents did improve both physical activities and social interactions and cohesion after moving to the walkable environment in the community of Mueller in Austin. Increased walking in the community correlated with improved social interactions and the perception of social cohesion. The findings also showed a significant reduction in driving among residents, suggesting

⁹ Walkable communities: Impacts on residents’ physical and social health. (2013). World Health Design, pp. page 68-75. Available at: <http://www.aia.org/aiaucmp/groups/aia/documents/pdf/aiab099630.pdf>.

¹⁰ Ibid.

¹¹ Ibid.

¹² Walkable communities: Impacts on residents’ physical and social health. (2013). World Health Design, pp. 68-75.

important environmental benefits that walkable communities can bring by improving community health, reducing fuel consumption and environmental pollution.¹³

There are many models around the country that show clear economic benefits to improving the environment for walking in residential and commercial districts. The cities of Lodi and Mountain View in California and West Palm Beach, Florida, offer three examples of successful strategies for making communities simultaneously more walkable, livable, and prosperous. Tolley (2011) evaluated the impacts on retailers and local residents from improving the walking and cycling conditions of commercial streets. The study found that streetscape enhancements that improve walking and cycling conditions tend to increase property values and rents, attract new businesses, and increase local economic activity. Analyzing bicycle and automobile parking space requirements, it was concluded that bicycle parking can produce much higher levels of retail spend than the same space devoted to car parking.

Rural communities across America are working to strengthen their economies, provide better quality of life to residents, and build on assets such as agricultural and working lands, and natural amenities and resources. Similar to Berkshire Township, many rural communities and small towns are facing challenges, including rapid growth from the metropolitan border, and loss of farms and working lands. Slow-growing and shrinking rural areas might find that their policies are not bringing the prosperity they seek, while fast-growing rural areas at the edge of metropolitan regions face metropolitan-style development pressures.¹⁴

Smart growth strategies can help rural communities achieve their goals for growth and development while maintaining their distinctive rural character. Policies that protect the rural landscape help preserve open space, protect air and water quality, provide places for recreation, and create tourist attractions that bring investments into the local economy. Policies that support walking, biking, and public transit help reduce air pollution from vehicles while saving people money and increasing their health. These strategies are based around three central goals: 1) support the rural landscape by creating an economic climate that enhances the viability of working lands and conserves natural lands; 2) help existing places to thrive by taking care of assets and investments such as existing infrastructure, and places that the community values; and 3) create great new places by building vibrant, enduring neighborhoods and communities that people, especially young people, want to remain.¹⁵

It is reported that the first step for a community to improve its growth pattern is to assess the current environmental, economic, and social conditions. In 2008, the Delaware County Regional Planning Commission worked with community residents, and stakeholders, and updated the Berkshire Township

¹³ Walkable communities: Impacts on residents' physical and social health. (2013). World Health Design, pp. 68-75.

¹⁴ USEPA, (2014). Putting Smart Growth to Work in Rural Communities. [online] at http://www.epa.gov/dced/sg_rural.htm.

¹⁵ Ibid.

Comprehensive Plan. The plan identified how the township connected to other communities in the region; identified the township's best assets and its key challenges; and, outlined its highest priorities (See Table 1). The residents and stakeholders developed the township's long-term vision (See Figure 1.)

The built environment can facilitate physical activity by being structured in ways that give people more opportunities and choices to be physically active. For example, ready access to parks and trails may facilitate walking for exercise; sidewalks and mixed-use development are likely to be more important to encourage walking for shopping or other utilitarian purposes. The built environments that facilitate more active lifestyles and reduce barriers to physical activity are desirable because of the positive relationship between physical activity and health.

Figure 1. Berkshire Township Residents' Vision Statement

When Berkshire Township is all built out, we would like it to be a community that has large lots, generally 1 acre or greater, or an equivalent density with cluster housing and significant open space. The rural character of the township will be maintained via a network of green space and/or parks. Rural roads would have a rough edge, with fencing that reminds us of the rural past, and mature landscaping to replace fence/tree rows if they are removed.

We would like to preserve the sensitive environmental aspects (ravines, floodplains, jurisdictional wetlands, waterways, etc.) as the township develops.

We would like to preserve the special places such as forested lands, open meadows and creek-side trails.

We would like to retain historic and/or significant agricultural structures that give a sense of our farming heritage.

We would like to see commercial and industry developed for a broader tax base. They should be concentrated, yet separated and buffered from exclusively residential areas.

We would like to see a diversity of housing types to meet different housing needs (i.e., older adults, empty nesters, individuals and families).

We would like to improve major thoroughfares and use access management policies to prevent congestion and dangerous road conditions.

We would like to see improved rural/suburban services offered at reasonable costs.

Table 1. Berkshire Township Highest Priorities¹⁶

1. Rural feel as characterized by: <ul style="list-style-type: none"> • Agriculture • Open spaces. • Preservation of significant agricultural buildings where appropriate as part of redevelopment when agriculture is gone. • Preservation of open space when agriculture is gone. Establish parks/green areas in neighborhoods to replace farmland that is converted to development. • Green space between developments. Greenbelts/bike paths which tie together neighborhoods, perhaps using drainage way or utility corridors. • Preserved ravines, jurisdictional wetlands, slopes >20%, trees and fence lines. • Access to Hoover Reservoir and Big Walnut Creek, and to a lesser extent, Alum Creek State Park. • Large lots for residential country living. • Mature trees on scenic roads; rough road edge, farm fences, and split rail. • Large agricultural areas, retention of open space along roads to remind of the former agricultural land. • Wildlife corridors maintained.
2. Planned developments with a mix of land uses (residential, commercial, industrial, institutional) for a balanced tax base. Diverse housing types.
3. I-71/US 36 interchange as the central core for commercial and light industrial uses.
4. Low level lighting, downward cast of commercial use.
5. Effective landscape buffers between commercial and residential uses.
6. Moderate traffic. Ideally to be less auto-dependent, by designing connecting paths between future developments

¹⁶ Delaware County Regional Planning Commission, Berkshire Township Delaware County Comprehensive Plan 2008.

In 1996, the U.S. Surgeon General reported that regular physical activity improves health; exercise has many benefits, which include the following: prolonging life; preventing diabetes, high blood pressure, and colon cancer; supporting weight control; improving mobility; reducing feelings of depression and anxiety; and promoting psychological well-being.¹⁷ The Centers for Disease Control and Prevention (CDC) recommends that adults either engage in moderate exercise (e.g., walking briskly) for at least 30 minutes, five days per week, or in vigorous exercise (e.g., jogging) for at least 20 minutes, three days per week. Children should get some combination of moderate and vigorous exercise for at least one hour per day.

In conclusion, continuing modifications to the built environment provide opportunities, over time, to institute policies and practices that support the provision of more activity-conducive environments, which is the goal of this HIA.

HIA ANALYSIS SUMMARY OF FINDINGS

The Berkshire Township Residents and HIA Steering Committee selected traffic and connectivity as the scope of this HIA. Within this scope, relevant health impacts were identified that include traffic safety, physical activity, and cardiovascular risk factors. A summary of findings are presented in Table 2 on page 10. HIA findings suggest that the development of the Premium Outlet Mall has the potential to improve the health of the community through increased physical activity opportunities if connectivity recommendations are included and eventually implemented in a 5-, 10-, 15-year Berkshire Township Comprehensive Plan.

The data revealed that the development of the outlet mall could potentially adversely impact the community through increased traffic, and with a potential increase in motor vehicle fatalities and injuries. The Trans Associates Engineering Consultants, Inc. recent Traffic Impact Study prepared for Premium Outlets-Simon Property Group and Tanger Factory Outlet Centers, Inc., conclusions and recommendations are included in Appendix A.

HIA recommendations that improve roadway design would allow for increased safety for motorists, bicyclists, and pedestrians and increased opportunities for physical activity that will help prevent or reduce chronic diseases should the residents choose active transportation options.

¹⁷ U.S. Department of Health and Human Services. Physical Activity and Health: A Report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, 1996.

Table 2. HIA Summary Findings	Health Determinant	Direction	Magnitude	Strength of Evidence	Distribution
Health Outcomes	Traffic injuries, fatalities	-	High	◆◆◆	Impacts entire community relatively equally
	Cardiovascular disease and risk factors (hypertension, obesity/overweight, high cholesterol, diabetes, air pollution)	-	Medium	◆◆◆	Impacts entire community unequally
Behavioral Determinants of Health	Physical activity	+	Medium	◆◆	Impacts entire community unequally
Environmental Determinants of Health	Traffic	-	High	◆◆◆	Impacts entire community relatively equally
	Connectivity	+	High	◆◆	Impacts entire community relatively equally

Legend:

DIRECTION OF IMPACT

Positive(+)=Changes that may improve health
 Negative(-)=Changes that may detract from health

MAGNITUDE OF IMPACT

Low=Causes impacts to no or very few people
 Medium=Causes impacts to wider number of people
 High=Causes impacts to many people

STRENGTH OF EVIDENCE

◆◆◆-Strong evidence exists from multiple peer-reviewed sources with consistent findings.
 ◆◆-Some evidence exists from several peer-reviewed sources.

DISTRIBUTION OF THE IMPACT

Impacts entire community relatively equally
 Impacts entire community unequally

Note: Strength of evidence was based on peer-reviewed published Academia Journal articles, and Federal guidance documents.

SUMMARY OF MAJOR HIA RECOMMENDATIONS FOR CONNECTIVITY (COMMUNITY) AND TRAFFIC (CONGESTION)

- Policy Adoption

Policies adoption should be fully integrated into ongoing planning activities such as comprehensive planning, zoning regulations, Complete Street policy, site plan ordinances and review, and street design standards based on safety surveys.

- Promote Active Transportation

Comprehensive street design that accommodate all roadway users such as providing sidewalks, bicycle lanes, and share-the-road signs that provide safe and convenient travel for all users of the roadway.

- Improve Safety for All Roadway Users

Incorporate roadway design measures that improve pedestrian safety such as traffic coalmining, buffer zones, pedestrian lighting, and pedestrian crossing signals.

- Incorporate Healthy Community Design Features

Incorporate health in community design by providing healthy food and beverage options, eliminating tobacco smoke, and providing infrastructure for active transportation.

- Increase Connectivity

Ensure that safe pedestrian walkways and multiuse paths are installed in existing and new subdivisions that provide direct links to major destinations such as schools, grocery, parks, and shopping centers.

- Enhance Walkability/Bikeability

Follow development and redevelopment practices that support walking, biking and transit use through placement and proximity of destination.

- Encourage Walking/Biking

Research the potential grant opportunities available such as Safe Routes to School and the Ohio Clean Fund to help fund walking/biking opportunities for the community.

HEALTH PROFILE FOR DELAWARE COUNTY, OHIO

2013 motor vehicle accident Injury and fatality data are shown on Table 3.

Motor Vehicle accident type	Ohio ¹⁸	Delaware County ¹⁹	Berkshire Township ²⁰
Fatalities	990	11	1
Injuries	101,138	1,353	110
Collision with pedestrians	2,365	-	-
Collision with pedalcyclist*	909	-	-
Mortality rate per capita per 100,000	8.5	6.3	32
Injury rate per capita per 100,000	868	776	3,565

*Pedalcyclists are riders of bicycles (two-wheel, non-motorized cycles) and other cycles (tricycles and unicycles) powered solely by pedal.

Physical Activity: Chronic Disease Prevention

Achieving the CDC recommended physical activity levels can help with weight management and decrease the risk of many chronic diseases including heart disease, cancer, and diabetes. Table 4 reports physical activity, percentage of population overweight, obese and those who have diabetes. Data were obtained from Delaware General Health District's 2013 Behavioral Risk Factor Surveillance Survey, which surveyed Delaware County residents 18 years old and above.

Indicator	Delaware County, Ohio ²¹	Berkshire Township ²²
Percentage Who Did At Least 30 Minutes of Physical Activity in a Typical Week	87%	97.5%
Average Days Per Week With At Least 30 Minutes of Physical Activity	4.2 days	4.5 days
Overweight	36%	25%
Obese	25%	21%
Diabetes	11%	8.8%

¹⁸ Ohio Traffic Crash Facts All Counties. (2014). Ohio Department of Public Safety, p. .

¹⁹ Ibid.

²⁰ Ibid.

²¹ Kristel, O. Szymansk, A., and Awe, S. (2014) Report to the Partnership For a Healthy Delaware County: 2013 Community Health Status Assessment. Delaware, Ohio, [online]. Available at: http://delawarehealth.org/files/files/2013%20CHSA_Report%20FINAL%2012_19_13%20-%20FULL%20survey_profile.pdf.

²² Ibid.

Air Pollution: Respiratory and Cardiovascular Disease Risk Factor

Air pollution can trigger asthma attacks, acute bronchitis, heart attacks, and heart arrhythmias. In 2012, 28.5% of Delaware County residents age 18 years and younger were diagnosed with asthma²⁵

Connectivity: Health Equity

- If community development is designed solely for vehicular access, then the mobility of those who cannot afford a car or drive due to age or circumstance will be greatly limited.
- 690 households in Delaware County (1.1%) do not own a vehicle; 7,280 households in Delaware County (11.6%) have access to 1 vehicle.²⁶
- The proportion of Delaware’s population that is below the poverty level is 4.7%. One third of those below the poverty level were 18 years and younger²⁷
- One-quarter of Delaware County’s population is too young to drive.²⁸

Table 5. Percentage of Population: Asthma, Heart Attack, Stroke

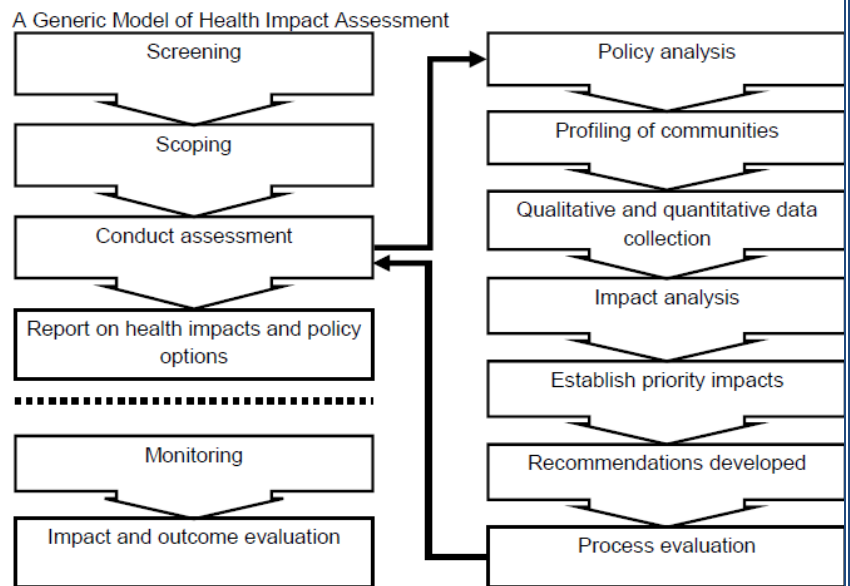
Health Indicator	Delaware County ²³	Berkshire Township ²⁴
Asthma	13%	4%
Heart Attack	6%	4%
Stroke	6%	4%

BACKGROUND and SCREENING

What is a Health Impact Assessment (HIA)?

A HIA is a tool to help decision-makers recognize the health consequences of new programs, policies or projects, and provides alternative solutions to create healthier environments (see Figure 2). HIAs use a combination of procedures and methods by which a policy, program or project may be evaluated regarding its potential effects on the health of the population, and the distribution of those effects on the health of the population, and the distribution of those effects within the population.²⁹

Figure 2. A Generic Model of Health Impact Assessment



²³ Kristel, O. Szymanski, A., and Awe, S. (2014) Report to the Partnership For a Healthy Delaware County: 2013 Community Health Status Assessment. Delaware, Ohio, [online]. Available at: http://delawarehealth.org/files/files/2013%20CHSA_Report%20FINAL%2012_19_13%20-%20FULL%20survey_profile.pdf.

²⁴ Ibid.

²⁵ State of the Air 2012, American Lung Association.

²⁶ (DADS), D. (2014). American FactFinder - Results. [online] Factfinder2.census.gov. Available at: http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_12_5YR_S0801 [Accessed 18 Jun. 2014].

²⁷ Ibid.

²⁸ (DADS), D. (2014). American FactFinder - Results. [online] Factfinder2.census.gov. Available at: http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC_10_DP_DPDP1 [Accessed 18 Jun. 2014].

²⁹ Health Impact Project, <http://www.healthimpactproject.org/hia/process>.

This HIA followed the six-step process described by the Human Impact Project.³⁰ The steps are reviewed below with the assessment of the Premium Outlet Mall project.

1). SCREENING

The screening step determined whether this HIA would likely succeed and add value. Questions included: What specific proposed project will the HIA address? For example, since the HIA will address the proposal for the development of an outlet mall, what specific decision-making process (such as connectivity and traffic) will the HIA inform? How important is it to consider the residents' health in the decision? Will the HIA provide new and important information or insight on previously unrecognized health issues? Is the HIA feasible in terms of available resources (e.g., data, time, money, stakeholder interest and political will)?

2). SCOPING

The scoping step created objectives for the HIA and outlines the steps of the HIA process by asking: What health effects should the HIA address? What concerns have stakeholders and residents expressed about the development of the Premium Outlet Mall? Who will be affected by the development of the outlet mall, and how will they be impacted?

3). ASSESSMENT

The assessment step involved two steps: 1) Describing the baseline health of residents that are affected by this decision, and 2) Predicting the potential health effects. The baseline health analysis attempted to explain not only the important health issues existing, but also the conditions that influence health and could be impacted by the decision in question—such as traffic, motor vehicle fatalities and injuries; connectivity to the neighborhoods such as walkability, physical activity, and availability of parks and recreation facilities.

The assessment stage also involved literature review, qualitative analysis and quantitative modeling. It identified not only the important health risks and benefits, but also their distribution among vulnerable subgroups within the population (such as children, the elderly, people with chronic illnesses, or those with low incomes). The HIA was conducted in an impartial, scientific way that identified both the risks and the benefits associated with this development. Assessment of health-related economic costs and benefits was also included in this HIA because such analysis may help weigh the relative importance of identified health issues against other considerations.

4). RECOMMENDATIONS

These HIA recommendations are designed to protect and promote community health. The actions required to integrate this HIA's analysis and recommendations into a decision-making process are

³⁰ Health Impact Project, <http://www.healthimpactproject.org/hia/process>.

unknown at this time. However, by providing an analysis that outlines the potential risks, the benefits of these recommendations may help policy makers to make informed choices that promote community health. These recommendations are based on the HIA analysis, and provide practical, specific actions that can be taken in order to promote health and avoid, minimize or mitigate adverse consequences.

5). REPORTING

The findings will be disseminated to decision makers, the affected communities and other stakeholders with a request for feedback. The success of this HIA depends on effective dissemination. This HIA will ultimately look towards policy adoption, regulatory, education and awareness to ensure effective dissemination of the findings and to help facilitate adoption of any recommendation.

6). EVALUATION AND MONITORING

Three types of evaluation will be conducted: 1) process evaluation which will gauge the HIA's quality according to established standards and the original plan for the HIA; 2) impact evaluation assesses the HIA's impact on decision-making and its success according to the recommendations based on the scope of this HIA; and 3) outcome evaluation will assesses changes in health status and health determinants as the development is occurring and once established.

The monitoring step will track indicators that will be used to inform process, impact and outcome evaluations.³¹

OVERVIEW OF PREMIUM OUTLET MALL PROJECT

The NACCHO and the PEW Charitable Trust Foundation awarded a Health Impact Assessment (HIA) mentorship grant to the Delaware General Health District on September 1, 2013, in order to conduct a HIA on the Premium Outlet Mall development in Delaware County, Ohio. The Simon Property Group and Tanger Outlets have proposed to develop a 350,000-square-foot outlet center with 90 retail businesses on approximately 50 acres in Berkshire Township, Delaware County, Ohio. Plans also include additional future commercial and office uses on the remaining land. At 350,000 square feet, the proposed outlet center is larger than the Kellogg School of Management's estimated national average size for an outlet mall of 200,000 square feet. The proposed outlet center is close in size to the two closest outlet malls currently serving central Ohio.

The proposed site can be accessed easily by the current US Interstate 71 North and South interchange at US-36/SR-37; however, the actual development site will require the construction of a new road that would be extended to the South from US-36/SR-37. The proposed mall project will utilize land currently

³¹ Health Impact Project, [online]. Available at: <http://www.healthimpactproject.org/hia/process>

The major concerns for this development that were expressed by Berkshire Township residents relate to traffic capacity of the existing interstate interchange, and increased traffic on rural roads as a result of the planned development. The residents had a successful petition drive to place a referendum on the ballot on November 8, 2013, to overturn the re-zoning decision. All development was ceased until a decision was made, unless the property was annexed into the Village of Sunbury or the residents decided to remove the referendum from the ballot. On November 8, 2013, the voters approved the referendum, which upheld the re-zoning of this plot of land.

The decision-makers involved in the design-approval process include the Delaware County Regional Planning Commission. Other entities that must agree to the proposed development include: the Delaware County Engineer's Office (with approval from the Ohio Department of Transportation on findings from the recent Traffic Impact Study); the DGHD; the Delaware County Sanitary Engineer; the Delaware County Soil and Water Conservation District; and the Berkshire Township Zoning Commission, which already has granted approval. The DGHD worked with decision-makers to provide the HIA recommendations during their review. On June 6, 2014, summarized HIA recommendations were provided to the Delaware County Regional Planning Commission Executive Director who included these recommendations in the Regional Planning report to Simon Property Group. The full HIA report was distributed in August 2014 to all the engaged stakeholders, active Berkshire Township residents, and the Simon Property Group.

To address health equity and the HIA health equity principles, residents were kept informed, educated about issues related to the Premium Outlet Mall Project and empowered to participate in the decision-making process. The DGHD encouraged and engaged residents to participate on the Residents Advisory Group and to attend HIA meetings convened by DGHD on January 16, 2014 and April 30, 2014.

The DGHD HIA team developed the document "How to Engage Stakeholders," which is included as Appendix B.

The HIA Timeline

September 2013 - January 2014: Screening-Collaborated with the Residents Advisory Group and HIA Steering Committee to determine if an HIA will be feasible and produce beneficial information on the health impacts from the development of the Premium Outlet Mall on community health.

October 2013: Scoping-Collaborated with the Residents Advisory Group and HIA Steering Committee to determine the public health impacts from the development of the Premium Outlet Mall on community health, and identified vulnerable populations; finalized health impacts to be assessed by this HIA.

November 2013: Start Assessment step-determined how the population may be affected by the project by risk assessment and through existing evidence-based modeling for traffic, physical activity, and connectivity. Reviewed applicable literature and gathered secondary data.

December 2013 - June 2014: Continued with assessment step by selecting prediction models, and gathered public perception by attending Resident Advisory Group meetings and walkability audits, to understand the health impacts.

January 2014 - May 2014: Recommendations-final recommendations selected, which included strategies for active transportation, improving safety for all roadway users, incorporating healthy community design, and health-based recommendations.

June 2014: Any other health impact/risks that were identified was addressed in this HIA.

July 2014 - August 2014: Reporting-HIA report was reviewed with stakeholders, Premium Outlet Mall. The HIA report will be disseminated to the stakeholders, residents in Delaware County and throughout the State of Ohio through various public health association meetings/conferences.

Fall 2014 - Ongoing: Evaluation and Monitoring-To evaluate and monitor the impact on health outcomes that were identified in the scoping process.

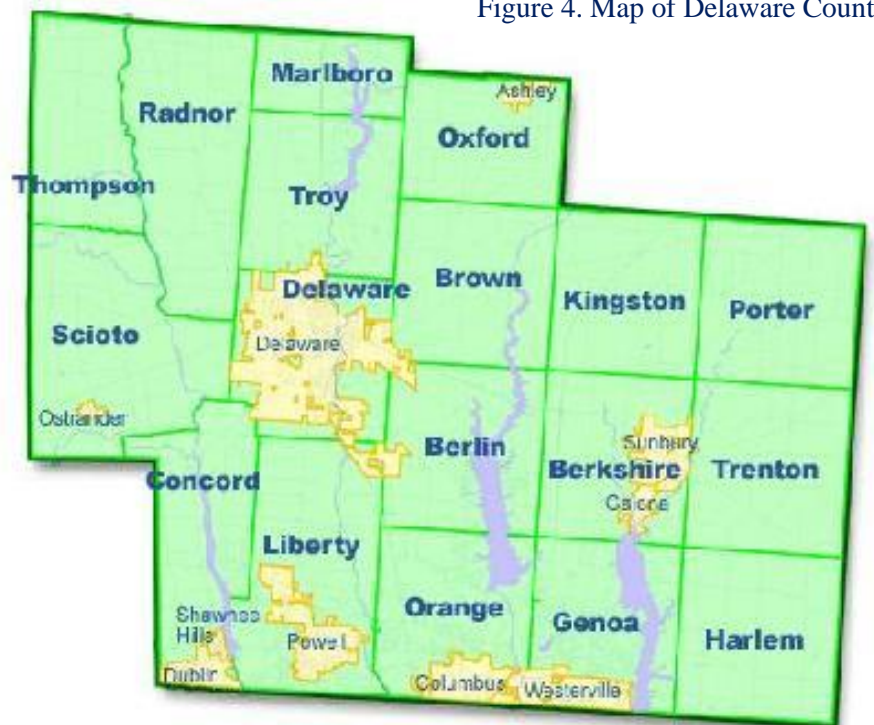
DELAWARE, OHIO PROFILE

Delaware County is located in the central portion of Ohio. The county seat is Delaware, which is the county's largest population center with just over 34,000 in 2010. This marked a 37% growth in the town's population since 2000, and the county itself experienced a 58% growth rate, to a total population of 174,214 people during this same period. Delaware County is one of Ohio's fastest growing counties.³²

Delaware County is the 15th most populated county in the state of Ohio out of 88 counties. The county's population density is 380.94 people per square mile, which is higher than the state average density of 257.36 people per square mile and is much higher than the national average density of 81.32 people per square mile.³³ According to the U. S. Census Bureau, the county has a total area of 456 square miles; 442 square miles is land and 14 square miles is water (2.97%).³⁴

Despite the tremendous growth, Delaware County remains rural, but subdivisions and businesses are quickly taking over much of this land. The southern part of the county, which is the area nearest Franklin County (Columbus), is experiencing the fastest population growth in the county, with the northern portion of the county remaining the most rural.³⁵ Retail sales positions are the county's largest employer, with service industries and manufacturing establishments finishing second and third respectively. Delaware County has one of Ohio's highest average incomes and lowest poverty rates. The county's median household income was approximately \$90,022 dollars in 2010, with only 4.5% of the population living in poverty.³⁶

Figure 4. Map of Delaware County



³² Ohio Historical Center website. [online]. Available at: http://www.ohiohistorycentral.org/w/Delaware_County?rec=1922&nm=Delaware-County.

³³ U.S. Census Bureau, 2010. [online]. Available at: <http://www.census.gov/2010census/popmap/ipmtext.php?fl=39>.

³⁴ Ohio History Central. [online]. Available at: http://www.ohiohistorycentral.org/w/Delaware_County

³⁵ U.S. Census Bureau, 2010. [online]. Available at: <http://www.census.gov/2010census/popmap/ipmtext.php?fl=39>.

³⁶ Ibid.

Map: People in Need. [online]. Available at: <http://www.delawarepeopleinneed.org/aboutus/delawarecounty.html>.

The most prevalent race in Delaware County in 2010 was white, which represent 89.8% of the total population. The remaining racial makeup of Delaware County was 7% Black or African American, 3.5% Native American and Alaska Native, 0.2% Asian, 4.7% Pacific Islander, 0.5% from other races, and 1.9% from two or more races. Compared to Ohio, which has a 12.2% Black population, Delaware County has approximately a 7% Black population.³⁷ Compared to the State of Ohio, Delaware County has a greater Asian population and fewer Black and Hispanic or Latino populations. In 2010, 31.2% of the population in Delaware County was under the age of 19 years. The median age was 37.4 years. The percentage of residents under the age of five is 7.4%, which is less than the percentage for Ohio (6.2%).³⁸ The United State Census Bureau estimates that in 2012, that number had fallen to 6.6% for Delaware County and 6.0% for Ohio. Also in 2012, the percentage of the population under the age of 18 was 28.0% for Delaware County compared to 23.1% of Ohio.

The average Delaware County education level in 2010 was higher than the state and national average. In Delaware County, 20% of the population received their high school diploma, 32% had a Bachelor's degree and 17% had a graduate or professional degree. In Ohio, 35% graduated from high school, and 28% received some college or an Associate degree. Over 15% in Ohio received a Bachelor's degree and 10% received a Master, Doctorate or Professional Degree³⁹

In 2010, there were 62,618 households in Delaware County; 42% of households had children under the age of 18 living with them, 67% were married couples living together, 7.5% had a female householder with no husband present, and 22.3% were non-families. Less than one-fifth of households (18.2%) were made up of individuals who lived alone and 5.3% were made of individuals 65 years of age or older that live alone. The average household size was 2.68, and the average family size was 3.06.⁴⁰ A complete Delaware County, Ohio demographic profile is outlined in Appendix C.

The Delaware General Health District's 2013 Behavioral Risk Factor Surveillance Survey (BRFSS) data revealed the health risks in Delaware County (Appendix D). Thirteen percent reported that they were diagnosed by their doctor or other healthcare provider that they had asthma. Non-white subgroups were more likely to report having been diagnosed with asthma (47%). Those with household incomes less than \$50,000 (19%) were more likely to report having been diagnosed with asthma, and younger respondents aged 50-64 (33%) were especially likely to report they had been diagnosed with asthma.

The 2013 county BRFSS data revealed that 25% of the respondents were obese and 36% were overweight. Body Mass Index indicating obesity were most often reported among those aged 50-64.⁴¹

³⁷ U.S. Census Bureau, 2010. [online]. Available at: <http://www.census.gov/2010census/popmap/ipmtext.php?fl=39>.

³⁸ Ibid.

³⁹ Ibid.

⁴⁰ Ibid.

⁴¹ Kristel, O., Szymansk, A. and Awe, S. (2014). *Report To The Partnership For A Healthy Delaware County: 2013 Community Health Status Assessment*. Delaware, Ohio, [online]. Available at: http://delawarehealth.org/files/files/2013%20CHSA_Report%20FINAL%2012_19_13%20-%20FULL%20survey_profile.pdf

A brief summary of Delaware County environmental health profile is outlined in Appendix E.

BERKSHIRE TOWNSHIP, DELAWARE COUNTY, OHIO PROFILE

According to the 2010 U.S. Census Bureau, the total population in Berkshire Township was 3,085.⁴² For the past 40 years, Berkshire Township has had varied rates of growth. Growth rates didn't increase significantly until the 1980s. This growth continued into the 1990s and appeared to have slowed slightly in the 1990s, as illustrated in Table 6. The population increased by over 50% from 2000-2010.⁴³ Berkshire Township, population demographics are presented in Table 7.

Table 6. Berkshire Township, Delaware County, Ohio, Population 1960-2010⁴⁴

Year	Census Population	Population Change from last Census	Percent change from last Census
1960	889	-	-
1970	927	38	4.30%
1980	1,272	345	37.20%
1990	1,713	441	34.70%
2000	1,946	233	13.60%
2010	3,085	1,139	58.53%

Table 7. Summary of Population Demographics in Berkshire Township, Delaware County, Ohio¹

Berkshire Township	Percent of			
	White	Black	Asian	Hispanic
	94.78%	1.23%	1.62%	1.3%

Twenty-six percent of the population that live in the study area is 18 years and younger. According to the 2010 U.S. Census Bureau, that represents 805 children and teenagers, age 18 and younger living in Berkshire Township.⁴⁵ There are 10 Elementary, 2 Middle, 1 Intermediate and 2 High Schools, which represents a total student population of 10,207 located within 12 miles of Premium Outlet Mall site.

⁴² U.S. Census Bureau. [online]. Available at: <https://www.census.gov/2010census/popmap/>.

⁴³ Ibid.

⁴⁴ Delaware County Regional Planning Commission. [online]. Available at: <http://www.dcrpc.org/compplan/document/BerkshireTwpCompPlan.pdf>.

⁴⁵ Ibid.

This number of youth represents a significant vulnerable population that lives in, travels to and will spend time in the study area--due to adverse health effects from potentially deteriorating air quality, and increasing traffic. It is noteworthy that motor vehicle crashes were the leading cause of death for age 4 and every age 11 through 27.⁴⁶

Berkshire Township is also home to 333 adults aged 65 and older. Adults aged 85 and older in Ohio had the highest motor vehicle fatality rate of 18.7 per 100,000 in 2010, which exceeds the national standard set by Healthy People 2020 of 12.4 deaths per 100,000. Older pedestrians (age 65+) accounted for 20% (935) of all pedestrian fatalities in the U.S., and an estimated 9% (7,000) of all U.S. pedestrians injured in 2012.

COMMUNITY ASSETS

The majority of businesses in the township are located in the northwestern corner near the I-71 & US-36/SR-37 interchange. Twelve of the 49 businesses are restaurants, five are gasoline service stations and four are motels. There are also a number of construction industry related businesses and two golf courses in the township. Both golf courses offer a club house with a restaurant and banquet facilities. The Northstar subdivision has a community outdoor swimming pool. Currently there is very little retail.⁴⁷

BUILDING GROWTH RATE

Building permit figures show increased growth rate in Berkshire Township. In 2009, the township issued 46 permits, its highest total to date. In 2013, 38 building permits were issued. Since 1995, the township has averaged 20 building permits each year with above average permits issued the past two years. Berkshire Township had the sixth highest number of building permits of all 18 townships in Delaware County over the last two years, behind Orange, Genoa, Concord, Liberty and Berlin townships, respectively.⁴⁸

Until recently, homes in the township have been built one-at-a-time on individual acreage lots with on-lot sewage treatment systems. Such conditions have not lent themselves to large production builders and accounts for the modest growth compared to neighboring Berlin and Genoa Townships where centralized sewer is available.

There is a 1.8 mile bikeway in the township that runs along Old 3C Highway through Sunbury, Galena, and Genoa Township, and connects to the 2.2 mile Westerville bikeway. These bikeways are indicated

⁴⁶ National Traffic Highway Safety Administration, [online], <http://www-nrd.nhtsa.dot.gov/Pubs/811620.pdf>

⁴⁷ Delaware County Regional Planning Commission. [online]. Available at: <http://www.dcrpc.org/compplan/document/BerkshireTwpCompPlan.pdf>.

⁴⁸ Ibid.

on the proposed bikeway map in blue in Appendix F. In 2006, the Mid Ohio Regional Planning Commission (MORPC) updated its Regional Bikeway Plan for Franklin and Delaware Counties in hopes of obtaining funding through the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU).

The purpose of the Regional Bikeway Plan is to: provide a bikeway planning guide for local jurisdictions considering land development, roadway widening, and highway improvements or zoning changes; facilitate development of a transportation system that provides direct and convenient bicycle travel within and between residential areas, places of employment and neighborhood activity centers; provide for the development of a regional bikeway system meeting the travel needs of the bicycling public; provide for a regional bikeway system that is integrated with central Ohio's surface transportation system; and recommend a number of bikeways along traditional roads in Berkshire Township to create a network that will include the existing Sunbury and Westerville bikeways. The proposed bikeways are indicated in blue on the Bikeways Map; see Appendix F.⁴⁹ The Delaware County Parks and Trails map is shown in Appendix G.

COMMUNITY HEALTH

ADULT HEALTH

The DGHD conducted a Behavioral Risk Factor Surveillance Survey as part of its 2013 community health status assessment. The results, which are outlined below showed an alarming amount of the adult population, age 18 years and older that had been diagnosed with a chronic disease or other health indicator. Over 25% of the adults in Berkshire Township were overweight and over 21% were obese. To that end, over 43% of the population is trying to lose weight. Obese individuals are typically sedentary as there is an inverse relationship between BMI and activity levels. An increase in BMI is not only negatively associated with physical activity levels, but it is also associated with an increase in functional impairment, which could lead to impaired balance and an increased risk of falls. Responders report engaging in physical activity for at least 30 minutes per day an average 4.5 days per week.⁵⁰

The data for diabetes indicated that 11% of adults (18+) living in Delaware County have been diagnosed with diabetes. According to the U.S. Census Bureau, in 2010, that percentage represents over 13,608 adults in Delaware County who have been diagnosed with diabetes.⁵¹

High blood pressure has been linked to many serious health issues, such as strokes, heart attacks, and heart disease. Over one-quarter of the adult survey respondents indicated that they have been told that

⁴⁹ Delaware County Regional Planning Commission. [online]. Available at: <http://www.dcrpc.org/compplan/document/BerkshireTwpCompPlan.pdf>.

⁵⁰ Kristel, O., Szymansk, A. and Awe, S. (2014). *Report To The Partnership For A Healthy Delaware County: 2013 Community Health Status Assessment*. Delaware, Ohio, [online]. Available at: http://delawarehealth.org/files/files/2013%20CHSA_Report%20FINAL%2012_19_13%20-%20FULL%20survey_profile.pdf.

⁵¹ U.S. Census Bureau, 2010. [online]. Available at: <http://www.census.gov/2010census/popmap/ipmtext.php?fl=39>.

they have high blood pressure by a doctor or other health care provider. According to the U.S. Census Bureau, in 2010, that percentage represents over 34,638 adults in Delaware County who have been diagnosed with high blood pressure. Those who were 65 years and older were more likely to report a high blood pressure diagnosis (57%). Those with household incomes less than \$50,000 were more likely to report a high blood pressure diagnosis (37%).⁵²

High blood cholesterol, like high blood pressure, has also been linked to many serious health issues such as strokes, heart attacks and heart disease. Over one-quarter of adult survey respondents indicated that they have been told that they have high blood cholesterol by a doctor; according to the U.S. Census Bureau, in 2010, that percentage represents over 35,875 adults in Delaware County who have been diagnosed with high blood cholesterol. Those who were 65 years and older were more likely to report ever having received a diagnosis of high blood cholesterol (57%).⁵³

According to the National Center for Health Statistics, two of the top four leading causes of death in the U.S. are heart disease and stroke. Six percent of adult survey respondents indicated that they have been told by a doctor or other health care provider that they have had a coronary heart disease or stroke. According to the U.S. Census Bureau, in 2010, that percentage represents over 7,422 adults in Delaware County who have been told that they have had a stroke or coronary heart disease by a doctor, nurse, or other health professional. Those who were over age 65 were more likely to report being diagnosed with heart disease (12%) or stroke (13%).⁵⁴

CHILDREN AND ADOLESCENT HEALTH

According to the Data Resource Center for Children & Adolescent Health, in 2011-2012, 15.6% and 13.4% of children, aged 10-17 years old were considered overweight nationwide and in Ohio, respectively. In that same year, 15.7% and 17.4% of children, aged 10-17 years old were considered obese nationwide and in Ohio, respectively.⁵⁵

In 2010, an Ohio Department of Health survey found that in Delaware County, 25.7% of 3rd grade students were either overweight or obese.⁵⁶ To estimate the prevalence of obesity and overweight among those surveyed, a Body Mass Index was calculated for each individual who provided his/her weight. The standard weight status guidelines were used: Normal weight, BMI between 18.5-24.9; overweight, BMI between 25-29.9; obese, BMI over 30.

⁵² Kristel, O., Szymanski, A. and Awe, S. (2014). *Report To The Partnership For A Healthy Delaware County: 2013 Community Health Status Assessment*. Delaware, Ohio, [online]. Available at: http://delawarehealth.org/files/files/2013%20CHSA_Report%20FINAL%2012_19_13%20-%20FULL%20survey_profile.pdf

⁵³ Ibid.

⁵⁴ Ibid.

⁵⁵ Data Resource Center for Children & Adolescent Health. [online]. Available at: <http://www.nschdata.org/browse/survey/results?q=2462&r=1&r2=37>

⁵⁶ A report of the Body Mass Index of Ohio's 3rd Graders, 2004-2010 Ohio Department of Health. [online]. Available at: http://www.healthy.ohio.gov/resources/datareports/~/_media/53EF42E4728644E68E6CA700480DCA9E.ashx

PHYSICAL ACTIVITY AND HEALTH

Physical activity is widely recognized as a means for the primary prevention and reduction of chronic diseases as well as in patients' treatment and rehabilitation. The strongest evidence exists for colon cancer, breast cancer, and cardiovascular diseases. The maximal magnitudes of the risk reduction reported were: 75% for breast cancer, 49% for cardiovascular and heart diseases, 35% for diabetes, and 22% for colorectal cancer. Increased physical activity also prevented the weight gain associated with aging at least 2-times greater in individuals who were more active compared with those who were inactive.⁵⁷ According to the CDC, overweight and obese individuals are at an increased risk for many diseases and health conditions, including hypertension, Type 2 diabetes, coronary heart disease, stroke, osteoarthritis, and are at an increased risk of falls.

CDC claims that the majority of U.S. health care and economic costs associated with medical conditions are for the costs of chronic diseases and conditions and associated health risk behaviors. The total costs of heart disease and stroke in 2010 were estimated to be \$315.4 billion in the U.S. Of this amount, \$193.4 billion was for direct medical costs, not including costs of nursing home care. In the U.S., cancer care cost \$157 billion in 2010 dollars.

SCREENING

To screen for the HIA, the Health Commissioner and the author attended a Berkshire Township Residents' Advisory Group meeting on October 12, 2013, and discussed how an HIA might help decision-makers further evaluate and prioritize the residents' concerns about the Premium Outlet Mall project and its potential impact on community health.

The Delaware General Health District project team determined that an HIA would provide an opportunity to examine the potential health impacts of the proposed Premium Outlet Mall development and alternatives to help further refine and improve infrastructures and to help the township possibly prioritize funding for projects that provide health as well as environmental and economic benefits. A screening worksheet was prepared for this project by Health District staff and is included in Appendix H.

⁵⁷ U.S. Department of Health and Human Services. Physical Activity and Health: A Report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, 1996.

The scoping phase of this HIA was used to gain an understanding of what concerns were most important to the community concerning the development of the Premium Outlet Mall. The scoping process was finalized during a meeting on January 16, 2014, where 25 stakeholders and 7 Berkshire Township residents met with the Director of Development for the Premium Outlet Mall. The purpose of the meeting was to give the community an opportunity to voice their concerns and to make recommendations to improve the infrastructure that supports active transportation, improves traffic congestion, and other improvements to the built environment. The scope of this HIA was determined by the entire group based on the discussions held at the meeting. A scoping worksheet and the scoping minutes are included in Appendix I.

The residents provided a list of concerns and recommendations as highlighted in Table 8.

The HIA Steering Committee and the Residents Advisory Group used a multifaceted approach to identify the key issues associated with the development of the Premium Outlet Mall that have the potential to impact the community’s health. The purpose of this approach was to ascertain issues of public concern, issues with the greatest impact, based on impact severity or the number of

people affected, and issues that may affect the most vulnerable populations. Using Resident Advisory group input, literature review, and the HIA Steering Committee’s professional expertise, several critical issues were identified that have the potential to impact the health of the study area population. These include access to opportunities for physical activity through connectivity and traffic such as congestion, roadway improvements, motor vehicle fatalities and injuries. Connectivity is crucial. The participants agreed that connectivity—between multiuse trails; between bicycle lanes and transit; between streets via sidewalks; and between neighborhoods and destinations—would not only make active transportation easier and in some cases more efficient, but would increase physical activity and a sense of community.

Table 8. Berkshire Township Residents’ Top Concerns and Recommendations

Light and noise pollution during construction
Improvement to freeway
Air pollution
Roadway improvement and maintenance
Limiting truck traffic during rush hour
Incorporating mass transits
Crime and safety
Separating truck and automobile traffic
Public education about sharing road with trucks
Pedestrian safety and walkability
Impacts on arterial streets
Aesthetics of the development
Economic impacts
Public outreach and public involvement in the process and decision-making
Mitigating impacts from construction
Quality of life—impacts on the rural atmosphere
Traffic-commuting and children’s safety around homes
Landscape-natural beauty and farmland
Resident friendly-bike and walking trails, and parkland
Pedestrian bridge across US-36/SR-37
Architecture façade-will it hold up 10 years from now
Sustainability of the development
Landscaping-evergreen

RESEARCH QUESTIONS

A list of research questions were identified to evaluate the scope of mobility/connectivity and traffic; to support decisions; to determine data related to the development of the outlet mall; and to identify the public health impacts/benefits and implications of the development. They include:

1. What are the current rates of injuries and fatalities associated with vehicle collisions?
2. What is the expected effect of the proposed outlet mall to the current traffic and on the safety of motorists, pedestrians, and pedalcyclists?
3. What are the current physical activity levels for residents in the community and how could this be affected by an outlet mall?
4. What are the current rates of overweight, obesity, and chronic diseases in the community, and how could connectivity to the outlet mall and surrounding neighborhoods impact community health?
5. How walkable and/or bikeable (community connectivity) is the study area?

RESEARCH QUESTION METHODOLOGY

In selecting the indicators and data to address each of the above research questions, the HIA team chose data that could be obtained from the Delaware General Health District's BRFSS and data that would be useful for the selected prediction models.

For Research Question 1 concerning the number of motor vehicle fatalities and injuries, the Ohio Department of Public Safety's *2013 Crash Report*, the Ohio Department of Health's *Burden of Injury in Ohio 2000-2010* report, and Grady Memorial Hospitals *Community Health Needs Assessment*, were used to collect these data.

To answer the Research Question 2 concerning what impact would the outlet mall have on traffic, and the safety of motorists, pedestrians and pedalcyclists, the Traffic Impact Study, traffic calming benefits' model and the crash reduction factor estimate countermeasure were used to predict change in traffic volume and the benefits to applying traffic safety countermeasures. In addition to the prediction model, a literature review was conducted and several relevant studies were included in the assessment section of this report.

For Research Question 3 concerning physical activity levels, the HIA team examined data from the DGHD 2013 Community Health Assessment process, which collected the self-reported number of days the respondents reported that they exercised. It is important to note that these data from Berkshire Township is a very small sample size and was not collected to reflect the demographics of that particular township; therefore, Delaware County physical activity data was also included as a comparison. The

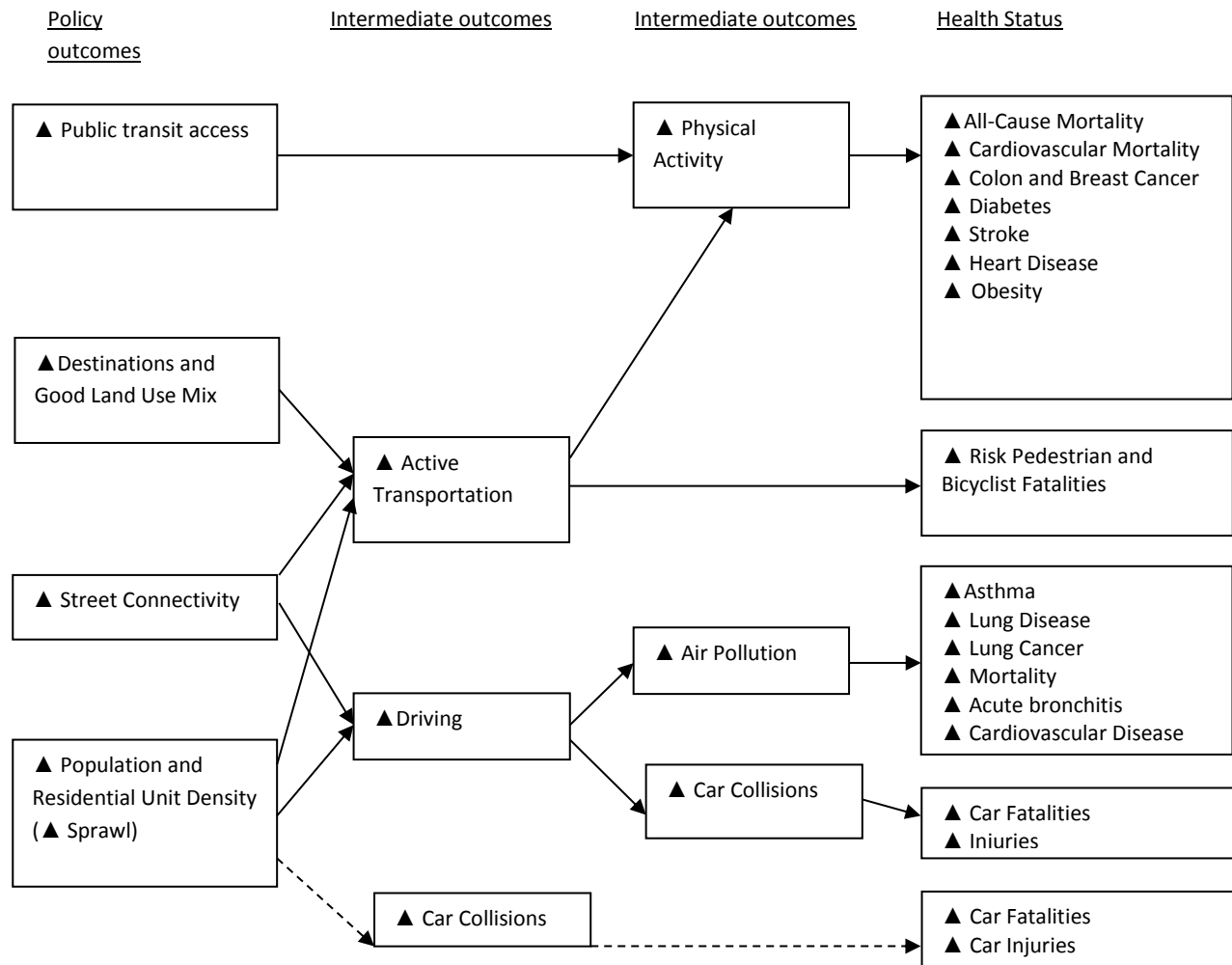
demographics data was obtained from the 2010 Census Bureau. A literature review was conducted to answer what effects could the outlet mall have on physical activity levels of the residents. In order to determine how increased physical activity could impact health, the Boarnet, Greenwald, McMillian framework for quantifying the value of reduced mortality from the addition of community design features was used.

For Research Question 4 regarding obesity and overweight and chronic disease, the DGHD 2013 BRFSS data was collected. The evidence that active transportation has multiple health benefits is unequivocal and literature research is presented to this end.

In order to answer Research Question 5 regarding the walkability or bikeability (connectivity) of the study area, a walking and biking audit was conducted at the intersection of US-36/SR-37 and Wilson Road, which will be a major entrance to the Premium Outlet Mall and the Northstar residential subdivision.

Health Pathway Diagram: Premium Outlet Mall Project

The pathway diagram below illustrates the link between the development of the Premium Outlet Mall in Delaware County, Ohio and potential change in health status.



The goal of this assessment was to: 1) Present literature review on traffic and physical activity research and the concluding evidence; 2) Summarize baseline conditions of traffic, traffic injuries and fatalities, and health risks; identify vulnerable populations; and 3) Predict how this project will impact the community's health.

To understand the impact of the built environment on traffic and physical activity, providing literature reviews and the following measures were essential.

- Current data on traffic, motor vehicle, pedestrian, and pedalcyclists' fatalities and injuries
 - Source: Ohio Department of Public Safety, Ohio Department of Health
 - Estimating change in motor vehicle, pedestrian, pedalcyclists' fatalities and injuries
 - Source: Ohio Department of Transportation's Traffic Study, Community walking audits, Photovoice, and Residents' Advisory Group meeting discussions
 - Current data on physical activity levels and chronic disease for baseline conditions.
 - Source: Delaware General Health District
 - Supportive Literature Review
 - Predicting health benefits of increasing walkability and bikeability in the community
-

CONNECTION BETWEEN TRAFFIC AND THE BUILT ENVIRONMENT, LITERATURE REVIEW

Research shows that traffic accidents and fatalities can be attributed in part to traffic volume, vehicle speed, and street environment.

Traffic Volume

Since motor vehicles are implicated in nearly all traffic accidents, the most important causal factor in traffic accidents is the amount of driving people do. Many studies have found this relationship. In one report, Litman (2004) makes the case that area-wide reductions in vehicle miles traveled (VMT) will result in proportional reductions in total crash costs. He cites empirical evidence showing that each one percent reduction in vehicle miles reduces total crash costs by 1.0 to 1.4 percent. Another example is a study published in the British Medical Journal, which found that the risk of injury to child pedestrians is strongly associated with traffic volume. Risk of injury at sites with highest traffic volumes was 13 times greater than that at the least busy sites. Any measure which reduces VMT or traffic volumes, whether the measure is transportation- or land use-related, should reduce the number of fatal and non-fatal traffic accidents.⁵⁸

⁵⁸ Understanding The Relationship Between Public Health And The Built Environment. [online]. Available at: <http://www.usgbc.org/Docs/Archive/General/Docs1480.pdf>

Vehicle Speed

Another primary cause of traffic accidents is vehicle speed. Physics has proven that lower speeds give drivers more time to react to unforeseen hazards, and reduce the severity of impact when collisions occur. At 40 mph, a driver needs about 300 feet to stop; at 30 mph, stopping distance is 197 feet and at 20 mph, it is only 112 feet (AASHTO, 2001). The relationship is non-linear. Struck by a vehicle traveling 40 mph, a pedestrian has an 85 percent chance of being killed. The fatality rate drops to 45 percent at 30 mph and to 5 percent at 20 mph or less. This relationship is non-linear as well.⁵⁹

A study published in the ITE Journal on the Web found that pedestrian crash rates were primarily a function of traffic speed. An increase in the average speed from 20 to 30 mph was associated with 7.6 times the risk of pedestrian injury (Peterson et al. 2000). The number of parked cars on the street was the second most influential factor in this particular study. All else being equal, measures that lower vehicle operating speeds should reduce the frequency and severity of traffic accidents.⁶⁰

Street Environment

A third causal factor, about which less is known, is the street environment (i.e. the built environment along the roadway, and the activity it generates). The design of roadways contributes to safety: streets that are wide, smooth and straight encourage motorized travel at fast speeds and discourage travel by foot or bicycle, while streets that are narrow and irregular have the opposite effect.⁶¹

Typical suburban areas with low street connectivity, typified by cul-de-sac development and large roads that serve as primary routes to many neighborhoods, have been found to have higher car collision fatality rates.⁶²

Other roadway characteristics associated with pedestrian injuries include intersection design and street type (e.g. residential, freeway, arterial).⁶³ For example, a national multi-city study found that crosswalks at locations without traffic signals were a significant hazard for pedestrians on high traffic and multi-lane roads.

Built environments that encourage alternate forms of transportation can lead to lower volume on the roadways. Higher traffic volume has been found to be associated with higher risk of injury for pedestrians.⁶⁴ It has also been found that when alternate modes of transportation increase, such as walking and bicycling, the risks of accidents, injuries and fatalities to pedestrians and bicyclists

⁵⁹ Understanding The Relationship Between Public Health And The Built Environment. [online]. Available at: <http://www.usgbc.org/Docs/Archive/General/Docs1480.pdf>

⁶⁰ Ibid.

⁶¹ Ibid.

⁶² Ibid.

⁶³ Ibid.

⁶⁴ The benefits of regular walking for health, well-being and the environment. [online]. Available at: <http://www.c3health.org/wp-content/uploads/2009/09/C3-report-on-walking-v-1-20120911.pdf>

decrease.⁶⁵ In a study entitled “Safety in Numbers: More Walkers and Bicyclists, Safer Walking and Bicycling,” Jacobsen taps several data sources to show that crashes between motorists and pedestrians or bicyclists are less likely when there are more people out walking or bicycling. In an environment with many pedestrians or bicyclists, motorists come to expect them and apparently adjust their behavior accordingly.

In conclusion, unsafe streets are a primary barrier to walking behavior. Increasing pedestrian safety helps to prevent obesity and limit the burden of chronic diseases associated with lack of exercise.

Pedestrian safety is also necessary to reduce the harmful impacts of vehicle trips on air and noise pollution and energy consumption.⁶⁶

COSTS OF MOTOR-VEHICLE INJURIES

Road traffic crashes can place a heavy emotional burden on the family and friends of the injured person, many of whom also experience adverse social, physical and psychological effects.

The average costs of fatal and nonfatal unintentional injuries are estimated by the National Safety Council within its annual reference guide, Injury Facts. The costs are a measure of the dollars spent and income not received due to incidents, injuries, and fatalities. This cost serves as a way to measure the importance of prevention efforts – and to illustrate the impact of unintentional injuries and fatalities on the nation's economy.⁶⁷

Table 9. Average Economic Cost per Death, Injury, or Crash, 2012

Injury	Estimated Cost
Death	\$1,410,000
Nonfatal Disabling Injury	\$78,900
Property Damage Crash (including non-disabling injuries)	\$8,900

Table 10. Average Economic Cost by injury Severity, 2012

Severity of Injury	Estimated Cost
Incapacitating injury (A)	\$72,700
Non-incapacitating evident injury (B)	\$23,400
Possible injury (C)	\$13,200

The calculable costs of motor-vehicle crashes are wage and productivity losses, medical expenses, administrative expenses, motor vehicle damage, and employers’ uninsured costs. The costs of all these items for each death, injury, and property damage crash are shown in Table 9.

Estimates are given in Table 10 of the costs by severity of injuries, as defined in the Manual on Classification of Motor Vehicle Traffic Accidents. These injury severity designations are sometimes

⁶⁵ Jacobsen, P. (2003). Safety in numbers: more walkers and bicyclists, safer walking and bicycling. *Injury prevention*, 9(3), pp.205--209.

⁶⁶ Impacts of Urban Land Use Development on Pedestrian-Motor Vehicle Collisions: An Application of the San Francisco Pedestrian Injury Model to Five Neighborhood Plans. [online]. Available at: <http://www.sfhealthequity.org/component/jdownloads/finish/7-land-use/42-impacts-of-urban-land-use-development-on-pedestrian-motor-vehicle-collisions/0?Itemid=0>.

⁶⁷ Estimating the Cost of Unintentional Injury. [online]. Available at: http://www.nsc.org/news_resources/injury_and_death_statistics/Pages/EstimatingtheCostsofUnintentionalInjuries.aspx.

referred to as class "A," "B," and "C." Ohio's 2013 total economic impact (not comprehensive costs) from motor vehicle injuries was \$3,665,590,000 based on 2012 economic costs estimates and is illustrated in Table 11. Berkshire Township, Delaware County, Ohio 2013 total economic impact (not comprehensive costs) from 1 motor vehicle fatality and 71 injuries was \$6,571,700 based on 2012 economic cost estimates.

Table 11. 2013 Ohio's Estimated Economic Impact from Motor Vehicle Injury by Severity

Pedestrian injury Severity	Cost of injury	Number of incidents	Total cost, Economic impact
Fatal injury	\$1,410,000	990	\$1,395,900,000
Incapacitating injury (A)	\$72,700	9,232	\$671,166,400
Non-incapacitating evident injury (B)	\$23,400	39,062	\$914,050,800
Possible injury (c)	\$13,200	51,854	\$684,472,800
2012 Total Motor Vehicle Cost			\$3,665,590,000

New findings from the Insurance Research Council's (IRC) *Auto Injury Insurance Claims Study* shows that medical expenses reported by auto injury claimants continue to increase faster than the rate of inflation, in spite of the fact that the severity of the injuries themselves remain on a downward trend. From 2007 to 2012, average claimed economic losses (which include expenses for medical care, lost wages and other out-of-pocket expenditures) grew 8 percent annualized among personal injury protection (PIP) claimants. Among bodily injury (BI) claimants, average claimed losses grew 4 percent. Over the same period, measures such as the percentage of claimants who had no visible injuries at the accident scene or who had fewer than 10 days in which they were unable to perform their usual daily activities, provided evidence of a continuing decline in the severity of injuries.

- In 2012, the average auto liability claim for property damage was \$3,073; the average auto liability claim for bodily injury was \$14,653.
- In 2012, the average collision claim was \$2,950; the average comprehensive claim was \$1,585.⁶⁸

Over the past three decades, the United States has slipped from being a world leader in traffic safety to 13th place as measured by the number of traffic deaths per million vehicles.⁶⁹ Motor vehicle traffic

⁶⁸ 2014 Rocky Mountain Insurance Information Association. [online]. Available at: http://www.rmiiia.org/auto/traffic_safety/Cost_of_crashes.asp.

⁶⁹ Impacts of Urban Land Use Development on Pedestrian-Motor Vehicle Collisions: An Application of the San Francisco Pedestrian Injury Model to Five Neighborhood Plans. [online]. Available at: <http://www.sfhealthequity.org/component/jdownloads/finish/7-land-use/42-impacts-of-urban-land-use-development-on-pedestrian-motor-vehicle-collisions/0?Itemid=0>.

accidents are a major cause of morbidity and mortality in the United States⁷⁰ and the greatest cause of disability and death for persons aged 5-27.⁷¹ According to the CDC, fatal and non-fatal traffic accident injuries also cause a serious economic burden, with an estimated cost of \$41 billion in medical and work loss costs in 2005. In Ohio, that total was \$1.23 billion in 2005. Ohio is one of the tenth highest states in motor vehicle work loss and medical costs.

MOTOR VEHICLE TRAFFIC, INJURIES AND FATALITIES

Daily Vehicle Miles Traveled (DVMT) is a simple mechanism to measure how much traffic is going along a roadway in a 24-hour period. This simple formula multiplies Average Annual Daily Traffic (AADT) by the length of the roadway. DVMT's are computed for all of the Federal Functional Class (FC) categories within each of Ohio's 88 counties. All DVMT figures are reported in thousands, referred to as kDVMT, or Daily Vehicles Miles Traveled in thousands, where the k=1000.⁷² See Table 12 for 2013 kDVMT for Delaware County, Ohio.

The AADT and Roadway length information are very accurate for the State Highway System (Interstate, US and State Routes). For roadways that are not part of the State Highway System, various representative counts were used, such as railroad crossing counts, HPMS Sample Section Counts, etc. All traffic count data that was not collected during the current year has had a statewide growth factor applied that accounts for systematic growth.

Table 12. 2013 Delaware County, Ohio Daily Vehicle Miles Traveled	
2013 Data	Delaware, Ohio kDVMT
01 - Rural Interstate	587.16
02 - Rural Principal Arterial-other Freeway/Expressways	0
03 - Rural Principal Arterial-other	325.06
04 - Rural Minor Arterial	236.43
05 - Rural Major Collector	280.71
06-Rural Minor Collector	202.29
07 - Rural Local	260.56
Total rural	1,892.21
01 - Urban Interstate	633.01
02 - Urban principal arterial-other Freeway & Expressways	74.39
03 - Urban principal arterial-other	830.03
04 – Urban Minor Arterial	934.49
05- Urban Major Collector	563.47
06 – Urban Minor Collector	30.48
07 – Urban local	203.64
Total Urban	3,269.51
Total County	5,161.72

⁷⁰ National Traffic Safety Highway Administration. [online]. Available at: <http://www-nrd.nhtsa.dot.gov/Pubs/811620.pdf>.

⁷¹ Ibid.

⁷² Daily Vehicle Miles Traveled Report, Ohio Department of Transportation, [online], at: <http://www.dot.state.oh.us/Divisions/Planning/TechServ/TIM/Documents/DVMT/VMT2013.pdf>

Motor Vehicle Fatalities and Injuries

Motor vehicle crashes were one of the leading causes of fatal and non-fatal unintentional injuries in Ohio.⁷⁴

The State of Ohio, Delaware County and Berkshire Townships' motor vehicle fatality injury rates were all higher than the 2020 Healthy People national objective of 694.3 injuries per 100,000.⁷⁵ (See Table 13.)

Table 13. 2013 Motor Vehicle Crash Statistic by Injury Severity^{73*}

	Motor Vehicle Crash Fatalities		Motor Vehicle Crash injuries	
	Number	Per Capita rate per 100,000	Number	Per Capita rate per 100,000
Ohio	990	8.5	100,148	868
Delaware County	11	6.3	1,353	776
Berkshire Township	1	32**	110	3,565**
Standard: Healthy People 2020 National Objective		12.4		694.3
*: Based on 2010 Census Bureau data.				
**: Population size: 3,085.				

TRENDS

Ohio fatalities resulting from unintentional motor vehicle traffic crashes decreased 15 percent from 11.5 per 100,000 in 2000 to 9.8 per 100,000 in 2010. The average decrease was 0.3 deaths per 100,000 per year. The decrease in death rates was similar among males and females. Decreases were found in several age groups with the largest decrease among ages 15-24 (0.8 per 100,000 per year). Rates among ages 25-34, 45-74, and 85 or older did not follow a linear trend. Decreases in rates were found among whites (0.3 per 100,000 per year) while rates among blacks did not follow a consistent pattern.⁷⁶

In 2010, the person injured in approximately one-half (588 deaths) of crashes was unspecified. The most common specified fatally injured persons were car occupants (259 deaths), motorcyclists (150 deaths), and pedestrians (108 deaths). The number of car occupant deaths decreased by 20 deaths per year while deaths of motorcyclists increased by 5 per year. The number of deaths with an unspecified person and pedestrian deaths did not follow a consistent trend.⁷⁷

HOSPITALIZATIONS

Nearly 4,800 Ohio inpatient hospitalizations resulted from unintentional motor vehicle traffic-related injury in Ohio in 2010. The motor vehicle traffic-related hospitalization rate was 41 per 100,000. The

⁷³ 2013 Crash Report, Ohio Department of Public Safety [online] at: <https://ext.dps.state.oh.us/CrashRetrieval/OHCrashRetrieval.aspx>

⁷⁴ The Burden of Injury in Ohio 2000-2010 Report, Ohio Department of Health, [online] at: http://www.healthy.ohio.gov/~media/HealthyOhio/ASSETS/Files/injury%20prevention/Burdenreport/Burden%20Report_%20-%20FINAL.ashx

⁷⁵ Healthy People 2020

⁷⁶ Ibid.

⁷⁷ The Burden of Injury in Ohio 2000-2010 Report, Ohio Department of Health, [online] Available at: http://www.healthy.ohio.gov/~media/HealthyOhio/ASSETS/Files/injury%20prevention/Burdenreport/Burden%20Report_%20-%20FINAL.ashx

hospitalization rate was higher for males (52 per 100,000) compared to females (30 per 100,000). The highest rates were found among individuals 15-24 years (64 per 100,000) and 25-34 years (55 per 100,000). The lowest rates were found among children 14 years of age or less.⁷⁸

In Delaware County, Ohio, Grady Memorial Hospital reported that the inpatient hospitalization rate which resulted from unintentional motor vehicle traffic-related injury was 33.921 per 100,000 during 2005-2007.⁷⁹

TRENDS

As with deaths, hospitalizations resulting from unintentional motor vehicle traffic-related injury decreased 34% from 63 per 100,000 in 2002 to 41 per 100,000 in 2010. The average decrease was 3 hospitalizations per 100,000 per year. The decrease in hospitalizations was slightly higher among males (4 per 100,000) than females (3 per 100,000). Hospitalization rates decreased among ages 15 and older with the largest decrease occurring among ages 15-24 (7 per 100,000).⁸⁰

NATURE OF CRASH

The most common causes of motor vehicle traffic hospitalizations were a collision with another motor vehicle, loss of control (not on a highway), and a traffic crash of an unspecified nature. These categories combined account for nearly 75% of hospitalizations associated with motor vehicle traffic crashes each year. The number of hospitalizations for each of these categories has decreased from 2002 - 2010 with the largest decreases associated with collisions with other motor vehicles (204 per year). Hospitalizations resulting from motor vehicle traffic crashes associated with loss of control, not on highway (88 per year), and unspecified nature (70 per year) also experienced more modest decreases during this time period. While the number of injuries treated in health care facilities has decreased over the past decade, motor vehicle traffic crashes among teen drivers remains a public health and safety issue. In 2011, nearly 290,000 motor vehicle traffic crashes were reported to the Ohio Department of Public Safety. Of these crashes, 67,829 or 14% involved drivers ages 16-20. The crashes ranged in severity with 124 resulting in death, nearly 19,000 resulting in injury, and approximately 48,000 resulting in property damage. Teen drivers were disproportionately involved in crashes compared to all other age groups. Teenage males were more likely to be involved in a crash than females.⁸¹

⁷⁸ The Burden of Injury in Ohio 2000-2010 Report, Ohio Department of Health, [online] Available at: http://www.healthy.ohio.gov/~media/HealthyOhio/ASSETS/Files/injury%20prevention/Burdenreport/Burden%20Report_%20-%20FINAL.ashx.

⁷⁹ Ibid.

⁸⁰ Ibid.

⁸¹ Ibid.

RISK FACTORS

There are many well-known factors that raise a driver's risk of being killed or injured in a crash:

1. Speed – Among Ohio drivers of all age groups in 2010:
 - 156 fatal crashes were caused by speeding or driving at unsafe speeds.
 - 5,306 crashes resulting in injuries were caused by speeding or driving at unsafe speeds.
 - 9,376 crashes resulting in property damage were caused by speeding or driving at unsafe speeds.
2. Alcohol - Among Ohio drivers ages 16-20 in 2010:
 - 36 fatal crashes were caused by alcohol impaired drivers.
 - 91% of fatal crashes involved a driver ages 16-20 with a blood alcohol concentration of 0.08 or higher. In 2011, seven percent of high school students in Ohio reported driving a car or other vehicle when they had been drinking alcohol. No differences in the percentage of students reporting episodes of drinking and driving were found by sex while students in grade 12 were more likely to drive after drinking alcohol (13%) than students in grade 10 (4%).
3. Lack of seat belt use:
 - Only 29% of occupants aged 16-20 who were killed in traffic crashes were restrained.
 - Ten percent of high school students in Ohio reported “never” or “rarely” wearing a seat belt when driving a car. Males were more likely to “never” or “rarely” wear a seat belt (13%) than females (6%). No differences were found by grade level.
4. Driving at night – The fatal crash rate of 16-year-olds was nearly twice as high at night.
5. Driver distractions such as talking on a cell phone and carrying multiple peer passengers are risky. Teen passengers and cell phones are two distractions proven to kill teens. Two or more peer passengers more than triples the risk of a fatal crash with a teen at the wheel. The risk is not just for the driver. Most teen passengers who die in crashes are riding with a teen driver.⁸²

VEHICLE COLLISION WITH PEDESTRIAN

For this report, a pedestrian is any person on foot, walking, running, jogging, hiking, sitting or lying down who is involved in a motor vehicle traffic crash. Also, a traffic crash is defined as an incident that involves one or more vehicles where at least one vehicle is in transport and the crash originates on a public traffic way. Crashes that occurred exclusively on private property, including parking lots and driveways, were excluded.⁸³

⁸² The Burden of Injury in Ohio 2000-2010 Report, Ohio Department of Health, [online] Available at: http://www.healthy.ohio.gov/~media/HealthyOhio/ASSETS/Files/injury%20prevention/Burdenreport/Burden%20Report_%20-%20FINAL.ashx.

⁸³ Ibid.

In 2013, in Ohio there were 88 pedestrian fatalities and 2,277 pedestrian injuries in traffic crashes.⁸⁴

In the U.S in 2012, there were 4,743 pedestrians killed and an estimated 76,000 were injured in traffic crashes. On average, a pedestrian was killed every 2 hours and injured every 7 minutes in traffic crashes. The pedestrian deaths accounted for 14 percent of all traffic fatalities and made up 3 percent of all the people injured in traffic crashes. Almost three-fourths (73%) of these pedestrian fatalities occurred in an urban setting versus a rural setting. Over two-thirds (70%) of pedestrian fatalities occurred at non-intersections versus at intersections. Eighty-nine percent of pedestrian fatalities occurred during normal weather conditions (clear/cloudy), compared to rain, snow and foggy conditions. A majority of the pedestrian fatalities, 70 percent, occurred during the nighttime (6 p.m. – 5:59 a.m.). Between 2011 and 2012, all these percentages stayed relatively level.⁸⁵

Older pedestrians (age 65+) accounted for 20 percent (935) of all pedestrian fatalities and an estimated 9 percent (7,000) of all pedestrians injured in 2012. The fatality rate for older pedestrians (age 65+) was 2.17 per 100,000 population – higher than the rate for all the other ages under 65. Starting at age 45, the fatality rates are generally higher than in the younger age groups. In 2012, people 65 and older made up only 14 percent of the country's population. In 2012, the average age of pedestrians killed in traffic crashes was 46 and the average age of those injured was 35. Over the past 10 years the average age of those killed has remained almost unchanged, while the age of those injured has steadily increased. The highest three pedestrian injury rates by age group were 21-24, 16-20 and 10-15.⁸⁶

In 2012, more than one-fifth (22%) of the children ages 5 to 15 who were killed in traffic crashes were pedestrians. Children age 15 and younger accounted for 6% of the pedestrian fatalities in 2012 and 18% of all pedestrians injured in traffic crashes.⁸⁷

PEDALCYCLISTS

In Ohio in 2013, there were 19 pedalcyclists killed in motor vehicle crashes and an additional 890 were injured.⁸⁸

A total of 726 pedalcyclists were killed in the U.S. in motor vehicle crashes in 2011 and 49,000 were injured in motor vehicle traffic crashes.⁸⁹ The 14-and-younger age group accounted for 8% (58) of those fatalities, and males accounted for 81% (47) of the fatalities among pedalcyclists 14 and younger.⁹⁰

⁸⁴ Ohio Department of Public Safety. 2013 Ohio Crash Report. [online]. Available at: <http://www.publicsafety.ohio.gov/links/2013CrashFacts.pdf>.

⁸⁵ The Burden of Injury in Ohio 2000-2010 Report, Ohio Department of Health, [online] at:

http://www.healthy.ohio.gov/~media/HealthyOhio/ASSETS/Files/injury%20prevention/Burdenreport/Burden%20Report_%20-%20FINAL.ashx.

⁸⁶ Ibid.

⁸⁷ Ibid.

⁸⁸ Ibid.

The number of pedalcyclists killed in 2012 is 6% higher than the 682 pedalcyclists killed in 2011. In 2012, the average age of pedalcyclists killed in traffic crashes was 43. During the past 10 years, there has been a steady increase in the average age of pedalcyclists killed and injured. Pedalcyclists ages 45 to 54 accounted for 24 percent of those killed and 14% of those injured in that year. Sixty-nine percent of all pedalcyclist deaths in 2012 occurred in urban areas.⁹¹

VULNERABLE SUBPOPULATIONS

Socio-demographic characteristics of a place can also increase risk of pedestrian injuries. Age is an established independent risk factor for pedestrian injury. The elderly and children take longer to cross a street, increasing their exposure for injury;⁹² children also have less developed cognitive, perceptual, motor and traffic safety skills.⁹³ Further, collisions involving pedestrians over age 65 versus younger pedestrians are more likely to result in fatal injuries.⁹⁴ Lower income children have also been found to have a higher rate of pedestrian injury than higher income children, though the mechanisms contributing to this disparity – including the physical and social environment – are not well understood.⁹⁵

PREDICTING INCREASES IN TRAFFIC, FATALITIES AND INJURIES

PRESENTATION OF MODELS AND AVAILABLE DATA

PREDICTING INCREASES IN TRAFFIC

According to the Traffic Impact Study prepared by Trans Associates Engineering Consultants, Inc. completed on December 9, 2013 and revised and re-submitted on March 5, 2014, the estimated number of new trips the Premium Outlet Mall will generate is indicated in Table 14.

Land Use	Gross Floor Area	Trips	Peak hour	
			Weekday PM	Saturday
Factory Outlet Center	400,000SF	Entering	431	773
		Exiting	485	743
		Total	916	1,516

⁸⁹ The Burden of Injury in Ohio 2000-2010 Report, Ohio Department of Health, [online] at: http://www.healthy.ohio.gov/~media/HealthyOhio/ASSETS/Files/injury%20prevention/Burdenreport/Burden%20Report_%20-%20FINAL.ashx.

⁹⁰ Ibid.

⁹¹ Ibid.

⁹² Impacts of Urban Land Use Development on Pedestrian-Motor Vehicle Collisions: An Application of the San Francisco Pedestrian Injury Model to Five Neighborhood Plans. [online]. Available at: <http://www.sfhealthequity.org/component/jdownloads/finish/7-land-use/42-impacts-of-urban-land-use-development-on-pedestrian-motor-vehicle-collisions/0?Itemid=0>.

⁹³ Ibid.

⁹⁴ Ibid.

⁹⁵ Ibid.

⁹⁶ Proposed Simon-Tanger Outlet Mall US 36/SR 37 Delaware County, Ohio. Trans Associates Engineering Consultants, Inc.. Dec. 2013. P. 9.

PREDICTING INJURIES AND FATALITIES

Predicting the average crash frequency as a function of traffic volume and roadway characteristics is a new approach that can be readily applied in a variety of ways, including design projects, corridor planning studies, and smaller intersection studies. The approach is applicable for both safety specific studies and as an element of a more traditional transportation study or environmental analysis. The Ohio Department of Transportation's Safety Study Guidelines is available at:
http://www.dot.state.oh.us/Divisions/Planning/SPPM/SystemsPlanning/Safety_Study/Safety%20Study%20Guidelines.pdf.

The safety engineering study is an analysis of roadway and traffic-related data to determine the contributing factors to an identified crash pattern at an intersection or highway section. The safety engineering study also identifies potential alternative countermeasure(s) meant to reduce crash frequency or severity at the studies' site. These guidelines include expected crash frequency under existing conditions, safety study analysis and resources tools, and crash reduction factor estimates for effective countermeasures.

PREDICTING INCREASE IN PEDESTRIAN COLLISIONS

A simple way to forecast pedestrian collisions resulting from changes in vehicle volume is to apply changes in vehicle volume to a road safety function, which describes the relationship between traffic volume and injury rates or collision counts.⁹⁷ The following power function (1.1) is a commonly used, empirically supported parametric form of the road safety function:

$$\% \text{ Change Pedestrian Collisions} = \left[\left(\frac{\text{Future AADT}}{\text{Baseline AADT}} \right)^\beta - 1 \right] \times 100 \quad (1.1)$$

AADT = Average Annual Daily Trip

In the equation, typically $\beta < 1$, and evidence suggests that 0.5 is a reasonable parameter. With $\beta = 0.5$, the rate of pedestrian collisions would be forecasted to increase proportional to the square root of vehicle volume with the increase in collisions attenuated at higher vehicle volumes. Thus, a 50% increase in traffic volume would translate into an approximately 22% increase in the number of pedestrian collisions, assuming that there is no confounding factor by other environmental changes. To forecast pedestrian collisions prospectively using the power function model requires two data inputs: the baseline and future vehicle volume on roadways in the area. A fundamental limit of the power function

⁹⁷ Impacts of Urban Land Use Development on Pedestrian-Motor Vehicle Collisions: An Application of the San Francisco Pedestrian Injury Model to Five Neighborhood Plans. [online]. Available at: <http://www.sfhealthequity.org/component/jdownloads/finish/7-land-use/42-impacts-of-urban-land-use-development-on-pedestrian-motor-vehicle-collisions/0?Itemid=0>

is that it does not take into account pedestrian activity and other variables affected by development.⁹⁸

Baseline volume of traffic at Wilson Road intersection, weekday 5:00pm (both approaches): 1328

Predicted additional volume of traffic for Premium Outlet Mall project, weekday (entering, exiting): 916

Traffic fatalities and injuries within a one-mile radius of I-71 & US-36/SR-37 are listed in Table 16.

PREDICTING TRAFFIC CALMING BENEFITS

Traffic calming measures have reduced fatal and injury motor vehicle crashes and the prediction reduction is estimated at 40%.⁹⁹ To determine the total benefit, the National Safety Council comprehensive costs estimate is used since it also includes a measure of the value of lost quality of life which was obtained through studies of what people actually pay to reduce their safety and health.

The results, summarized in Table 15, indicate that by incorporating traffic calming measures to roadways in Berkshire Township within a one-mile radius of the intersection of I-71 & US-36/SR-37, a 40% reduction in fatal and nonfatal injuries is expected along with a predicted \$3,631,520 savings per year.

Description	2012 Berkshire Township	40% reduction	Comprehensive Cost	Total
Fatal	1	.04	\$4,538,000	\$181,520
Injury	39	15	\$230,000	\$3,450,000
Total				\$3,631,520

PREDICTING CRASH REDUCTION BENEFITS

Crash reduction factor (CRF) is the percentage crash reduction that might be expected after implementing a given countermeasure. In some cases, the CRF is negative, i.e. the implementation of a countermeasure is expected to lead to a percentage increase in crashes. One CRF estimate is provided for each countermeasure. Where multiple CRF estimates were available from the literature, selection criteria were used to choose which CRFs to include in the issue brief:

- CRFs from studies that took into account regression to the mean and changes in traffic volume were preferred over studies that did not.
- CRFs from studies that provided additional information about the conditions under which the countermeasure was applied (e.g. road type, area type) were preferred over studies that did not.

⁹⁸ Impacts of Urban Land Use Development on Pedestrian-Motor Vehicle Collisions: An Application of the San Francisco Pedestrian Injury Model to Five Neighborhood Plans. [online]. Available at: <http://www.sfhealthequity.org/component/jdownloads/finish/7-land-use/42-impacts-of-urban-land-use-development-on-pedestrian-motor-vehicle-collisions/0?Itemid=0>.

⁹⁹ Sany R. Zein, Erica Geddes, Suzanne Hemsing and Mavis Johnson "Safety Benefits of Traffic Calming," Transportation Research Record 1578, 1997, pp. 3-10.

Table 16 below presents the crash reduction factor estimates for each pedestrian safety countermeasure that is listed.

Table 16. Geometric Countermeasures			
Countermeasure(s)	Crash Severity	All Crashes	Pedestrian
Convert unsignalized intersection to roundabout	Fatal/Injury		27(12) ¹⁰⁰
	Fatal/Injury		90 ¹⁰¹
Install pedestrian overpass/underpass	All	86 ¹⁰²	
Install pedestrian overpass/underpass (unsignalized intersection)			
Install pedestrian overpass/underpass (unsignalized intersection)	All		13 ¹
Install raised median	All		25 ¹
Install raised median (marked crosswalk) at unsignalized intersection	All		46 ¹
Install raised median (unmarked crosswalk) at unsignalized intersection	All		39 ¹
Install raised pedestrian crossing	All	30(67) ¹	
	Fatal/Injury	36(54) ¹	
Install refuge islands	Fatal/Injury	36(54) ¹	
Install sidewalk (to avoid walking along roadway)	All		88 ¹
Provide paved shoulder (of at least 4 feet)	All		71 ¹
Narrow roadway cross section from four lanes to three lanes (two through lanes with center turn lane)	All	29 ¹	

LEGEND:

$$CRF(\text{standard error})^{\text{REF}}$$

The CRF is the value selected from the literature. The standard error is given where available. The standard error is the standard deviation of the error in the estimate of the CRF. The true value of the CRF is unknown. The standard error provides a measure of the precision of the estimate of the true value of the CRF. A relatively small standard error indicates that a CRF is relatively precisely known. A relatively large standard error indicates that a CRF is not precisely known.

The REF is the reference number for the source information.

As an example, the CRF for the countermeasure *convert unsignalized intersection to roundabout* is: 27(12)²

The following points should be noted:

- The CRF of 27 means that a 27% reduction in pedestrian crashes is expected after converting the unsignalized intersection to a roundabout.
- This CRF is bolded which means that a) a rigorous study methodology was used to estimate the CRF, and b) the standard error is relatively small. A CRF which is not bolded indicates that a less rigorous methodology (e.g. a simple before-after study) was used to estimate the CRF and/or the standard error is large compared with the CRF.
- The standard error for this CRF is 12.

A crash reduction factor estimate for signalized countermeasures for intersections, which includes signal operations countermeasures, signal hardware countermeasures, and combination signal and other countermeasures, is provided at:

http://safety.fhwa.dot.gov/intersection/resources/fhwas10005/brief_8.cfm.

¹⁰⁰ De Brabander, B. and Vereeck, L., "Safety Effects of Roundabouts in Flanders: Signal type, speed limits and vulnerable road users." AAP-1407, Elsevier Science, (2006).

¹⁰¹ Gan, A., Shen, J., and Rodriguez, A., "Update of Florida Crash Reduction Factors and Countermeasures to improve the Development of District Safety Improvement Projects." Florida Department of Transportation, (2005).

¹⁰² Ibid.

Impact Prediction: Both the significant projected growth in vehicle trips during peak hours and the expected growth in population in the study area that already experiences high levels of roadway vehicle volume, the roadway improvements that are outlined in the Trans Associates Engineering Consultants, Inc. Traffic Impact Study will help alleviate the predicted additional traffic. It is recommended to include active forms of transportation alternatives in the context of sustainable planning and community health.

PHYSICAL ACTIVITY

THE CONNECTION BETWEEN PHYSICAL ACTIVITY, HEALTH AND THE BUILT ENVIRONMENT

LITERATURE REVIEW

There has been a good deal of attention given to the importance of physical activity in achieving good health in the media. This is largely due to the recent rise in overweight and obesity in the population and the vast body of evidence on the benefits of physical activity in weight management and other health effects. Physical activity confers numerous benefits to health.¹⁰³

In 1996, commissioned as a response to the rising levels of obesity in the U.S., the U.S. Department of Health and Human Services Surgeon General's report on physical activity and obesity was the first to bring to the forefront the positive health outcomes of physical activity. Based on this and a number of other comprehensive reviews of the literature, engaging in physical activity affects a variety of health outcomes including:

- All causes of mortality
- Cardiovascular disease
- Diabetes mellitus
- Cancer (colon and breast)
- Hypertension
- Bone and joint diseases (Osteoporosis and osteoarthritis)
- Mental health¹⁰⁴

The U.S. Surgeon General issued a report confirming what is generally known: Americans aren't getting enough exercise.¹⁰⁵ The American Heart Association has listed physical inactivity as the fourth major risk factor associated with chronic disease.¹⁰⁶ Of great concern to public health officials in all parts of the United States, the trend of physical inactivity is getting worse: a 2009 summary by the Robert Wood Johnson Active Living Research program revealed that fewer than 50% of children and adolescents and

¹⁰³ Press, V., Freestone, I. and George, C. (2003). Physical activity: the evidence of benefit in the prevention of coronary heart disease. *Qjm*, 96(4), pp.245--251.

¹⁰⁴ U.S. Department of Health and Human Services. Physical Activity and Health: A Report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, 1996.

¹⁰⁵ Ibid.

¹⁰⁶ Physical Activity and Public Health Updated Recommendation for Adults From the American College of Sports Medicine and the American Heart Association. [online]. Available at: <http://circ.ahajournals.org/content/116/9/1081.full.pdf>.

fewer than 10% of adults in the U.S. achieve public health recommendations of 30 to 60 minutes per day of moderate- to vigorous-intensity physical activity on 5 or more days of the week.¹⁰⁷

Physical activity is associated with all-cause mortality in an inverse dose-response fashion; increasing levels of physical activity being associated with decreasing levels of mortality. In addition, studies have found that physical activity has reduced caused-specific mortality, including deaths from cardiovascular disease. In addition, physical activity is associated with lowered risk of colon cancer and breast cancer in women.¹⁰⁸

Reviews of physical activity interventions suggest that people may be more willing and able to adopt moderate physical activities. Once such activities are set in motion they are more inclined to maintain them over time, as compared with other types of vigorous physical activity.¹⁰⁹

Physical activities that are incorporated into daily life or have an inherent meaning, or lifestyle activities, rather than structured exercise regimens, are good strategies for increasing physical activity. Even relatively small changes in physical activity can translate into potentially large changes in weight trends at the population level.¹¹⁰

According to the CDC, a total of 30 minutes of moderate to vigorous physical activity, which can be achieved via brisk walking or cycling on most days of the week, reduces the risk of cardiovascular diseases, diabetes and hypertension, and helps to control blood lipids and body weight. These benefits are conferred even if the activities are done in short ten- to fifteen-minute episodes. Thus, CDC's physical activity recommendations for adults call for at least 30 minutes of moderate to vigorous activity per day for health benefits.

While the benefits of physical activity increase with the intensity and frequency of physical activity, the greatest benefit occurs when people who have been sedentary engage in some form of physical activity.¹¹¹

Evidence that physical activity has multiple health benefits is unequivocal. A comprehensive review documents the particularly strong evidence for a causal relationship between activity level and enhanced cardiorespiratory and muscular fitness, cardiovascular and metabolic health biomarkers, bone health, body mass and composition in children and youth. In adults and older adults, strong evidence

¹⁰⁷ Designing for Active Living. [online]. Available at: http://activelivingresearch.org/files/Built_Design_0.pdf.

¹⁰⁸ Physical Activity and Cancer Risk. [online]. Available: <http://www.cancer.net/navigating-cancer-care/prevention-and-healthy-living/physical-activity/physical-activity-and-cancer-risk>.

¹⁰⁹ Hiaguide.org, (2014). *Physical Activity | Health Impact Assessments - UCLA SPH*. [online] Available at: <http://www.hiaguide.org/sectors-and-causal-pathways/pathways/physical-activity> [Accessed 23 Jun. 2014].

¹¹⁰ Ibid.

¹¹¹ U.S. Department of Health and Human Services. *Physical Activity and Health: A Report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, 1996.

demonstrates that, compared to less active counterparts, more active men and women have lower rates of all-cause mortality, coronary heart disease, high blood pressure, stroke, type 2 diabetes, metabolic syndrome, colon cancer, breast cancer, and depression. For older adults, strong evidence indicates that being physically active is associated with higher levels of functional health, a lower risk of falling, and better cognitive function. This research reported reasonably consistent findings specifically for the health benefits of walking – showing a consistently lower risk of all-cause mortality for those who walk two or more hours per week. A 2011 report issued by an international group of experts using data from Copenhagen documents similar all-cause mortality benefits from regular cycling for commuting controlling for socio-demographic and leisure time physical activity.

An article in *Springer Journal* describes the link between physical activity and health outcomes. An economic study, it revealed that urban design could be significantly associated with some forms of physical activity and with some health outcomes. After controlling for demographic and behavioral covariates, the county sprawl index had small but significant associations with minutes walked. Those living in sprawling counties were likely to walk less, weigh more, and have greater presence of hypertension than those living in compact counties.

Although the magnitude of the effects observed in this study was small, they do provide added support for the hypothesis that urban design affects health and health-related behaviors.¹¹²

Table 17 reports the built environment’s common barriers to walkability.¹¹³

Another report from the peer-reviewed literature, *Linking Objectively Measured Physical Activity with Objectively Urban Form*, claims that there are now sufficient studies documenting associations between the built environment and physical activity and to consider land-use decisions as a critical public health issue.¹¹⁴

The built environment may be contributing to the obesity epidemic, because obesity is more prevalent in areas where land use makes it difficult to walk to destinations and where there are relatively few recreational resources.¹¹⁵

Table 17. Common Barriers to Walkability

- Lack of sidewalks
- Narrow walkway widths
- Missing curb cuts
- Poorly constructed and/or maintained walking surfaces
- Difficult street crossings (e.g., too wide, too fast)
- Inadequate bridge design (e.g., no place to walk)
- Physical features (e.g., rivers, railroad tracks, major arterial streets lacking pedestrian crossings)
- Inadequate facilities for access to transit services
- High-speed, high volume traffic adjacent to schools, parks, shopping, and residential areas
- Inadequate sidewalk maintenance (including snow/ice removal and repair)

¹¹² Frank, L., Schmid, T., Sallis, J., Chapman, J. and Saelens, B. (2005). Linking objectively measured physical activity with objectively measured urban form: findings from SMARTRAQ. *American journal of preventive medicine*, 28(2), pp.117–125.

¹¹³ Proposed Walkability Strategies. [online]. Available at: <http://www.reconnectingamerica.org/assets/Uploads/WalkabilityStrategy200909.pdf>

¹¹⁴ Humboldt County General Plan Health Impact Assessment: Transportation Indictors. (2014).

¹¹⁵ Frank, L., Schmid, T., Sallis, J., Chapman, J. and Saelens, B. (2005). Linking objectively measured physical activity with objectively measured urban form: findings from SMARTRAQ. *American journal of preventive medicine*, 28(2), pp.117–125.

Neighborhood design can also significantly impact physical activity and health, especially through features such as land use mix, walkability, bicycling infrastructure, parks and open space. A study conducted in Atlanta, Georgia encourages walking and was associated with a 12% reduction in the likelihood of obesity.¹¹⁶

Numerous studies have linked proximity of parks and other recreational facilities to higher levels of physical activity among both youth and adults.

One major limitation of existing park and physical activity research strongly relies on cross-sectional and self-report data. Evidence concerning the linkages between parks and physical activity would be strengthened with the addition of prospective and quasi-experimental studies using more objective measures of the environment and physical activity. Ecological studies that incorporate a variety of methods and measures should, therefore, be considered in order to evaluate the effects of park policy, program and environmental interventions on park use and physical activity for various populations.¹¹⁷

Sufficient evidence was found in the literature that street-scale design and the land use policies to support physical activity in small-scale geographic areas are effective in increasing physical activity such as bicycle and pedestrian infrastructure.¹¹⁸

The most consistent characteristics positively associated with physical activity were population density, land use mix, and distance to nonresidential destinations. Conversely, a study on the association between time spent in cars, physical activity and obesity found that each additional hour spent in a car per day was associated with a 6% increase in the likelihood of obesity.¹¹⁹ Street design facilitates or hinders walking and cycling.¹²⁰ Other environmental features influencing mode of transport choice include the availability of cycle and pedestrian lanes, preferably separated from other road users and other measures to calm motorized traffic.¹²¹

Land use practices that isolate employment locations, shopping and services and housing locations can encourage car use, particularly where public transport options are not available or attractive alternatives.¹²² Where urban development is unplanned or uncontrolled and spreads out into areas adjoining the edge of a city – commonly known as urban sprawl – car dependency is likely to be increased.¹²³ Evidence suggests that people living in sprawling communities drive three to four times

¹¹⁶ City of New York, (2014). *PROMOTING PHYSICAL ACTIVITY AND HEALTH IN DESIGN ACTIVE DESIGN G*. City of New York, p.17.

¹¹⁷ Parks, Playgrounds and Active Living. [online]. Available at: http://activelivingresearch.org/files/Synthesis_Mowen_Feb2010_0.pdf.

¹¹⁸ Heath, G., Brownson, R., Kruger, J., Miles, R., Powell, K., Ramsey, L., Services, T. and others, (2006). The effectiveness of urban design and land use and transport policies and practices to increase physical activity: a systematic review. *Journal of Physical Activity & Health*, 3, p.55.

¹¹⁹ *Ibid.*

¹²⁰ *Ibid.*

¹²¹ *Ibid.*

¹²² Heath, G., Brownson, R., Kruger, J., Miles, R., Powell, K., Ramsey, L., Services, T. and others, (2006). The effectiveness of urban design and land use and transport policies and practices to increase physical activity: a systematic review. *Journal of Physical Activity & Health*, 3, p.55.

¹²³ *Ibid.*

more than those who live in efficient, well-planned areas. Compared to those living in compact areas, people living in sprawling areas walk less for exercise, have higher weight levels and are more likely to have high blood pressure.¹²⁴ Long commuting times can also have an impact on mental health, family life and social networks, with people having less time for civic engagement.¹²⁵

Walking or biking for utilitarian trips is an opportunity to incorporate routine physical activity into daily living. There are multiple environmental barriers that both children and adults face to achieving recommended levels of physical activity including: limited discretionary time, barriers to accessing parks and recreational areas, reductions in school physical education programs, and sidewalks, streets, or outdoor spaces that are not or are not perceived as safe to use. Encouraging and facilitating active transportation – walking or cycling as a form of travel for utilitarian trips – is a key strategy for increasing daily physical activity. Built environmental factors that are associated with active transportation via walking and cycling include increased resident and employment density, greater diversity of land use mix (e.g., residential land use near retail land uses), shorter distances destinations, and street design factors (e.g., grid street networks, the presence of sidewalks).¹²⁶

In conclusion, for the built environment, consistent evidence supports an association between density, destinations, and land use mix and walking transportation. The evidence was also consistent in showing that areas with higher sprawl or suburban development had higher fatality rates from collisions. In addition, when pedestrian and bicyclist volume increases, the risk of injuries and fatalities for pedestrians and bicyclists decreases.¹²⁷

Environments that support walking, biking and transit trips as an alternative to driving have multiple potential positive health impacts.¹²⁸ Quality, safe pedestrian and bicycle environments support a decreased risk of motor vehicle collisions and an increase in physical activity and social cohesion with benefits including the prevention of obesity, diabetes, and heart disease as well as stress reduction and mental health improvements that promote individual and community health. Environments that encourage walking and biking while discouraging driving can further reduce traffic-related noise and air pollution – associated with cardiovascular and respiratory diseases, premature death, and lung function changes especially in children and people with lung diseases such as asthma.¹²⁹

¹²⁴ Dannenberg, A., Jackson, R., Frumkin, H., Schieber, R., Pratt, M., Kochtitzky, C. and Tilson, H. (2003). The impact of community design and land-use choices on public health: a scientific research agenda. *American journal of public health*, 93(9), pp.1500–1508.

¹²⁵ Does the Built Environment Influence Physical Activity? Transportation Research Board. [online]. Available at: <http://onlinepubs.trb.org/onlinepubs/sr/sr282.pdf>

¹²⁶ Sustainable Communities Index. [online]. Available at: <http://www.sustainablecommunitiesindex.org/indicators/view/45>.

¹²⁷ Heath, G., Brownson, R., Kruger, J., Miles, R., Powell, K., Ramsey, L., Services, T. and others, (2006). The effectiveness of urban design and land use and transport policies and practices to increase physical activity: a systematic review. *Journal of Physical Activity & Health*, 3, p.55.

¹²⁸ CDC. [online]. Available at <http://www.cdc.gov/transportation/recommendation.htm>.

¹²⁹ Ibid.

THE COMMUNITY HEALTH DATA

The physical activity levels and chronic disease data of the community were assessed using the 2013 DGHD's BRFSS. The self-reported data from this survey are shown in Table 18.

Table 18. 2013 DGHD BRFSS Data¹³⁰

Indicator	Berkshire Township	Delaware County, Ohio
Percentage Who Did At Least 30 Minutes of Physical Activity in a Typical Week	97.5%	87%
Average Days Per Week With At Least 30 Minutes of Physical Activity	4.5 days	4.2 days
Asthma	4%	13%
Diabetes	8.8%	11%
Obesity	21%	25%
Overweight	25.4%	36%
High Blood Pressure	33.7%	28%
High Cholesterol	27.2%	29%
Heart Attack	4%	3%
Stroke	4%	3%

Chronic diseases are the leading cause of death and disability in the U.S. They are caused by various risk factors including genetics, lifestyle and environment, and the percentages are expected to increase as the population ages and as the potential for risk factors increases. By reporting chronic disease statistics, this HIA can monitor patterns of community chronic diseases, their determinants, and provide an evaluation tool for health outcomes of implementation of the recommendations included within this report. The focus is on diseases that can be modified by changing behaviors such increasing physical activity.¹³¹

PREDICTING HEALTH BENEFITS THROUGH CONNECTIVITY

Meta-analysis by de Hartog, et al. (2010) indicates that people who shift from driving to bicycling enjoy substantial health benefits (3 to 14 month longevity gains) plus additional benefits from reduced air

¹³⁰ Kristel, O. Szymanski, A., and Awe, S. (2014) Report to the Partnership For a Healthy Delaware County: 2013 Community Health Status Assessment. Delaware, Ohio, [online]. Available at: http://delawarehealth.org/files/files/2013%20CHSA_Report%20FINAL%2012_19_13%20-%20FULL%20survey_profile.pdf.

¹³¹ Healthy People 2020: An Opportunity to Address Societal Determinants of Health in the U.S. [online]. Available at: <http://www.healthypeople.gov/2020/about/advisory/SocietalDeterminantsHealth.pdf>

pollution and crash risk to other road users. Table 19 summarizes typical benefit values, measured in cents per mile of travel of increased walking and cycling activity. Higher values may be justified if an unusually large number of users would otherwise be sedentary.¹³²

The authors, Boarnet, Greenwald and McMillan (2008) developed a framework for quantifying the value of reduced mortality from urban design improvements that increase walking activity can provide. Table 20 summarizes the estimated benefits of various changes in neighborhood walkability factors from a median to the seventy-fifth (lower value) and ninety-fifth (higher value) percentile. For example, the number of intersections within ½ mile increased by 0.3816 (lower value) or 1.1844 (higher value), for a hypothetical 5,000 resident neighborhood. Per capita estimated benefits for neighborhood walkability ranged from a low of \$31 to a high of \$12,345, depending upon the design improvement.¹³³

Table 19. Increased Walking and Cycling Activity Benefit (Per Person-Mile)

Impact Category	Urban Peak	Urban off-peak	Rural	Overall Average	Comments
Fitness and health-walking	\$0.50	\$0.50	\$0.50	\$0.50	Benefits are larger if pedestrian facilities attract at-risk users.
Fitness and health-cycling	\$0.20	\$0.20	\$0.20	\$0.20	Benefits are larger if pedestrian facilities attract at-risk users.

Table 20. Health Benefits From Various Neighborhood Walkability (Boarnet, Greenwald and McMillan 2008)

Neighborhood Walkability Changes	Total Benefits		Per Capita Benefits	
	Lower	Higher	Lower	Higher
Increase number of intersection within ½ mile	\$2,255,107	\$23,205,007	\$451	\$4,641
Increased retail employment density	\$466,574	\$18,331,955	\$93	\$3,666
Increased employment density	\$155,525	\$19,492,206	\$31	\$3,898
Increased population density	\$1,555,247	\$8,353,802	\$311	\$1,671
Distance from central business district	\$4,510,215	\$61,725,318	\$902	\$12,345

Note: This table summarizes the estimated value of health benefits from neighborhood design changes that increases per capita walking activity. “Lower” and “higher” values indicate the range from sensitivity analysis using higher- and lower-bound assumptions.

¹³² Economic Value of Walkability. [online]. Available at: http://www.saferoutespartnership.org/sites/default/files/pdf/Lib_of_Res/ECON_EconomicValueofWalkability_Victoria_Transport_Policy.pdf

¹³³ San Francisco Department of Public Health. [online]. Available at: <http://www.sfhealthequity.org/elements/24-elements/tools/106-pedestrian-environmental-quality-index>

Impact Prediction: With the potential creation of a park, trails, green space and providing connectivity surrounding the outlet mall, the number of days residents could engage in physical activity could increase. Increasing connectivity for pedestrians and bicyclists makes walking and bicycling more attractive choices, enabling people to increase their trips by these active modes. This should increase the health benefits associated with greater levels of physical activity and reduce the costs and negative impacts associated with motor vehicle travel. It is also expected that there is improved mental health indicators with improved access to other regional destinations and associated activities.

FINDINGS

Several methods can be used to evaluate walkability, taking into account the quality of pedestrian conditions and the geographic distribution of destinations. The Pedestrian Environmental Quality Index (PEQI) and Bicycle Environmental Quality Index (BEQI) tools (Appendix J, K, respectively) were used to evaluate the capacity of 2014 existing conditions to encourage walking and biking at a major intersection in the study area in Berkshire Township, Delaware County, Ohio. These observational survey tools were developed by the San Francisco Department of Public Health (SFDPH). The PEQI and BEQI assessed the quality of the physical pedestrian and bicycling environments using a formula for scoring this main intersection in the study area based on its features. SFDPH developed the PEQI as a practical method to evaluate existing barriers to walking and to prioritize future investments for increasing pedestrian activity and safety in land use and urban planning processes. SFDPH consulted national experts including city planners, independent planning consultants, and pedestrian advocates to develop the indicator weights and scores for each indicator category.¹³⁴

The study area for these audits for this HIA included the intersection at US-36/SR-37 and Wilson Road approximately one-half north from the proposed site. Features examined were physical attributes of the sidewalks, location of public transit, and roadway conditions.

The PEQI and BEQI features are grouped into five main categories known to affect people's travel behaviors: intersection safety, traffic, street design, land use, and perceived safety. There are many features evaluated in the PEQI and BEQI including: traffic calming features (chicanes, medians, speed hump/bump), marked crosswalks, sidewalk impediments, driveway cuts, tree coverage, and pedestrian scale lighting.

The PEQI or BEQI score reflects the quality of the pedestrian/bicycling environment on a 0 to 100 scale. For both BEQI and PEQI, the categories of scores developed by SFDPH are:

¹³⁴ San Francisco Department of Public Health. [online]. Available at: <http://www.sfhealthequity.org/elements/24-elements/tools/106-pedestrian-environmental-quality-index>

- 0-20 Environment not suitable to pedestrians/bicyclists
 - 21-40 Poor pedestrian/bicyclist conditions exist
 - 41-60 Basic pedestrian/bicyclist conditions exist
 - 61-80 Reasonable pedestrian/bicyclist conditions exist
 - 81-100 Ideal pedestrian/bicyclist conditions exist
-

PEQI SCORES AND RESULTS FOR 2014 EXISTING CONDITION

The PEQI score quantifies street and intersection factors that are known to affect pedestrian travel behaviors. The index includes presence of sidewalk, width of sidewalk, public seating, public art, illegal graffiti and litter, empty spaces (vacant lots, abandoned lots, parking lots), pedestrian refuge islands, curb cuts at crossings, and pedestrian signals. For the Premium Outlet Mall Project HIA, Google Maps Street Views were generated to assist in completion of the BEQI and PEQI surveys. The data can be mapped using ESRI ArcGIS software. Streets are color coded depending upon PEQI scores, ranging from less than 20 – Unsuitable for Pedestrians (red color) to 81-100 – Ideal pedestrian conditions exist (green color). For BEQI, streets are color-coded ranging from <20 – Environment not suitable for bicycles to >80 – Ideal bicycling conditions. The team evaluated the PEQI and BEQI scores for 2014 existing conditions to assess potential differences that would enhance walkability and bikeability and hence physical activity and health. Both PEQI and BEQI are also useful in identifying the capacity of the roadway network in the vicinity of US-36/SR-37 to encourage walking and biking.¹³⁵

Analytical method: The PEQI is an observational survey that quantifies street and intersection factors that are known to affect people’s travel behaviors and is organized into five categories: intersection safety, traffic, street design, land use, and perceived safety. These indicators are aggregated to create a weighted summary index, which can be reported as an overall index. A PEQI score, reflecting the quality of the pedestrian environment on a 0 to 100 scale, is created for each street segment and intersection in a defined area. Below is the list of indicators for assessing pedestrian ease and security. Many of these indicators are included in the Premium Outlet Mall Study evaluation criteria.¹³⁶

Intersection Safety: Crosswalks, intersection lighting, traffic control, pedestrian signal, countdown signal, wait time, crossing speed, pedestrian refuge island, curb ramps, intersection traffic calming features, pedestrian engineering countermeasures.

Traffic Volume: Number of vehicle lanes, posted speed limit, traffic volume, street traffic calming features.

¹³⁵ San Francisco Department of Public Health. [online]. Available at: <http://www.sfhealthequity.org/elements/24-elements/tools/106-pedestrian-environmental-quality-index>.

¹³⁶ Ibid.

Street Design: Continuous sidewalk, width of sidewalk, width of throughway, large sidewalk obstructions, sidewalk impediments, trees, driveway cuts, presence of a buffer, planters/gardens.

Land use: Public seating, retail use and public places, public art/historic sites.

Perceived safety: Pedestrian scale lighting, illegal graffiti, litter, empty lots.



Picture of PEQI and BEQI intersection

The intersections of US-36/SR-37 and Wilson Road received a PEQI score **between 0 and 40**, which indicates that it is not suitable for pedestrians or that poor pedestrian conditions exist.

BEQI SCORES AND RESULTS FOR 2014 EXISTING CONDITIONS

The BEQI provides scores for 22 indicators, each of which has been shown to promote or discourage bicycle riding and connectivity to other modes of transport. Factors considered in BEQI are:

Intersection Safety: dashed intersection bicycle lane, no turn on red signs, bicycle pavement treatment, amenities.

Vehicle Traffic: Number of vehicle lanes, vehicle speed, traffic calming features, parallel parking adjacent to bicycle lane/route and street, traffic volume, percentage of heavy vehicles.

Safety/Other: Presence of street lighting, presence of bicycle lane or share roadway signs.

Land Use: Line of site, bicycle parking, retail use.¹³⁷

The intersections US-36/SR-37 and Wilson Road received a BEQI score **between 0 and 40**, which indicates that it is not suitable for bicyclists or that poor bicycle conditions exist.

¹³⁷ San Francisco Department of Public Health. [online]. Available at: <http://www.sfhealthequity.org/elements/24-elements/tools/106-pedestrian-environmental-quality-index>.

HIAs make evidence-based recommendations to promote positive health outcomes and minimize negative consequences. The scope of the HIA is connectivity and traffic. Since the scope is very broad, these recommendations not only included the area being developed for the Premium Outlet Mall, but also included anticipated future development within the surrounding area, and recommendations are multi-jurisdictional. The recommendations, strategies, and evidence are divided into seven categories:

- Policy Adoption
- Promote Active Transportation
- Improve Safety for All Users
- Incorporate Healthy Community Design Features
- Increase Connectivity
- Enhance Walkability/Bikeability
- Encourage Walking/Biking

POLICY ADOPTION

To achieve walkable communities, pedestrian considerations and provisions and policies should be fully integrate into ongoing planning activities (comprehensive planning, zoning regulations, site plan ordinances and review, street design standards). The planning process should increase sustainable mobility. Safe and convenient bicycling and walking will be the cornerstone of this mobility. Effective pedestrian-oriented land-use and transportation systems planning will have a significant impact on pedestrian travel, it is recommended that the revised comprehensive plan include options for residents to walk or bike to many of their destinations (connectivity); and, provisions for children to walk or bike to their schools and to nearby parks.

The plan should encourage the adoption of street design standards that give priority to safe, easy access for pedestrians in residential and commercial areas, as well as in areas near schools, parks, dining, shopping, and other public places. Such things as vehicle speed, number of lanes, overall roadway width, location and width of sidewalks, and intersection crosswalks should be designed for safety to encourage walking.

Additional plan and policy recommendations include:

- A Bike-Transit Integration Study.
- Improve countywide bike-friendly policies along with marketing and engineering efforts.
- Implement Complete Streets Policy (See Appendix L for sample policy.)

PROMOTE ACTIVE TRANSPORTATION

- **Accommodate all roadway users with comprehensive street design** measures such as “complete streets,” including sidewalks, bicycle lanes, and share-the-road signs that provide safe and convenient travel for all users of the roadway. All new roads entering outlet mall should have sidewalks installed on both sides of the road and wide enough to accommodate people walking in groups, or pushing strollers, and individuals with disabilities. A “furnishing zone” should be added to each sidewalk to provide a buffer between pedestrian and street traffic, which would include pedestrian scale street lighting.
- **Provide streetscape amenities** such as benches, landscaping, lighting, and public art. Amenities are placed to not block or narrow sidewalks particularly for the visually impaired, older adults, people pushing strollers, and individuals with disabilities.
- **Encourage way-finding with signs, maps, and landscape** cues to direct pedestrians and bicyclists to the most direct routes to the outlet mall.
- **Provide bicycle parking at workplaces and transit stops.** Designate bicycle-specific crossings and signals to organize the movement of pedestrian, cyclists, and motorists at the busy intersection into the entry of the mall. Offer a buffer between bicyclists and cars to increase safety.
- **Ensure that site design, parking, and fences do not preclude** safe and comfortable pedestrian connections to future development.
- **Support physical activity among people with disabilities** and special needs such as elderly and handicapped by making all new roads and paths universally accessible.
- **Provide safe and convenient bicycle and pedestrian connections such as a trail or easement** to dedicated green space and potential public parks and recreation areas.

IMPROVE SAFETY FOR ALL USERS

A Federal Highway Administration review of the effectiveness of a wide variety of measures to improve pedestrian safety found that measures that design the street with pedestrians in mind – sidewalks, raised medians, better transit stop placement, traffic-calming measures, and treatments for disabled travelers – all improve pedestrian safety.

PEDESTRIAN AND BICYCLE SAFETY

According to the literature review, appropriate design and engineering, policies, signage, and education are important components to reducing the risk of injury.

Vehicle speeds are associated with injury occurrence and injury severity for all road users. A literature review sponsored by the National Highway Traffic Safety Administration (NHTSA) found that pedestrians

have a five percent chance of fatal injury when hit by a car traveling 20 miles per hour (mph) or less. This risk increases to 40 percent at a vehicle speed of 30 mph, 80 percent at 40 mph, and nearly 100 percent at 50 mph or more. Reduce traffic speeds by installing traffic diverters, roundabouts, and mini-traffic circles on new roads entering outlet mall.

- **Incorporate additions that have been shown to effectively calm traffic**, such as curb extensions, medians, and raised speed reducers. (See Appendix M.)
- **Provide advance warning signs for drivers to “Yield to Pedestrian”**. These signs have been shown to reduce pedestrian crashes by 10 percent.
- **Account for pedestrian and bicycle vulnerabilities with streetscape design**, placing an emphasis on increased visibility, route signage, and buffer zones.
- **Prevent crime** with effective strategies such as adequate lighting on roadways, in parks, along trails, and green space, installing emergency call boxes or cameras and policing.
- **Install audible and visual pedestrian crossing signals**. Design crossings for all users. Special consideration should be given to the design of crossing environments for pedestrians with disabilities and vision or hearing impairments.
- **Provide appropriate infrastructure for biking**. Bicycle lanes are preferred where bicycles must travel alongside the roadway. Refer to the Federal Highway Administration, the American Association of State and Highway Transportation Officials, and the Pedestrian and Bicycle Information Center for design guidelines.
- **Implement interventions for pedestrian and cyclist safety**. Interventions for pedestrian and cyclist safety focus on separation by time and space, increasing pedestrian/cyclist visibility, and reducing motor vehicle speeds. Effective interventions include: traffic signals at high-speed intersections, exclusive walk signal phasing, adequate duration of yellow/red signal timing, sidewalks, bicycle lanes, refuge islands and raised medians on multi-lane, high traffic volume roads, and increased intensity of roadway lighting to reduce nighttime pedestrian crashes.
- There are many specific ways to improve bicycle transportation. These include:
 1. Improved paths and bike lanes.
 2. Correcting specific roadway hazards (potholes, cracks, narrow lanes, etc.).
 3. Improved bike parking.
 4. Develop a more connected street network and clustered development (New Urbanism).¹³⁸

INCORPORATE HEALTHY COMMUNITY DESIGN FEATURES

- **Institute tobacco-free policy** for the entire outlet mall and post signage.
- **Provide healthy food and beverage options** in the outlet mall area.

¹³⁸ Victoria Transport Policy Institute. [online]. Available at: <http://www.vtpi.org/tm/tm92.htm>.

- **Expand green space for future recreational** areas such as playgrounds, soccer fields or skate park to increase sustainability. Provide a pathway or an easement from outlet mall to dedicated green space.
- **Create trail or pathway around aerated retention pond** and include benches, trees and way-finding signage that indicate distance around pond (Similar to Delaware City retention pond, pictured).
- **Promote bicycling and walking to nearby public transportation** station by providing sidewalks, bicycle lanes, and bicycle racks.



Figure 6. Wetlands behind Glenwood Commons, Delaware.

This Delaware wetlands drains runoff from the north side of US 36/Ohio 37, the Glenwood Commons retail center, and other surrounding areas. It is located on Mill Run behind Glenwood Commons. In the center of the park, there is an 8-acre retention pond, a basin that is designed to retain water runoff from surrounding areas. The park has a 0.68 mile trail that circles the retention pond and two bridges crossing wet areas.

INCREASE CONNECTIVITY

Connectivity of walking and bicycle infrastructure is associated with both increased walking and

increased transportation walking.¹³⁹ Connectivity refers to in this context as the number of blocks and intersections, as well as the presence of walking/biking infrastructure linking different destinations, mostly because they assist in providing more direct routes for accessing locations. Increasing the connectivity of the street network is an important component of this HIA.

- **Connect existing neighborhoods, greenways** by installing sidewalks, bike lanes, and provide connection paths to existing trails. The Ohio to Erie trail has been completed in Galena and will eventually connect Sunbury. This is a great opportunity to connect this new development with the east side of Delaware County.
- **New development and redevelopment** should provide pedestrian and bicycle connectivity through walkways, bike lanes, and multiuse paths between individual development sites to provide alternative means of transportation to this area to major destinations such as transit stops, schools, parks and shopping centers.
- **Recommend policies that maximizing the density of neighborhoods** requiring new developments be mixed-use and high density with good connectivity by incorporating active transportation infrastructure in neighborhoods. These kinds of changes to the built environment will make the areas more conducive to active transportation, which will have positive health benefits through increased physical activity, decreased air pollution, and reduced car collision fatalities for drivers, pedestrians, and bicyclists.

¹³⁹ Berrigan, D., Pickle, L.W., & Dill, J. (2010). Associations between street connectivity and active transportation. *International journal of health geographics*, 9(1), 20.
Health Impact Assessment/ Predicting the Health Impact of the Premium Outlet Mall Project on Community Health: Delaware, Ohio 54 of 100 | Page

- **Ensure that new parks are easily accessible by foot, bike or public transit** from neighborhoods that are currently underserved by parks. Create greenways/pedestrian and bicycle friendly routes and increase transit service, especially on weekends and holidays, from underserved neighborhoods to the site.
- **A needs assessment of existing neighborhoods in Berkshire Township should be conducted prior to updating the Berkshire Township Comprehensive Plan** to determine park needs, walkability issues, and other connectivity needs of residents.

ENHANCE WALKABILITY/BIKEABILITY

The placement and proximity of destinations is one of the most important factors in determining how much people walk for transportation.¹⁴⁰ The presence and convenience of utilitarian destinations has been associated with walking for transportation, especially destinations such as grocery stores, restaurants, post offices, and banks.¹⁴¹ A national survey of more than 12,000 adults found that the most common purpose of walking trips (38%) was for personal errands, such as going to the grocery store. Another important factor is the density of housing, which can increase the number of people who can live within a short distance (generally ¼ to ½ mile) of commercial, retail, school, work, or transit-stop destinations. Higher density at the parcel level has been associated with odds of walking frequently for transportation.¹⁴² A walkability checklist is included in Appendix N.

- **Follow development and redevelopment practices** that support walking, biking and transit use.
- **Consider changing minimum parking** requirements. Consider alternative parking provision strategies.
- **Allow zoning/re-zoning that facilitates** mixed-use development.
- **Incentivize mixed-use development** in Berkshire Township.
- **Continuous systems.** Provide interconnected streets, pedestrian sidewalks and other pedestrian facilities to increase walking.
- **Linkage to a variety of land use/regional connectivity.** Provide pedestrian and cyclists infrastructure to access shopping, transit, schools, parks, offices and other communities in this region of the county.
- **Coordinate between jurisdictions.** Close coordination with adjacent jurisdictions to meet future pedestrian and cyclists' connectivity infrastructure.
- **Accessible and appropriately located transit.** Provide transit facility close to commercial area to encourage transit usage, and include shelter, benches and bike racks.
- **Pedestrian-supportive land-use patterns.** Use a grid street layout with short blocks in commercial area to enhance pedestrian mobility.

¹⁴⁰ Ewing, R., & Cerero, R (2001). Travel and the Built Environment: a Synthesis. Transportation Research Record: Journal of the Transportation Research Board, 1780(1), 87-114.

¹⁴¹ Lee, C., & Moudon, A.V. (2006). Correlates of walking for transportation or recreation purposes. Journal of Physical Activity & Health, 3, S77.

¹⁴² Ibid.

- **Street trees and landscaping.** Provide street trees, flowers in planting strips or containers to enhance the pedestrian experience.
 - **Character and Scenic Opportunities.** Preserve important cultural and historic resources to sustain the community's heritage and provide an attractive environment for pedestrian use.
 - **Conduct a walking and biking audit** in the surrounding neighborhoods prior to updating the Berkshire Township Comprehensive Plan, and include results and recommendations in this plan.
-

ENCOURAGE WALKING/BIKING

Studies have shown that an individual's attitude toward walking can be as much of a barrier as the built environment. Exemplary programs include: Safe Routes to School for school-age children and related programs such as walking school buses and International Walk to School Day, Golden Marathon and other walking clubs, messaging or social media campaigns that promote walking as fun and/or important to long-term health, bike trail maps of all experience levels and abilities, and partnerships between public health professionals and area institutions to promote walking among area employees and/or residents (such as nature walks, pedometer giveaways, and lunchtime walks). Bicycle and walking encouragement include a variety of programs and activities that support and promote active transportation include:

- Creating greater awareness of the role of pedestrian/bike infrastructure in people's decisions to walk among residents and the public.
- Pursuing local, state, or federal grant funds that will fund additional trails and conservation of land.
- Conducting a walkability audit with neighborhood residents to audit existing infrastructure and identify priority areas.
- Reaching out to Rails to Trails and the Friends of the Big Walnut Trail to look at community connectivity and create awareness, and cycling and walking events and activities.
- Providing education programs that teach cycling skills.
- Promoting cycling maps that show recommended cycling routes and facilities, roadway conditions (shoulders, traffic volumes, special barriers to cycling, etc.), hills, and recreational facilities.
- Providing bicycles by employers and community organizations to rent or loan.
- Establishing Public Bike Systems that provide convenient rental bicycles for short utilitarian trips.
- Promoting Tourist materials highlighting cycling and walking.
- Providing wayfinding and navigation tools such as maps and other information on how to walk and cycle to a particular destination. (Wayfinding needs are best selected during the planning stages through a collaborative effort by architects, designers and signmakers--to address a project's total environmental communication.

ADDITIONAL RESOURCES

These documents and tools provide valuable information about potential countermeasures that can mitigate pedestrian safety concerns for a roadway.

- U.S. Department of Transportation. Federal Highway Administration
- FHWA Designing Sidewalks and Trails for Access, Part I, A Review of Existing Guidelines: http://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalks/
- FHWA Designing Sidewalks and Trails for Access Part II, Best Practices Guide: http://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalk2/
- Accessible Sidewalks and Street Crossings - An Informational Guide (FHWA-SA-03-019). U.S. Department of Transportation: http://www.bikewalk.org/pdfs/sopada_fhwa.pdf
- AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities: <https://bookstore.transportation.org/imageview.aspx?id=549&DB=3>
- AASHTO Guide for the Development of Bicycle Facilities: <http://www.railstotrails.org/resources/documents/ourWork/trailBuilding/DraftBikeGuideFeb2010.pdf>

REPORTING, EVALUATION & MONITORING

The findings and recommendations of this HIA will be presented and discussed with the stakeholders, developer, and the Berkshire Township Resident Advisory Group. Also plans for further disseminating of the results of the HIA will be discussed. During these discussions, it is anticipated that the recommendations will be prioritized and a plan for implementation will be developed.

The following evaluation criteria have been proposed:

- Survey stakeholders on how useful the information was in their deliberations.
- Number of future land-related projects that consider the HIAs in their decision-making process.
- Evaluate the number of recommendations considered and how it influenced physical activity, the baseline community health status, and community connectivity.

Monitoring is intended to track the impacts of the HIA on the decision-making process and decision, the implementation of the decision, and impacts of the decision on health determinants.

APPENDICES

Appendix A. Trans Associates Engineering Consultants, Inc. Traffic Impact Study Conclusions and Recommendations

The improvements for opening day are:

- 1) At the intersection of US-36/SR35 and the I-71 northbound ramps:
 - a. Construct third northbound right turn land 537 foot in total length.
 - b. Provide a two-lane parallel exit ramp per the top portion of Location and Design Manual Figure 505-2b.
- 2) Add third eastbound through land on US-36/SR-37 between I-71 northbound ramps and Wilson Road.
- 3) Construct South Wilson Road extension from US-36/SR-37 southward through development. South Wilson Road should have a five-lane section (two through lands in each direction, left turn lands at Flying J/Pilot.
- 4) Construct backage road from AD Farrow to South Wilson Road.
- 5) Remove signal and left turn lanes at Flying J/Pilot.
- 6) At the intersection of US-36/SR-37 and Wilson Road:
 - a. Drop third eastbound through lane at a free flow channelized right turn lane onto South Wilson Road.
 - b. On the eastbound approach, add 159' of storage to first left turn land and 113' of storage at the second left turn lane.
 - c. Construct one westbound left turn lane 514' in total length.
 - d. Construct northbound approach, consisting of one 780-foot left turn lane, one 1045-foot left turn lane, a through lane, and a shared through/right lane.
 - e. Restripe southbound approach for a separate left turn lane, through lane, and a 300-foot right turn lane.
 - f. Add signal heads for northbound approach, and retime signal to reflect new configuration.
- 7) At the intersection of South Wilson Road and the proposed backage road:
 - a. Install traffic signal.
 - b. Construct one eastbound left turn land 250' in total length.
 - c. Construct one northbound left turn lane 285' in total length.
 - d. Stripe out area for future 285-foot southbound left turn lane.
 - e. Construct one southbound right turn lane 325' in total length. While this lane is not required and was not analyzed as part of this study, it is being recommended at the request of the Delaware County Engineer's Office.
- 8) At the intersection of South Wilson Road and the outlet mall access:
 - a. Install traffic signal.
 - b. Construct one northbound left turn lane 375' in total length.

- c. Construct eastbound approach, consisting of one 450-foot left turn lane and a shared through/right lane.
 - d. Construct one southbound right turn lane 414' in total length. While this lane is not required and was not analyzed as part of this study, it is being recommended at the request of the Delaware County Engineer's Office.
- 9) For design year build conditions, several additional improvements are suggested. These roadway improvements are being suggested under the assumptions that in 2035 (1) no additional I-71 interchanges is built, and (2) the amount of retail development present closely matches that contained in the model used to develop the ODOT certified volumes. If either of these assumptions is invalid by the design year, many of the following improvements may be unnecessary. These improvements include:
- 10) Construct one additional through lane in the westbound direction to travel from just east of Wilson Road through the I-71 overpass.
 - 11) At the intersection of US-36/SR-37 and the I-71 southbound ramps:
 - 12) Prior to widening the bridge for dual westbound left turns, conduct Interchange Modification Study based on design year full build traffic.
 - 13) Stripe for dual westbound left turns onto I-71 south once the bridge is widened.
 - 14) Add second receiving lane to on ramp.
 - 15) At the intersection of US-36/SR-37 and Wilson Road:
 - 16) Continue third eastbound through lane just past the intersection.
 - 17) On the eastbound approach, add 472' of storage to each left turn lane.
 - 18) On the eastbound approach, construct one free flowing channelized right turn lane 872' in total length. While the required turn lane length is 1520', this full length will not be necessary since this movement operates outside of signal control.
 - 19) Add 161' of storage to westbound left turn lane.
 - 20) Add 300' of storage to southbound right turn lane.
 - 21) Retime signal to reflect new configuration.
 - 22) At the intersection of US-36/SR-37 and Galena Road:
 - 23) Construct one eastbound left turn lane 339' in total length.
 - 24) Construct one westbound left turn lane 314' in total length.
 - 25) Retime signal to reflect new configuration.

Appendix B: Engaging Stakeholders in the HIA Process Plan

In the HIA process, engaged and active stakeholders can:

- Increase the accuracy and value of the HIA by providing multiple perspectives. Working with stakeholders brings varying perspectives to the HIA and is integral to identifying the health impacts that are of greatest importance to the population identified in the HIA. Through the participation process, the knowledge, experience and values of diverse stakeholders can become part of the evidence base.¹
- Incorporate information not readily available with other forms of evidence. Stakeholders can share anecdotal information, histories and stories that provide a more well-rounded understanding of existing community conditions and potential health impacts. Stakeholders can also help refine research questions, support context-specific analysis of research findings, and help develop more feasible recommendations.²
- Increase the efficacy of the HIA to impact the policy decision by fostering active support for the HIA recommendations. Participation in the HIA process can provide stakeholders an opportunity to shape the analysis and provide meaningful input. Stakeholders can account for community concerns and visions, political realities, and reach diverse audiences for input and support. Since the recommendations stemming from the HIA analysis may also have the most impact on communities and other stakeholders, it is imperative they help shape them.³

HIA Stakeholder Engagement Per Stage⁴

Screening Stage

Deciding whether an HIA is needed, feasible, and relevant

<i>Task</i>	<i>Method to ensure participation</i>	<i>Challenges</i>
<ul style="list-style-type: none"> • Collaboratively identify criteria for selection and priority projects for HIA. • Educate all parties about the HIA process. • Discuss pros and cons of conducting an HIA. • Discuss potential priority health issues to study. • Solicit input and work to understand community's concerns about the development of the outlet mall • Identify expert/professional stakeholders to be involved in solving the community's concern with the outlet mall development and performing the HIA. • Include diversity in the stakeholders 	<ul style="list-style-type: none"> • Health District team identifies the stakeholders to be involved in the HIA. • Susan Sutherland will call everyone and ask them to come to the first HIA meeting to discuss the outlet mall. • Follow-up with an e-mail that includes the agenda items and who will be presenting on what topic. Identify other stakeholders at this meeting who needs to be involved in the process. 	<ul style="list-style-type: none"> • Understanding the HIA process and its value is time consuming and organizations may be unable to commit-find other stakeholders that are able to commit. • Different priorities and timelines to balance-select what is feasible and doable. • Group alienations—good facilitation is necessary! • Risk of burnout from workload-define timeline and responsibilities in the beginning of the process. • Build trust and credibility-proven through the process through good communications and follow-up.

Scoping Stage

Stakeholders will be asked to decide which health impacts to evaluate and the evaluation methodology to be utilized.

<i>Task</i>	<i>Method to ensure participating</i>	<i>Challenges</i>
<ul style="list-style-type: none"> • Collaboratively the group will identify priority health issues to study and identify goals for the HIA. • Defined geographic boundaries based on planning process • Solicit feedback from the community directly impacted by the development 	<ul style="list-style-type: none"> • Conduct a series of facilitated meetings with stakeholders to arrive at priorities for the HIA. • Discuss the possibility of conducting surveys, focus groups by Berkshire Township residents to establish priorities. • Conduct interviews with expert 	<ul style="list-style-type: none"> • Lack of interest in attending focus groups—need to conduct different survey. • Too many priorities—need to discover a tool to identify top priorities. • Lack of participation by developer-

- | | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> of the outlet mall. Continue to conduct outreach in the community to determine other stakeholder involvement Identify sources of information that already exists and invite stakeholder to present data. Discuss media and advocacy activities to report HIA findings Disclosure of all information concerning the HIA. Priorities of Berkshire township residents are well represented. Identify data sources, and health issues which are related to the priorities issues. Create a buy-in or consensus of the top priorities to address. | <p>professionals for their input on priorities.</p> <ul style="list-style-type: none"> One-on-one conversations with Berkshire township residents. Develop scoping documents for all stakeholders review and input. | <p>media attention is needed.</p> <ul style="list-style-type: none"> Funding priorities-look for other funding sources. |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|

Assessment

Using data, research, and analysis to determine the magnitude and direction of potential health impacts

<i>Task</i>	<i>Method to ensure participating</i>	<i>Challenges</i>
<ul style="list-style-type: none"> Engage all stakeholders in data collection. Seek feedback from the Berkshire Township Residents Advisory Group. Research and organize baseline existing conditions data. Lead or participate in field observations, i.e., walking audits. Conduct surveys, interviews, and or focus groups to further interpret communities' concerns with outlet mall. Assess potential impacts through analyzing available data, applicable literature, and stakeholder input to determine health outcomes and impacts to affected population Determine and use necessary prediction models to estimate health impact based on selected priority. Summarize data and findings. 	<ul style="list-style-type: none"> Interviews with key individuals. Data collection with key stakeholders. GIS mapping of demographics and data sources by stakeholders. Stakeholders assist in developing survey methodology and conducting surveys. Data input and analysis. 	<ul style="list-style-type: none"> Gaps in data-identify where the gaps are and develop plan to gather data. GIS mapping capabilities-find expert in the beginning to conduct all GIS mapping. Literature review time consuming-select experts to present literature findings. Community buy-in—review findings with all stakeholders, gather feedback and discuss issues that are feasible, doable Too broad—look for useful meaningful data that correlates with the construction of the outlet mall.

Recommendations

Providing recommendations to manage the identified health impacts and improve health conditions

<i>Task</i>	<i>Method to ensure participating</i>	<i>Challenges</i>
<ul style="list-style-type: none"> Use expert/professional stakeholder's advice to ensure recommendations reflect effective best practices. Work with Berkshire Township Residents Advisory Group to prioritize recommendations. Seek input on the recommendations from all stakeholders. 	<ul style="list-style-type: none"> Conduct outreach to get expert guidance to ensure recommendations reflect current effective best practices. Formalize a committee who will write and edit report. 	<ul style="list-style-type: none"> The recommendations may be too costly-look for other funding mechanisms. Too many recommendations—need to prioritize the recommendations annually. Recommendations are all-encompassing—review with all

- Develop recommendation report and gather feedback from stakeholders; finalize the report.

stakeholders to gather feedback.

Report & Communication Stage
Sharing the results, recommendations

<i>Task</i>	<i>Method to ensure participating</i>	<i>Challenges</i>
<ul style="list-style-type: none"> • Summarize primary findings and recommendations to allow for stakeholders understanding, evaluation, and response. • Acknowledge stakeholders participation in final report. • Respond to all stakeholders comments- provide follow-up in all incidents. • Work with stakeholders to build capacity of their understanding of the HIA findings. • Final report will address how the outcomes will be reported to decision makers and the community. • Results and methodologies will be report to the community. • Present recommendations to the developer as a HIA expert panel. 	<ul style="list-style-type: none"> • Conduct a meeting with the developer and present recommendations collectively. 	<ul style="list-style-type: none"> • Developer’s schedule-schedule meeting way in advance of beginning of the outlet mall. • HIA understanding-hold another built environment forum.

Monitoring Stage
Tracking how the HIA affects the decision and its outcomes

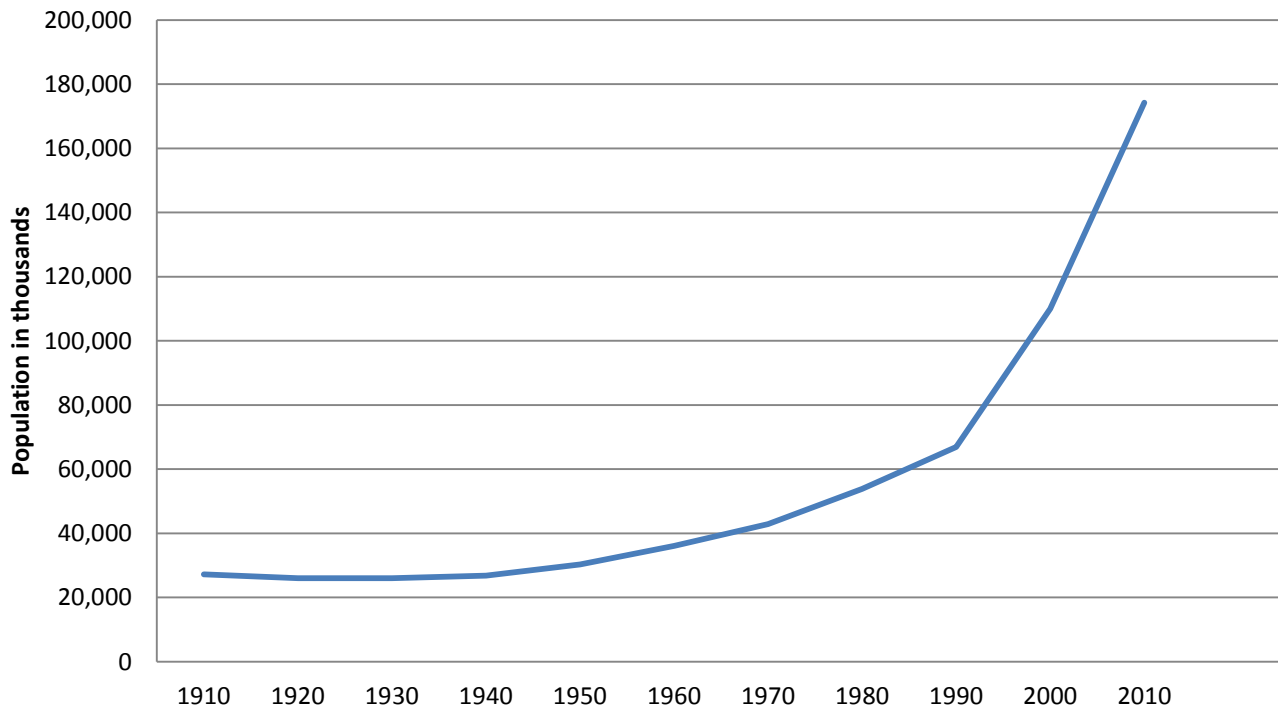
<i>Task</i>	<i>Method to ensuring participation</i>	<i>Challenges</i>
<ul style="list-style-type: none"> • Stakeholders will be involved in monitoring outcomes by their field of expertise. • Health District will facilitate a meeting of the stakeholders and experts to establish frequency of and mechanism for tracking outcomes. 	<ul style="list-style-type: none"> • Stakeholders and residents are involved in monitoring health outcomes. 	<ul style="list-style-type: none"> • Keeping the interest alive-provide continuously success stories. • Sustainability-hold education workshops at the new development, look for opportunities to partner within community

APPENDIX C: 2010 Demographic Information

As of 2010, the total population of Delaware County was 174,214, which is 58.39% more than it was in 2000. The population growth rate was much higher than the state average of 1.62% and the national average of 9.71%. Delaware County is the 15th most populated county in the state of Ohio out of 88 counties. The County's population density is 380.94 people per square mile, which is higher than the state average density of 257.36 people per square mile and is much higher than the national average density of 81.32 people per square mile.

According to the U. S. Census Bureau, the county has a total area of 456 square miles; 442 square miles is land and 14 square miles is water (2.97%).⁵

Figure 1: Delaware County's population growth from 1910-2010.



ETHNIC CHARACTERISTICS

The most prevalent race in Delaware County is white, which represent 89.8% of the total population. The remaining racial makeup of Delaware county was Black or African American, 3.5% Native American and Alaska Native, 0.2% Asian, 4.7% Pacific Islander, 0.5% from other races, and 1.9% from two or more races Compared to Ohio, which has a 12.2% black population, Delaware County has approximately a 7% black population.⁶ Compared to the State of Ohio, Delaware County has a greater Asian population and fewer Black and Hispanic or Latino populations.

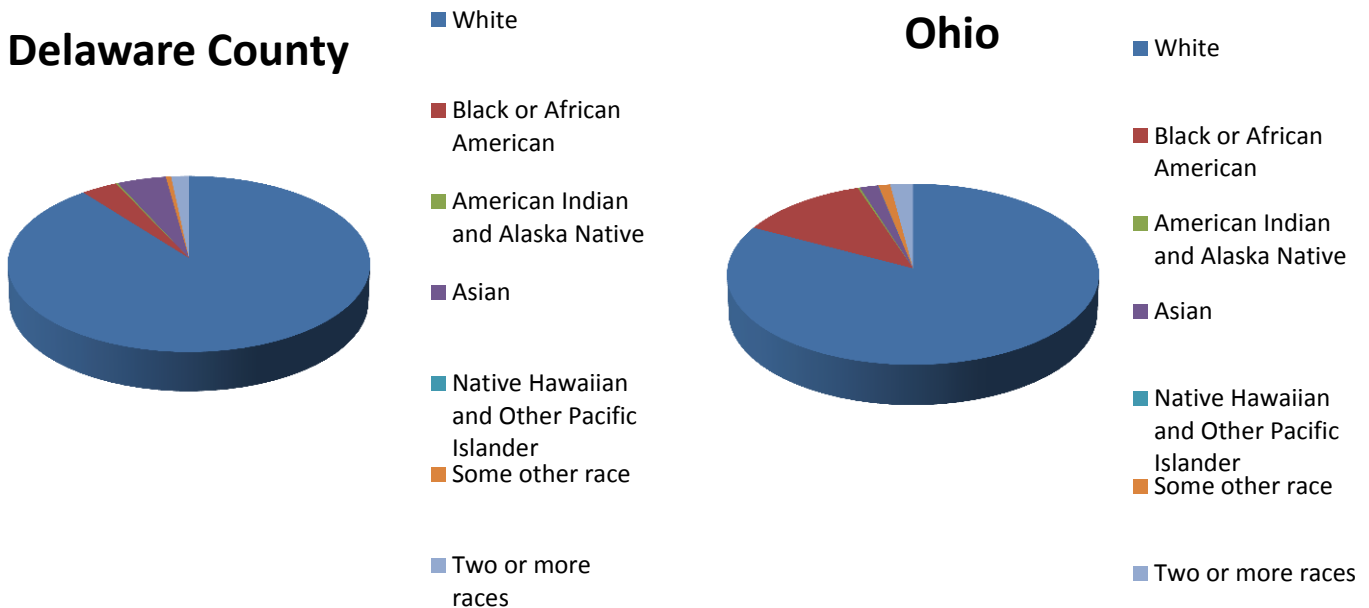
Table 1. Delaware County Total Population, 2010

2010 Total Population	Berkshire Township	Delaware County	Delaware City	Ohio
	3,085	174,214	48,107	11,536,504

2010 U.S. Census Bureau.

	Berkshire Township	Delaware County	Delaware City	Ohio
White	94.78%	89.8%	91.5%	82.7%
Black or African American	1.23%	3.5%	3.8%	12.2%
American Indian and Alaska Native	0.36%	0.2%	0.2%	0.2%
Asian	1.62%	4.7%	1.5%	1.7%
Asian Indian	-	1.8%	0.4%	0.6%
Chinese	-	0.9%	0.4%	0.4%
Filipino	-	0.3%	0.1%	0.1%
Japanese	-	0.2%	0.1%	0.1%
Korean	-	0.3%	0.2%	0.1%
Vietnamese	-	0.1%	0.2%	0.1%
Other Asian	-	0.3%	0.2%	0.2%
Native Hawaiian and Other Pacific Islander	0.097%	0.0%	0.037%	0.03%
Some other race	0.38%	0.5%	0.7%	1.1%
Two or more races	1.5%	1.7%	2.2%	2.1%
Hispanic or Latino	1.29%	2.3%	2.2%	3.1%

Figure 2. Population by ethnicity in Delaware County and Ohio, 2010



AGE AND SEX DISTRIBUTION

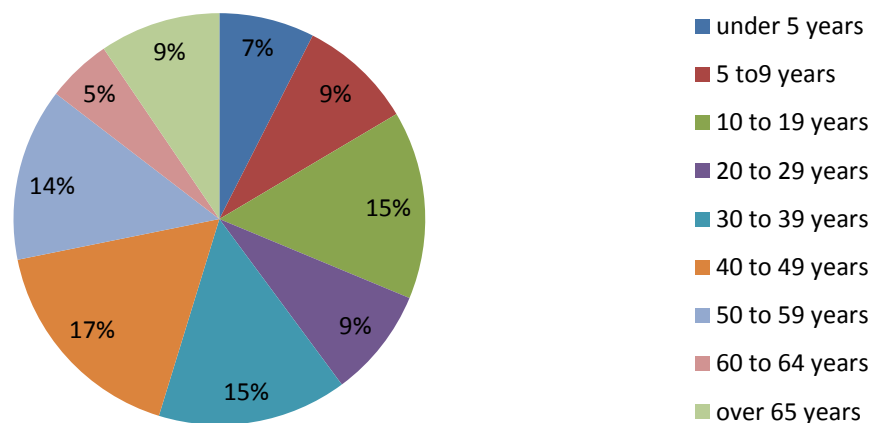
In 2010, 31.2% of the population in Delaware County was under the age of 19 years. The median age was 37.4 years. 7.4% of the residents of Delaware County were under the age of five, compared to 6.2% of Ohioans.⁷ The United State Census Bureau estimates that in 2012, that number had fallen to 6.6% for Delaware County and 6.0% for Ohio. Also in 2012, the percentage of the population under the age of 18 was 28.0% for Delaware County compared to 23.1% of Ohio.

Delaware County is evenly split between males and females. In 2010, for every 100 females there were 98.0 males, and for every 100 females age 18 and over, there were 94.9 males.⁸

Table 2: Population by Age, 2010 US Census Bureau

	Delaware County	Delaware City	Ohio
Under 5 years	7.5%	7.4%	6.2%
5 to 9 years	9.0%	7.5%	6.5%
10 to 14 years	8.1%	6.7%	6.7%
15 to 19 years	6.7%	7.1%	7.1%
20 to 24 years	4.1%	6.7%	6.6%
25 to 29 years	4.5%	6.0%	6.2%
30 to 34 years	6.4%	7.3%	6.0%
35 to 39 years	8.5%	7.9%	6.2%
40 to 44 years	8.7%	7.3%	6.6%
45 to 49 years	8.4%	6.8%	7.4%
50 to 54 years	7.3%	6.8%	7.7%
55 to 59 years	6.3%	6.1%	6.8%
60 to 64 years	5.1%	5.0%	5.8%
65 to 69 years	3.4%	3.6%	4.2%
70 to 74 years	2.3%	2.7%	3.2%
75 to 79 years	1.6%	1.9%	2.6%
80 to 84 years	1.2%	1.6%	2.1%
85 years and older	1.0%	1.5%	2.0%
Median age (years)	37.4	35.1	38.8

Figure 3. Age distribution in Delaware County



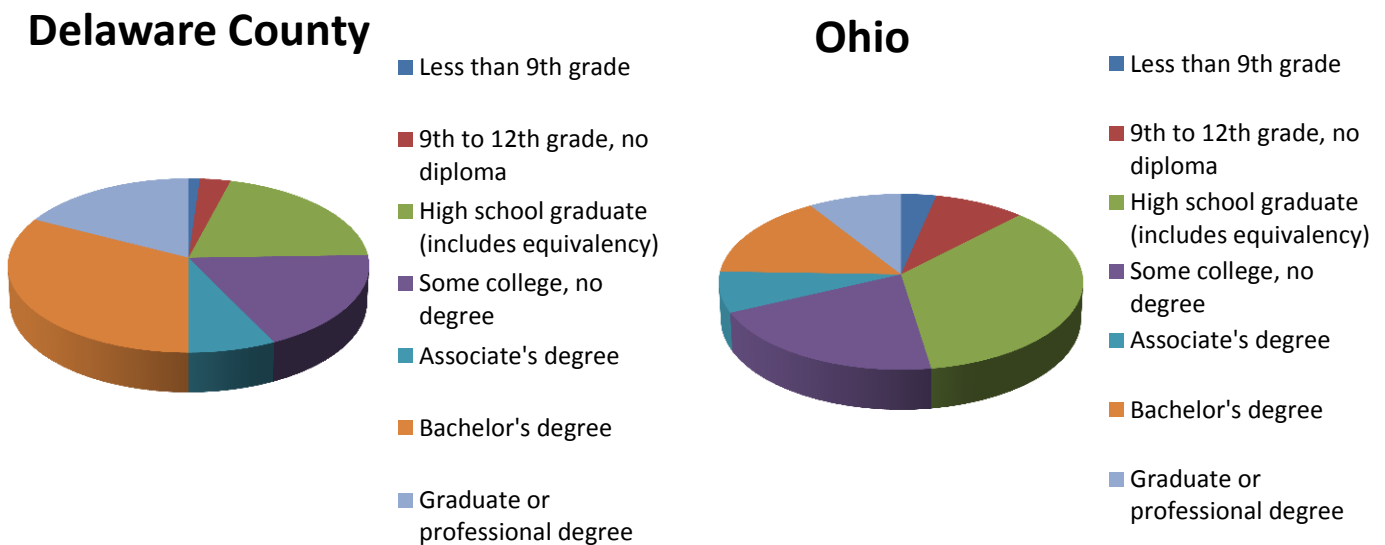
EDUCATION ATTAINMENT

The average Delaware County education level is higher than the state and national average. In Delaware County, 20.4% of the population received their high school diploma, and 32.6% of the population has a Bachelor's degree and 17.4% has a graduate or professional degree. In Ohio, 35.22% graduated from high school, and 28.11% received some college or an Associate degree. Over fifteen In Delaware County percent received a Bachelor's degree and 10.44 percent received a Master, Doctorate or Professional Degree.⁹

Table 3. Education Attainment in Delaware County, Delaware City and Ohio, 2010

	Delaware County	Delaware City	Ohio
Population 25 years and over	110,571	30,440	7,688,501
Less than 9th grade	1.1%	1.5%	3.4%
9th to 12th grade, no diploma	3.0%	5.5%	8.8%
High school graduate (includes equivalency)	20.4%	28.2%	35.4%
Some college, no degree	18.3%	21.5%	20.5%
Associate's degree	7.2%	9.4%	7.5%
Bachelor's degree	32.6%	22.8%	15.5%
Graduate or professional degree	17.4%	11.2%	9.0%
Percent high school graduate or higher	95.9%	93%	87.9%
Percent bachelor's degree or higher	50%	34%	24.5%

Figure 4. Delaware County and Ohio Educational Attainment, 2010



EMPLOYMENT AND HOUSEHOLD INCOME

As of 2010, the per capita income of Delaware County is \$38,683, which is higher than the state at \$23,975 and nation at \$26,059. Delaware County's median household income was \$87,908 in 2010, which grew by 30.70% between 2000 and 2010. The median household income growth rate is much higher than the state growth rate (10.9%) and the national growth rate (19.17%). As of 2006-2010, median price of a house in Delaware County is \$252,700, which is much higher than the state, which was \$134,400, and nation, which was \$179,900. The Delaware County median house value has grown by 32.72% since 2000. The growth rate for the price of a house in Delaware County is higher than the state average rate of 29.60% and is lower than the national average rate of 50.42%.

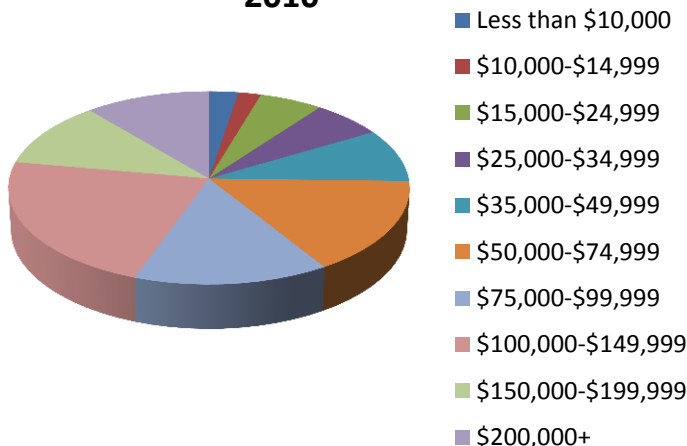
Delaware County's median family income was \$97,413 in 2010; the mean retirement income was \$24,751. Males had a median income of \$67,309 versus \$45,877 for females. About 3% of families and 4.5% of the population were below the poverty level, including 5% of those under the age of 18 and 5.5% of those 65 and older. The percentage of the population in poverty was lower than the state, which was 15.85%. The county's family poverty level (5.31%) was lower than the state level at 11.75%.¹⁰ The unemployment rate for Delaware County was 6.2%, which is lower than the State's rate at 10%.¹¹

Table 4. Delaware County, Delaware City, Ohio Income levels, 2007-2011 Estimates

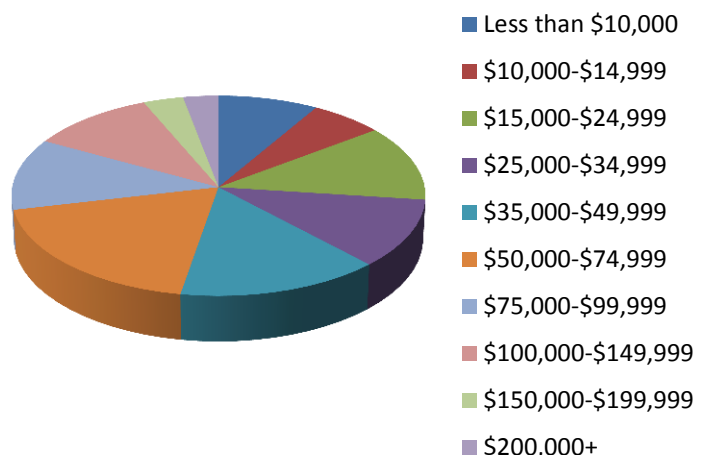
2007-2011 Estimates	Delaware County	Delaware City	Ohio
Less than \$10,000	2.6%	4.5%	8.5%
\$10,000-\$14,999	2.0%	3.5%	6.2%
\$15,000-\$24,999	5.6%	9.2%	12.3%
\$25,000-\$34,999	6.3%	9.7%	11.0%
\$35,000-\$49,999	8.9%	11.7%	14.7%
\$50,000-\$74,999	15.7%	19.6%	18.7%
\$75,000-\$99,999	14.4%	14.9%	11.6%
\$100,000-\$149,999	22.3%	17.7%	10.6%
\$150,000-\$199,999	11.1%	4.9%	3.4%
\$200,000+	11.1%	4.2%	3.0%

Figure 5. Delaware County and Ohio Per Capita Income, 2010

Delaware County Per Capita Income, 2010



Ohio Per Capita Income, 2010



MEDIAN HOUSEHOLD INCOME

Table 5. Median Household Income in Delaware County, Delaware City and Ohio, 2010

	Delaware County	Delaware City	Ohio
Median household income (dollars)	\$90,022.	\$64,406.	\$48,071.
Mean household income (dollars)	\$113,100.	\$78,877.	\$63,477.

NUMBER IN LABOR FORCE

There are 126,405 individual residing in Delaware County that are 16 years and older. Of that, 92,295 (73%) are in the labor force.¹²

Table 6. Percentage of population in Delaware County, Delaware City, and Ohio in Labor Force, 2010

	Delaware County	Delaware City	Ohio
Population 16 and over	126,405	36,738	9,110,226
In labor force	73%	70.9%	64.6%
Civilian labor force	72.9%	70.7%	64.5%
Employed	69.6%	67%	58.5%
Unemployed	3.2%	3.7%	6.0%
Armed Forces	0.1%	0.3%	0.1%
Not in labor force	27%	29.1%	35.4%

LANGUAGE SPOKEN AT HOME

In Delaware County, Delaware City and Ohio, the primary language spoken at home was English followed by other Indo-European language, and Spanish.¹³

Table 7. Percentage of population by language spoken at home in Delaware County, Delaware City and Ohio.

	Delaware County	Delaware City	Ohio
Population 5 years and over	157,655	44,347	10,106,940
English only	93.0%	95.9%	93.5%
Language other than English	7.0%	4.1%	6.5%
Speak English less than "very well"	1.8%	1.4%	2.3%
Spanish	1.3%	1.3%	2.2%
Speak English less than "very well"	0.3%	0.5%	0.9%
Other Indo-European languages	2.7%	1.6%	2.5%
Speak English less than "very well"	0.6%	0.4%	0.8%
Asian and Pacific Islander languages	2.5%	0.9%	1.0%
Speak English less than "very well"	0.8%	0.4%	0.5%
Other languages	0.6%	0.2%	0.7%
Speak English less than "very well"	0.2%	0.0%	0.2%

HOUSING

In 2010, there were 62,618 households in Delaware County, which 42% had children under the age of 18 living with them, 67% were married couples living together, 7.5% had a female householder with no husband present, and 22.3% were non-families. 18.2% of households were made up of individuals who lived alone and 5.3% were made of individuals 65 years of age or older that live alone. The average household size was 2.68, and the average family size was 3.06.¹⁴

As of 2010, median price of a house in Delaware County is \$253,400, which is much higher than the state average of \$135,600 and is higher than the national average of \$179,900. The Delaware County median house value has grown by 32.72% since 2000. The growth rate for the price of a house in Delaware County is higher than the state average rate of 29.60% and is lower than the national average rate of 50.42%. The median year that a house in Delaware County was built is 1995, which is newer than the median year for a house built in the state which is 1966 and is newer than the median year for a house built in the USA which is 1975.¹⁵

Table 8. Percentage of population by household in Delaware County, Delaware City, and Ohio

	Delaware County	Delaware City	Ohio
Total households	62,618	18,207	4,554,007
Family households (families)	77.7%	68.6%	65.3%
With own children under 18 years	42.0%	33.1%	28.8%
Husband-wife family	66.9%	54.5%	48.5%
With own children under 18 years	34.5%	24.4%	19%
Male householder, no wife present	3.4%	4.3%	4.2%
With own children under 18 years	2.2%	2.6%	2.2%
Female householder, no husband present	7.5%	9.9%	12.7%
With own children under 18 years	5.3%	6.0%	7.6%
Nonfamily households	22.3%	31.4%	34.7%
Householder living alone	18.2%	25.1%	29.2%
Average household size	2.68	2.52	2.4
Average family size	3.06	24.4	3.05

MEDIAN MARKET VALUE OF OWNED HOME

The 2010 median market value of residents who owned their home was \$253,400. Compared to Ohio, the median market value was \$135,600.¹⁶

Table 9. Delaware County, Delaware City and Ohio Median Market value of owned home, 2010

	Delaware County	Delaware City	Ohio
Median (dollars)	\$253,400	\$182,600.	\$135,600.

APPENDIX D: Behavioral Risk Factor Surveillance Survey, 2013

The Partnership for a Healthy Delaware County (PHDC), with support from the Delaware General Health District (DGHD), has embarked on a comprehensive community health assessment and strategic planning effort using the Mobilizing for Action through Planning and Partnership (MAPP) process as a framework. This collaborative project is guided by the vision of “A community where we work together to provide opportunities for complete health and well-being.” The PHDC serves as the steering committee for MAPP.

Overall, 1,218 telephone interviews were completed with Delaware County adult residents. Of those, 18 were residents from Berkshire Township. The following are the results of the Berkshire resident’s surveys.

Data Adjustments - Weighting: Survey data are often weighted to reduce bias caused by non-coverage and non-response, as well as to ensure the survey sample resembles (demographically) the population from which it was drawn. For the 2013 Community Health Assessment survey, a complex weighting procedure was used to accomplish this. For more detailed information regarding the survey methods used, the demographics of the survey respondents and the survey questionnaire can be found in Appendix A. For this analysis data was weighted using the variable “final countywide”.

GENERAL HEALTH

Would you say that, in general, your health is....

Health Category	Percentage
Excellent	27.8%
Very good	29.9%
Good	34.3%
Fair	4.0%
Poor	4.0%

N=18

Percentage of respondents reporting “Good” Health or Better

Delaware County	91%
Berkshire Township	92%

N=18

Average # of days in which physical health was “Not Good” in the past 30 days

Delaware County	2.5
Berkshire Township	2.0

N=18

Answer Range for Berkshire Township residents: 0 days-30 days

64.4% of Berkshire Township responders answered 0 days

Average # of days in which mental health was “Not Good” in the past 30 days

Delaware County	2.6
Berkshire Township	0.3

N=17

Answer Range for Berkshire Township residents: 0 days-5 days

87.7% of Berkshire Township responders answered 0 days

For how many days during the past 30 days did poor physical or mental health keep you from doing your usual activities, such as self-care, work or recreation

Delaware County	1.6
Berkshire Township	1.2

N=18

Answer Range for Berkshire Township: 0 days-30 days

Has a doctor, nurse or other health professional ever told you that you had any of the following?

Disease	% saying yes- Berkshire Township	% saying yes- Delaware County
Heart attack/myocardial infarction	4.0%	3%
Angina/coronary heart disease	4.0%	3%
Stroke	4.0%	3%
Asthma	4.0%	13%
COPD, emphysema or chronic bronchitis	4.0%	4%
Diabetes	8.8%	11%
Avg # A one C tests in past 12 months	2.5 (Two persons)	2.4
High blood pressure	33.7%	28%
High cholesterol	27.2%	29%
Arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia	45.8%	25%
Are you now limited in anyway of your usual activities because of arthritis or joint symptoms	17.4%	44%

HEALTH BEHAVIORS

Percentage of people who consume at least five servings of fruits and vegetables per day

Delaware County	35%
Berkshire Township	42.5%

N=18

Percentage of people who are overweight

Delaware County	36%
Berkshire Township	25.4%

N=18

Percentage of people who are obese

Delaware County	25%
Berkshire Township	21.1%

N=18

Percentage of people who use breaks while at work to do physical activity or exercise

Delaware County	25%
Berkshire Township	20.3%

N=9

Percentage of people who did at least 30 minutes of physical activity in a typical week

Delaware County	87%
Berkshire Township	97.5%

N=18

Average days per week with at least 30 minutes of physical activity

Delaware County	4.2
Berkshire Township	4.5

N=16

Percentage of people who are trying to lose weight

Delaware County	45%
Berkshire Township	43.4%

N=18

DEMOGRAPHICS

Age

Age range of respondents:	29-79 years
Mean age:	51.4 years

N=17

Employment Status

Employment Category	Percentage
Employed for wages	43.0%
Self Employed	14.6%
Out of work for more than 1 year	16.4%
Out of work for less than 1 year	0%
A homemaker	5.4%
A student	0%
Retired	20.6%
Unable to work	0%

N=18

Gender

Gender	Percentage
Male	39.7
Female	60.3

N=18

100% of respondents identified themselves as being White

0% of respondents identified themselves as being Hispanic

Marital Status

Married	74.1%
Divorced	2.7%
Widowed	0%
Separated	15.2%
Never married	1.6%
A member of an unmarried couple	6.4%

N=18

What is the highest grade or year of school you completed

Never attended school or only kindergarten	0%
Grades 1 thru 8 (Elementary)	0%
Grades 9 thru 11 (Some high school)	12.4%
Grade 12 or GED (High school graduate)	20.5%
College 1 year to 3 years (Some college)	29.1%
College 4 years or more (College graduate)	29.0%
Master's Degree	0%
Professional degree (doctor, lawyer)	2.5%
Doctorate degree	6.4%

N=18

Is your annual income from all sources

Less than \$25,000	23.2%
Between \$25,000 and less than \$50,000	20.0%
Between \$50,000 and less than \$75,000	23.8%
Between \$75,000 and less than \$100,000	14.5%
Between \$100,000 and less than \$150,000	9.1%
\$150,000 or more	9.5%

N=17

Appendix E: Delaware County Environmental Health Profile

DAILY VEHICLE MILES TRAVELED REPORT

Daily Vehicle Miles Traveled (DVMT) is a simple mechanism to measure how much traffic is going along a roadway during an average 24 hour period. This simple formula multiplies Average Annual Daily Traffic (AADT) by the length of the roadway. For example; if a roadway was 2 miles in length and the AADT was 4000 vehicles per day the DVMT would be computed by multiplying $2 \times 4,000 = 8,000$ or 8,000 DVMT.¹⁷

County-By-County DVMT is computed using the State of Ohio, Department of Transportation's Roadway Information Files and the annual Highway Performance Monitoring System (HPMS) Summary Reports. DVMT's are computed for all of the Federal Functional Class(FC) categories (see list at the end of this readme file) within each of Ohio's 88 counties.¹⁸

The AADT and Roadway length information are very accurate for The State Highway System (Interstate, US and State Routes,). For roadways that are not part of the State Highway System, various representative counts were used, such as: railroad crossing counts, HPMS Sample Section Counts etc. All traffic count data that was not collected during the current year has had a statewide growth factor applied that accounts for systematic growth.¹⁹

Given the previously mentioned methodologies, the DVMT data is more accurate on roads functionally classified as collector or above.²⁰

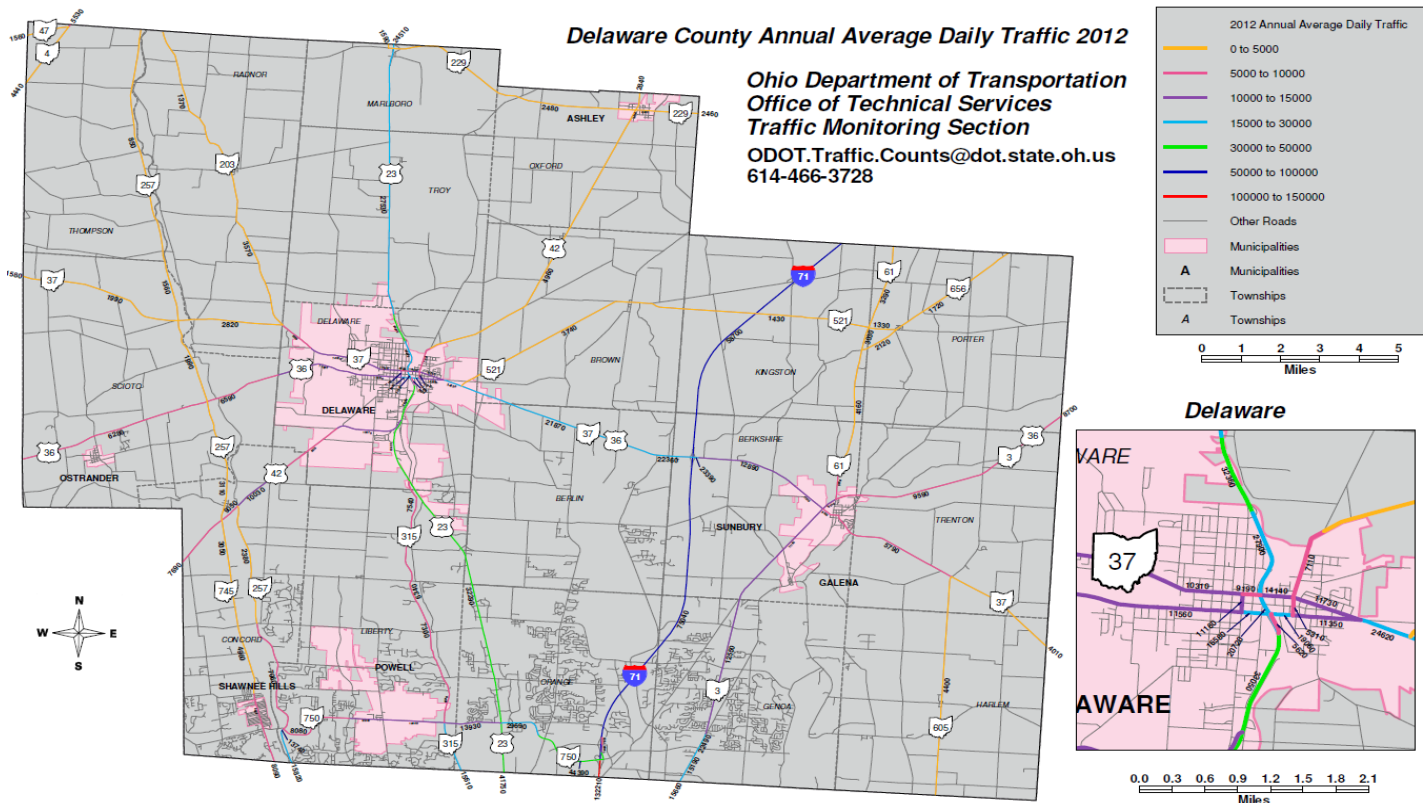
All DVMT figures in this report are in thousands. In the heading of the reports this is referred to as kDVMT, or Daily Vehicles Miles Traveled in thousands, where the k=1000. For example; if the report lists the DVMT at 26.52, the actual value would be computed a $26.52 \times 1,000 = 26,520$.²¹

On average Delaware County residents spend 24.7 minutes per day commuting to work, which is higher than the state average of 22.4 minutes and is about the same as the national average of 25.3 minutes.

2013 data ²²	Delaware kDVMT	Geauga kDVMT	Green kDVMT	Clark kDVMT
01 - Rural Interstate	587.16	0.00	146.85	842.56
02 - Rural Principal Arterial- other Freeway/Expressways	0	151.79	135.60	28.49
03 - Rural Principal Arterial- other	325.06	196.77	47.74	145.98
04 - Rural Minor Arterial	236.43	216.04	200.80	18.78
05 - Rural Major Collector	280.71	581.29	225.17	325.66
06-Rural Minor Collector	202.29	9.44	88.95	21.39
07 - Rural Local	260.56	76.70	285.95	341.45
Total rural	1,892.21	1,232.03	1,131.06	1,724.31

01 - Urban Interstate	633.01	0	1,101.34	728.67
02 - Urban principal arterial- other Freeway & Expressways	74.39	61.68	269.17	155.59
03 - Urban Principal Arterial-other	830.03	263.07	652.01	134.74
04 - Urban Minor Arterial	934.49	145.56	333.36	599.00
05 – Urban Major Collector	563.47	174.24	412.18	451.77
06 - Urban Minor Collector	30.48	0.0	21.83	0.00
07-Urban Local	203.64	102.27	246.18	356.60
Total Urban	3,269.51	746.82	3,036.06	2,426.36
Total County	5,161.72	1,978.85	4,167.12	4,150.67

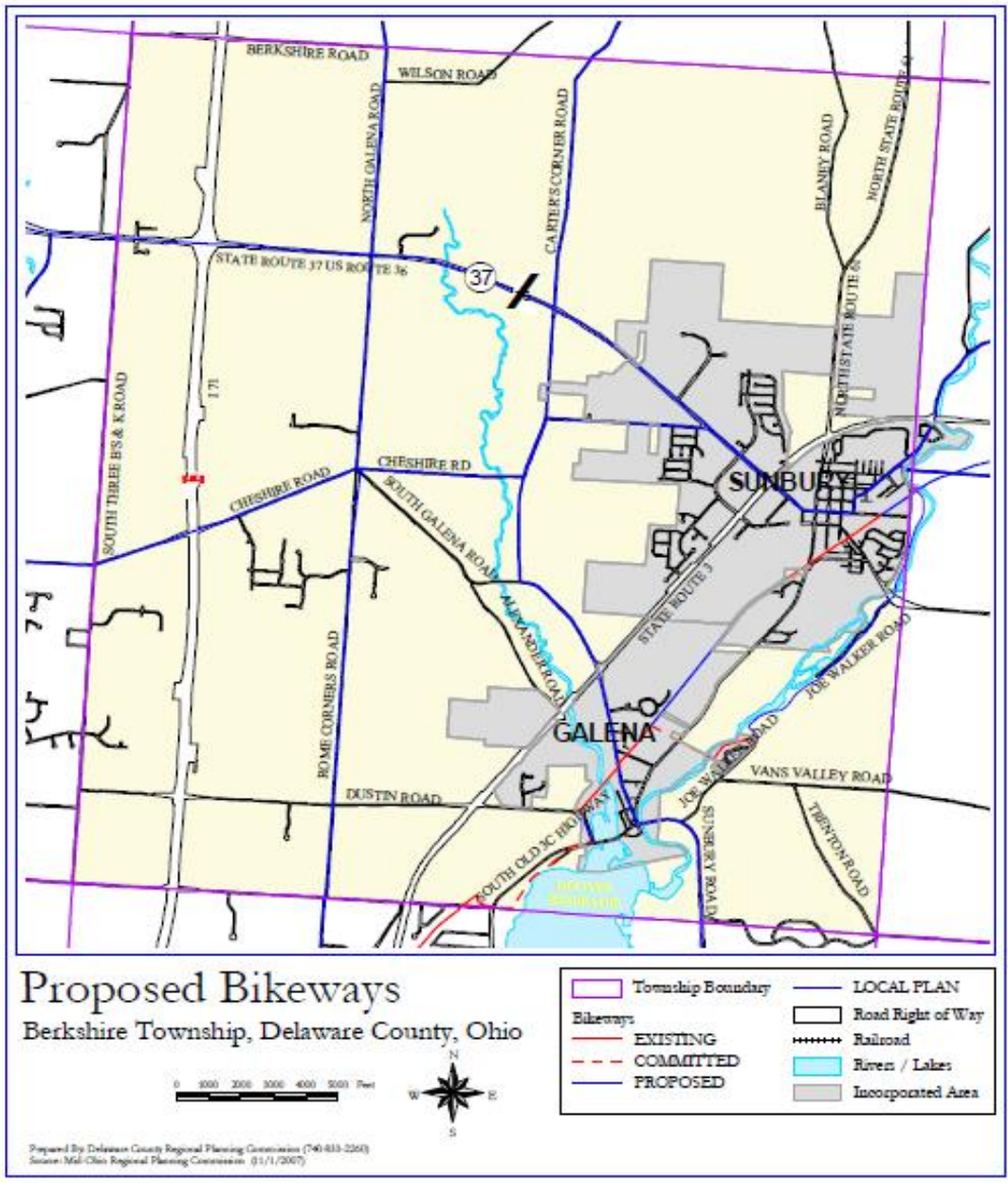
(kDVMT = Thousands of Daily Vehicle Miles Traveled)
2013 Delaware County total county 5161.72



Source: Ohio Department of Transportation at: <http://www.dot.state.oh.us/Divisions/Planning/TechServ/traffic/Pages/DVMT.aspx>

Means of transportation ²³	Number	Percentage
Drove a car alone	49,800	86%
Carpooled	4,057	7%
Bus or trolley bus	174	
Motorcycle	41	
Bicycle	29	
Walked	816	
Other means	257	
Worked at home	2,638	5%

APPENDIX F: Berkshire Township, Delaware County, Proposed Bikeway²⁴



APPENDIX G: Delaware County Parks and Trails

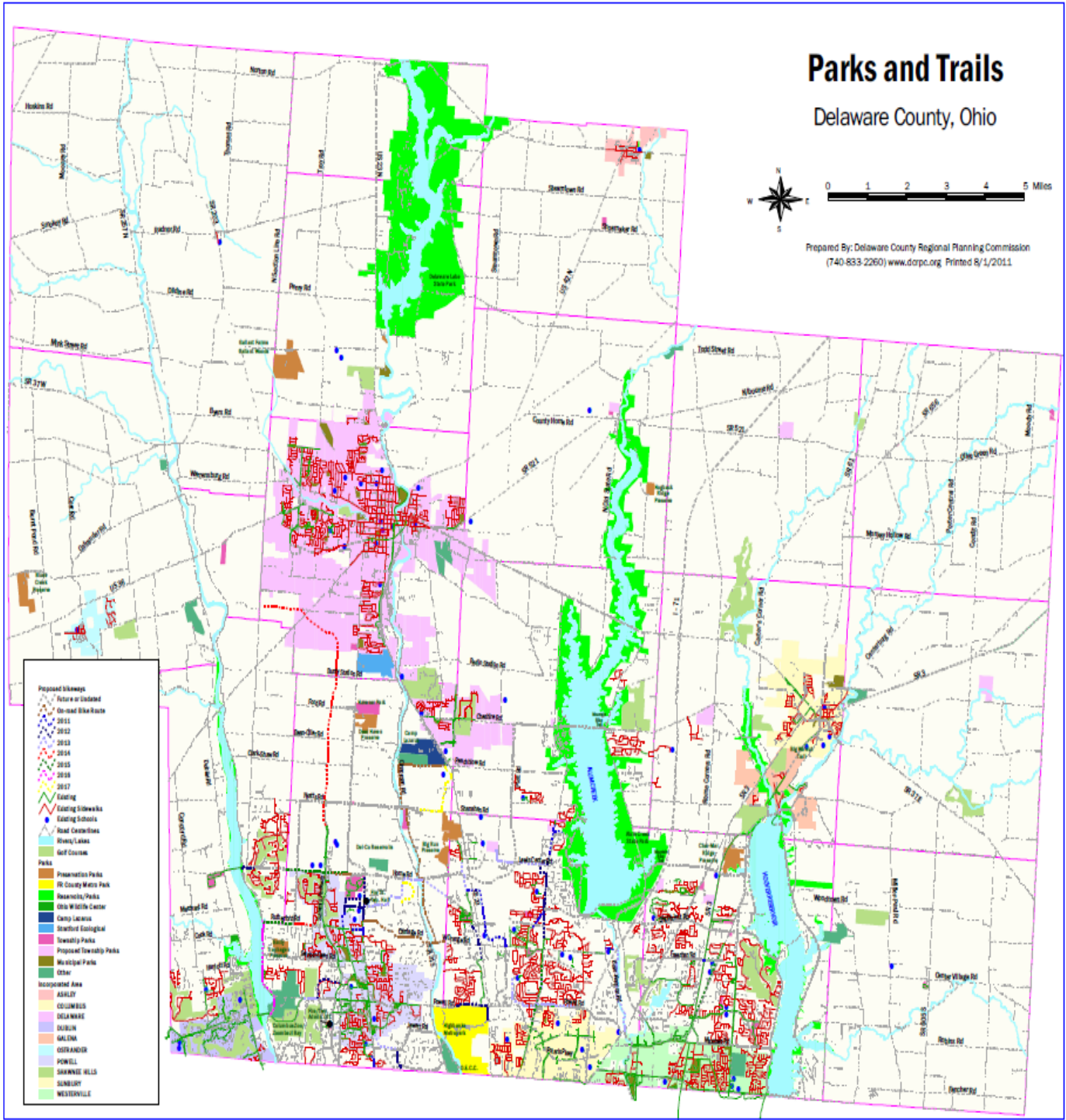
Parks and Trails

Delaware County, Ohio



0 1 2 3 4 5 Miles

Prepared By: Delaware County Regional Planning Commission
(740-833-2260) www.dorpc.org Printed 8/1/2011



HIA Screening Worksheet

Screening Questions	Response and Supporting Facts
<p>Project and Timing</p> <p><i>Has a project, plan or policy been proposed?</i></p> <p><i>Is there sufficient time to conduct an analysis before the final decision is made?</i></p>	<p>Yes, the proposed property for the outlet mall was rezoned from agricultural to commercial in June 2013.</p> <p>Yes, development plans have not been started yet. Mall to open in December 2014.</p>
<p>Health Impacts</p> <p><i>Does the decision have the potential to affect environmental or social determinants that impact health outcomes? If so, which determinants and which health outcomes?</i></p> <p><i>Would health inequities be impacted? In what ways?</i></p> <p><i>Are the proposal's impacts to health likely to be significant in terms of the number of people impacted, the magnitude, breadth and/or immediacy of impacts?</i></p> <p><i>Do evidence, expertise, and/or research methods exist to analyze health impacts of the decision?</i></p>	<p>Yes, the decision has the potential to affect the quality of air, water, noise level, traffic congestion, food choice, transportation. The potential health effects include increases in asthma, obesity/overweight and stress and its associated health-related outcomes.</p> <p>Yes, health inequities would be impacted since children and young adults in Delaware County have higher incidence of asthma. Also, adults in Delaware County have higher incidence of obesity/overweight.</p> <p>Yes, if an HIA is implemented on this project, it could have an impact on all development in Delaware County since it would set a precedent. And also affect residents in the vicinity and also other areas who may shop, and work at the mall.</p> <p>Yes, there are many evidence-based models available to evaluate air, water, noise, and traffic.</p>
<p>Potential Impact of HIA Findings</p> <p><i>Is health already being considered in the proposal or as part of the decision-making process?</i></p> <p><i>Are the links between the proposal and health or health determinants clear?</i></p> <p><i>Is the decision-making process open to the HIA and/or recommendations for changes to design, mitigations and/or alternatives?</i></p> <p><i>If applied, would HIA findings and recommendations potentially improve the impact that the proposal has on health?</i></p>	<p>The developer of the outlet mall sent our office an e-mail and has agreed to work with us on HIA and health impacts of the mall.</p> <p>Yes, the links between the proposed outlet mall and health determinants are clear such as potential traffic injuries, accidents, and fatalities; increases in cardio and respiratory complications due to air quality.</p> <p>Yes, the HIA findings and recommendations would improve the health impacts from the development by considering active transportation, resolution and/or reduction in the impact of to traffic flow patterns, air, water, noise, food choices and light pollution.</p>
<p>Potential Impact of the HIA Process</p> <p><i>What are the potential impacts of the HIA process? (e.g., building relationships, empowering community members, demonstrating how health can be used in decision making)</i></p>	<p>This HIA would be the first Delaware County endeavor to assist the community stakeholders to come together and evaluate the potential health impacts to the county residents and make recommendations to improve this outlet mall and become an impetus for other built environmental proposals.</p>
<p>Stakeholder Interest and Capacity</p> <p><i>Have public concerns about the health impacts of the decision been voiced or documented?</i></p> <p><i>Who are the stakeholders and interest groups involved in the decision-making process?</i></p> <p><i>Do stakeholders have the interest to participate in the HIA?</i></p> <p><i>Do stakeholders have the capacity (resources, skills, etc.) to participate in the HIA?</i></p> <p><i>Would stakeholders use the HIA to inform or influence the decision-making process? How?</i></p>	<p>Yes, residents have voiced their concerns at Township Trustees meeting and also during the developer's Resident Advisory Group meeting. Their concerns are associated with increased traffic congestion and associated stress. The stakeholder and interested groups include Residents Advisory Group, County Engineer, Regional Planning Commission, Ohio Dept. of Transportation, Ohio EPA, Sheriffs Office, Delaware General Health District, County Commissioners, Preservation Parks of Delaware County, Berkshire Township Trustees.</p> <p>Several stakeholders have attended HIA training sponsored by the Delaware General Health District.</p> <p>The stakeholders would serve on an HIA Advisory Group to influence the decision-making process.</p>

**Berkshire Township Outlet Mall Meeting
January 16, 2013, 8:00 a.m. - 10:00 a.m.
Bent Tree Golf Course, Sunbury, OH**

Name	Affiliation
Alan Gilbert	Resident
Brian Tatman	ODOT
Carla Geraci	Resident
Carol Deyo	Resident
Cindy Hall	Big Walnut Chamber of Commerce
Ginny Berry	DATA bus
Dave Efland	Delaware City Planner
Gus Comstock	Economic Development Director
Jack Kolesar	Resident
Jeff George	Berkshire Township Zoning
John Villapiano	Simon Group
Kelly Thiel	Ohio EPA
Mary VanHaافتن	Preservation Parks of Delaware County
Michele Shough	ODH
Mike Dattilo	Resident
Mike Sapp	Ohio EPA
Milt Link	Delaware Soil and Water Conservation District
Nancy Shapiro	Health District
Paul Wise	Genoa Township
Rob Riley	County Engineers Office
Rod Myers	Berkshire Township Trustee
Rosemary Chaudry	Health District
Scott Sanders	Delaware County Regional Planning Commission
Shawna Burkham	Resident
Shelia Hiddleston	Health Commissioner
Steve Masters	Resident
Susan Stanton	Resident
Susan Sutherland	Health District
Ted Miller	Preservation Parks of Delaware County
William Holtry	Berkshire Township Trustee

The meeting started with an introduction and welcome by Health Commissioner, Shelia Hiddleston. She also briefly explained the HIA process and how it will be utilized in this situation.

William Holty, Berkshire Township Trustee reported that currently Berkshire Township includes 6,000 acres, and the proposed outlet mall will take about 200 acres. He said that this will be a good tax base for the Township. There are about 2,500 people who reside in the township. He felt that the residents could not afford the amount of property tax increase to keep up with the necessary progression of things. He said that they needed an income generator to do that such as the outlet mall. A tax increment financing (TIF) may be used to come up with the funds to build a new exit ramp. The new Interchange will cost between \$100-\$140 million dollars to build. He said that the Township was also looking at the need of a new high school. The Township would also like to have trees, bike paths, and sidewalks in the vicinity of the outlet mall. Widening the road by the outlet mall on Africa Road near North and South Galena Road would cost about \$25-430 million. And to think big picture and widening the road to Sunbury would cost roughly \$200-\$225 million. Some of the money needed to build the exit ramp would be generated by sales tax; therefore, property taxes should not go up. There are discussions about putting in a Sheriff's substation in the Township as well; the Sheriff's office is open to this idea. Other items to consider are sewer, water, police, and fire. The priorities of the Township are 1.) Build a second exit ramp as soon as possible; 2.) Build a Police Department substation 3.) Protect taxes at the current rate.

Rob Riley, County Engineers' Office reported that a Traffic Impact Study was done by the Trans Associates Engineering Consultants, Inc. The Traffic Impact Study evaluated the 5 intersections impacted by the Premium Outlet Mall development. It was estimated that there would be 2,500 trips per hour during peak at entire site (this is both directions during afternoon rush hour.) There would be 300,000 square foot of office space, amounting to roughly 5-6 buildings.

There are discussion concerning a north versus south interchange or combination of both and the impact to east versus west; the funding needs to be identified first. The Federal Highway Administration in Washington must approve the exit ramp structure and location.

Most traffic flow for the Premium Outlet Mall would occur during week days in the afternoon and on weekends. The Traffic Impact Study does not include pedestrian traffic. But the County will be working with the Township and Delaware County Regional Planning Commission on design of the area. They are looking at pedestrian, and bicycle safety issues. Separating the trucks and the cars at that intersection is a challenge and adding a burden to traffic flow and safety. All improvements will need to be made before the outlet mall is opened, tentatively scheduled for summer 2015.

A Berkshire Township Comprehensive Plan is being updated for the outlet mall with 5-, 10-, 15-year conditions as the 200-acres gets built out.

Everyone at the meeting was in agreement that the scope of the HIA would be traffic in regards to congestion, injuries and fatalities, and connectivity in regards to safe mobility, walkability, and bikeability.

It was suggested to review Complete Streets policies. It was stated that Mid-Ohio Regional Planning Commission provides grant funding for communities who adopt Complete Street policies.

It was suggested to do a walkability study/audit in order to obtain data on baseline conditions and to provide recommendations for updating the Berkshire Township Comprehensive Plan by the Delaware County Regional Planning Commission.

Preservation Parks of Delaware County stated that they have been doing research on east–west connectivity, which is critically limited by Interstate 71. With the installation of the new ramp, it would be something to consider at that point.

APPENDIX I: Scoping Worksheet

Project:	Delaware County Outlet Mall Development	
Health Determinant:	Traffic	
Geographic Scope:	Mall location and surrounding area (I-71 and SR 36/37 east)	
Existing Conditions Research Questions	Impact Research Questions	Indicators
Proximate Effects		
What is traffic like now?	What will traffic be like if the outlet mall(s) are built?	# of cars/trucks; Average Annual Daily Traffic (AADT); auto Level of Service (LOS)
What is the road pattern now?	How will the road pattern change (location and type of road built, etc)?	maps
What types of access are there now for cars, public transit, bikes, and pedestrians to the study area?	What types of access will there be for all forms of transportation should the outlet mall be built?	maps
How many people walk, bike, or take public transit now in the study area and near the study area (to work and for recreation)?	How many people will take alternative forms of transportation when the outlet mall is built (to work; to the mall; for recreation)?	% of people walking, biking, taking public transportation to work and for recreation
How many traffic collisions (vehicle/vehicle; vehicle/ped; vehicle/bike) are there currently in the study area (location and amount)?	How will the Mall change the number and location of traffic collisions?	# of collisions; map of collision hot spots
What is congestion like now in the study area?	How will the traffic the Mall creates change congestion?	traffic models
What is the air quality in the study area like now?	How will the air quality change?	PM2.5; NOx; other elements in air that are pertinent to health

Health Outcomes		
Existing Conditions Research Questions	Impact Research Questions	Indicators
How many injuries and fatalities are there currently from collisions in the study area (cars/trucks vs. cars/trucks; vehicle vs. pedestrian; vehicle vs. bicycle)	When the mall is built, how many injuries and fatalities from vehicle collisions will there be?	# of fatalities; # of injuries

What is the incidence/prevalence of respiratory disease in the study area?	How will changes in air quality due to traffic change the incidence/prevalence of respiratory disease?	asthma hospitalizations; hospitalizations for upper respiratory disease.
Vulnerable populations		
Persons suffering from cardiovascular diseases are more vulnerable to particles and those suffering from respiratory diseases such as asthma are more vulnerable to several air pollutants; children; elderly		

APPENDIX J: Pedestrian Environmental Quality Index (PEQI)

Pedestrian Environmental Quality Index (PEQI)

Date entered into database: ___/___/___

Street & Intersection Audit Form

Project: _____

Survey Date: _____

Auditor(s): _____

INTERSECTION

This is the intersection of: (Primary) and: (Secondary)
 Intersection CNN: (The street you plan to walk down) (The street you will cross)

Are these two lane or one lane streets and alleys? Yes No Street type

	All ways	1 missing	2 missing	3 missing	None
1. Crosswalks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. High visibility crosswalks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4+ streetlights	3 streetlights	2 streetlights	1 streetlight	None
3. Intersection lighting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Traffic Signal	Stop All Way	Yield (no roundabout)	Roundabout	Uncontrolled
4. Traffic Control	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Skip questions 5-8 unless there is a traffic signal

5a. Is there a signal for pedestrians? All ways Some ways None

5b. If YES does the signal count down? All ways Some ways None

6. Wait time (seconds)

7. Time to Cross (seconds)

8. Crossing Distance (feet)

9. Pedestrian Refuge Island None Yes, 4 ft or narrower Yes, wider than 4 ft

10. Curb ramps Missing one or more ramp All corners ramped

11. Intersection traffic calming features a) Raised crosswalks e) Diagonal diverter
 Check all that apply. b) Pavement treatments f) Partial closure
 TOTAL # _____ c) Bike lane thru intersection g) Traffic calming circle
 d) Bulb-outs h) Mini-circle

12. Pedestrian Engineering Countermeasures d) Crosswalk scramble
 Check all that apply. a) Flashing beacon e) Red visibility curb
 TOTAL # _____ b) No Turn on Red Signs f) Advanced stop/yield lines
 c) Additional signs g) Pedestrian leading interval

STREET SEGMENT

This street is: (Primary) between: (Street #1) and: (Street #2)
 Side A CNN: Side B CNN: Street type:

13. Number of lanes: Shared / pedestrian only street 1 2 3 4+

14. Posted speed limit: 25 mph / none posted Under 25 mph Over 25 mph

15. Street traffic calming features a) Trees in median c) Speed enforcement
 Check all that apply. b) Speed hump / bump d) Protected bike lane
 TOTAL # _____ e) Chicane

Please indicate whether Side A and Side B are North, South, East, or West relative to the street centerline.

SIDE A | **SIDE B**
N / S / E / W | **N / S / E / W**

For questions 16-22 you will select one answer for each side of the street

16. Continuous sidewalk	No <input type="checkbox"/> Yes <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
17. Width of sidewalk <i>(if no sidewalk, skip #17-20, this side)</i>	Less than 5 ft <input type="checkbox"/> 5 ft to 8 ft <input type="checkbox"/> 8 ft to 12 ft <input type="checkbox"/> 12 ft or more <input type="checkbox"/>	Less than 5 ft <input type="checkbox"/> 5 ft to 8 ft <input type="checkbox"/> 8 ft to 12 ft <input type="checkbox"/> 12 ft or more <input type="checkbox"/> <i>(if no sidewalk, skip #17-20, this side)</i>
18. Width of throughway <i>The throughway is the part without furniture, signs, plantings, newspaper or utility boxes.</i>	Less than 4 ft <input type="checkbox"/> 4 ft to 6 ft <input type="checkbox"/> 6 ft to 8 ft <input type="checkbox"/> 8 ft or more <input type="checkbox"/>	Less than 4 ft <input type="checkbox"/> 4 ft to 6 ft <input type="checkbox"/> 6 ft to 8 ft <input type="checkbox"/> 8 ft or more <input type="checkbox"/>
19. Large sidewalk obstructions: <i>An obstruction is any object in the throughway.</i>	None <input type="checkbox"/> Temporary <input type="checkbox"/> Permanent <input type="checkbox"/>	None <input type="checkbox"/> Temporary <input type="checkbox"/> Permanent <input type="checkbox"/>
20. Sidewalk impediments: <i>Anything that poses a tripping hazard.</i>	None <input type="checkbox"/> Minor <input type="checkbox"/> Significant <input type="checkbox"/>	None <input type="checkbox"/> Minor <input type="checkbox"/> Significant <input type="checkbox"/>
21. Trees	None <input type="checkbox"/> Sporadically lined <input type="checkbox"/> Continuously lined <input type="checkbox"/>	None <input type="checkbox"/> Sporadically lined <input type="checkbox"/> Continuously lined <input type="checkbox"/>
22. Driveway cuts	<input type="checkbox"/> None <input type="checkbox"/> 1-5 <input type="checkbox"/> > 5	<input type="checkbox"/> None <input type="checkbox"/> 1-5 <input type="checkbox"/> > 5

For questions 23-26, check Yes or No on each side:

23. Presence of buffers <i>Check all that apply.</i>	Non-peak parallel parking <input type="checkbox"/> <input type="checkbox"/> Parallel parking <input type="checkbox"/> <input type="checkbox"/> Bike lane <input type="checkbox"/> <input type="checkbox"/>	Yes No <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	24. Planters and gardens <input type="checkbox"/> <input type="checkbox"/>	Yes No <input type="checkbox"/> <input type="checkbox"/>
25. Public seating	<input type="checkbox"/> <input type="checkbox"/>	Yes No <input type="checkbox"/> <input type="checkbox"/>	26. Public art/historical sites	Yes No <input type="checkbox"/> <input type="checkbox"/>

For questions 27-28, select one answer for each side of the street:

27. Retail use and public places <i>Retail that covers an entire block counts as three or more.</i>	None <input type="checkbox"/> 1 or 2 <input type="checkbox"/> 3 or more <input type="checkbox"/>	None <input type="checkbox"/> 1 or 2 <input type="checkbox"/> 3 or more <input type="checkbox"/>
28. Pedestrian-scale lighting	None <input type="checkbox"/> Sporadic <input type="checkbox"/> Continuous <input type="checkbox"/>	None <input type="checkbox"/> Sporadic <input type="checkbox"/> Continuous <input type="checkbox"/>

For questions 29-31, check Yes or No on each side:

29. Illegal graffiti <i>Select NO if there is only a little</i>	<input type="checkbox"/> <input type="checkbox"/>	Yes No <input type="checkbox"/> <input type="checkbox"/>	30. Litter <i>Select NO if there is only a little</i>	Yes No <input type="checkbox"/> <input type="checkbox"/>
31. Empty spaces <i>Check all that apply</i>	Abandoned buildings <input type="checkbox"/> Vacant lots <input type="checkbox"/> Parking lots <input type="checkbox"/> Construction sites <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Abandoned buildings <input type="checkbox"/> Vacant lots <input type="checkbox"/> Parking lots <input type="checkbox"/> Construction sites <input type="checkbox"/>	Yes No <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

APPENDIX K: Bicycle Environmental Quality Index (BEQI) Audit Form

Bicycle Environmental Quality Index (BEQI):

Neighborhood: _____ Surveyed By: _____ Survey Date: _____
 Project: _____ Date Entered into Database: _____

INTERSECTIONS

Intersection CNN #: _____ Primary Street: _____
 Secondary Street: _____

Domain:	Indicator:	Indicator Values:		Comments:	
Intersection Design:	1. Left Turn Bicycle Lane:	0	3		
		1	4		
		2			
	2. Dashed Intersection Bicycle Lane:	0	3		
		1	4		
		2			
3. No Turn on Red Sign(s):	0	3			
	1	4			
	2				

STREETS

Street: _____ CNN #: _____
 Cross Street #1: _____ Cross Street #2: _____

Domain:	Indicator:	Indicator Values:		Comments:	
Vehicle Traffic: <input type="checkbox"/>	4. Number of Lanes: (not including turning only lanes)	4 + Lanes			
		3 Lanes			
		2 Lanes			
		1 Lane			
		No Lanes			

<input type="checkbox"/>	5. Vehicle Speed - Is there a posted speed limit?	Yes			Note: San Francisco default street speed limit is 25 mph.	
		No				
	Speed Limit:	10 mph		35 mph		
		15 mph		40 mph		
		20 mph		45 mph		
		25 mph		50 mph		
		30 mph		55 mph		
		>55 mph				

<input type="checkbox"/>	6. Traffic Calming Features:	0 TCF		
		1-2 TCFs		
		3-4 TCFs		
		5 or more TCFs		

Check all that apply:^{*}
^{*} See BEQI manual for illustrations/definitions.
^{**} Intersection TCF

<input type="checkbox"/> Curb extensions or bulbouts**	<input type="checkbox"/> Pavement Treatments, Lights**	<input type="checkbox"/> Street Medians (w/ or without trees)
<input type="checkbox"/> Partial Closures**	<input type="checkbox"/> Speed Tables**	<input type="checkbox"/> Speed Limit
<input type="checkbox"/> Roundabouts**	<input type="checkbox"/> Speed Humps**	<input type="checkbox"/> Chicanes
<input type="checkbox"/> Semi-diverters**	<input type="checkbox"/> Mini-Circles **	<input type="checkbox"/> Rumble Strips

NOTE: From this point on, street conditions on each side of the street are recorded separately.
 Northern or Eastern side = N/E; Southern or Western side = S/W.

		N/E	S/W	Comments:	
<input type="checkbox"/>	7. Parallel Parking Adjacent to Bicycle Lane/Route:	Parallel Parking - not time restricted (PP) < 7ft			Note: Street cleaning restrictions do not count as time-restricted parallel parking.
		Parallel Parking - not time restricted (PP) 7ft - 9ft			
		Parallel Parking - not time restricted (PP) > 9ft			
		Time-restricted Parallel Parking (TPP) < 7ft			
		Time-restricted Parallel Parking (TPP) 7ft - 9ft			
		Time-restricted Parallel Parking (TPP) > 9ft			
		None			

: should be able to observe while standing in one place : assessed while walking along the street

Domain:	Indicator:	Indicator Values:	N/E	S/W	Comments:	
Street Design:	8. Presence of a Marked Area for Bicycle Traffic:	1. Bike Lane w/ Parking Adjacent to Right				
		2. Bike Lane w/ Sidewalk or Curb Adjacent to Right (without parking)				
		3. Bike Lane w/ HOV or Public Transit Adjacent to Right				
		4. Bike Lane w/ Traffic Lane Adjacent to Right				
		5. Shared Traffic Lane With Sharrow (or Painted Bike Marking on Pavement)	# of Sharrows: N - S -			
		6. Bike Path				
		7. None				
9. Width of Bike Lane:	> 6 ft					
	5 - 6 ft					
	<5 ft					
	None					
10. Bicycle Lane Markings:	One Stripe, Left Side of Bike Lane					
	Stripes on Both Sides of Bike Lane					
	None					
11. Trees:	Continuously Lined					
	Sporadically Lined					
	None					
12. Connectivity of Bicycle Lanes: (e.g. bike lane or sharrows)	Yes					
	No					
13. Pavement Type/Condition:	Smooth Surface					
	Mild Obstructions (e.g., cracks)					
	Medium Obstructions (e.g., Raised cracks or raised pavement parallel to street)					
	Large Obstructions (e.g., Potholes or Bumps)					
14. Driveway Cuts: (Please enter count and check a category)	Enter Count (#):				Note: Parking garages count as 2 (i.e., vehicle entry and exit in same driveway = 2 cuts)	
	5 or more					
	Few (less than 5)					
	None					
Safety/Other:	15. Bicycle/Ped Scale Street Lighting Present:	Yes, Pedestrian Lighting				
		Yes, Private (business or residential building)				
		Yes, Pedestrian and Private Lighting				
		No				
16. Presence of Bicycle Lane Signs:	Yes					
	No					
Adjacent Land Use:	17. Line of Site:	Line of Sight Obstructed or Compromised				
		Adequate Distance				
		Clear Line of Sight				
18. Bicycle Parking:	Yes					
	No					
19. Storefront/ Retail Use:	3 or More				Note: This should reflect <u>businesses only</u> . Include <u>ground floor</u> businesses with window treatments, displays and open shades.	
	1 or 2					
	0					

: should be able to observe while standing in one place

: assessed while walking along the street

MORPC Complete Streets Policy

1. Background

MORPC has long been a proponent of creating a multimodal, safe and efficient transportation system that ensures accessibility to all roadway users. In order to increase the number of projects that provide bicycle and pedestrian facilities in central Ohio, MORPC adopted a Routine Accommodation policy in 2004. This policy recognized the importance of and encouraged the construction of non-motorist facilities by putting a mechanism in place that required all project sponsors receiving MORPC-attributable federal funding to provide bicycle and pedestrian facilities in their design and construction phases as appropriate.

Since 2004, MORPC has engaged in intensive research to better understand how it can help make the region as attractive, livable, and prosperous as possible. The foundation of this research was a multifaceted growth strategy called *Regional Connections*. The objectives of *Regional Connections* were to create an understanding of central Ohio's anticipated growth over the next 20 to 30 years, and to formulate a strategy to address this growth in a way that would enhance the region aesthetically and economically. In 2007, MORPC adopted the recommendations of *Regional Connections* as "a significant guiding framework for Commission policy decisions."

This Complete Streets policy builds upon these efforts and promotes a multimodal transportation system that is integrated with sustainable land use developments. Its main objective is to design and build roads that safely and comfortably accommodate all users of roadways, including motorists, cyclists, pedestrians, transit and school bus riders, delivery and service personnel, freight haulers, and emergency responders. It includes people of all ages and abilities.

Building complete streets provides many benefits to residents, business owners, developers, and the community as a whole. First and foremost, embracing the complete streets concept will create balanced transportation systems by providing accessible, safe, and efficient connections between destinations. It will bolster economic growth and stability while increasing property values. It will ensure job growth, reduce crashes through safety improvements, improve public health and fitness, reduce harmful emissions, and reduce the overall demand on our roadways by allowing people to replace motor vehicle trips with active transportation options. Secondly, integrating sidewalks, bike facilities, transit amenities, or safe crossings into the initial design of a project spares the expense and complications of retrofits later.

2. Definition

Complete Streets are roadways designed to safely and comfortably accommodate all users, including, but not limited to motorists, cyclists, pedestrians, transit and school bus riders, delivery and service personnel, freight haulers, and emergency responders. "All users" includes people of all ages and abilities.

3. Vision/Purpose

To create an equitable, balanced, and effective transportation system where every roadway user can travel safely and comfortably and where sustainable transportation options are available to everyone.

The **goals** of this Complete Streets Policy are:

- 1) To create a comprehensive, integrated, and connected transportation network that supports compact, sustainable development and provides livable communities.

- 2) To ensure safety, ease of use, and ease of transfer between modes for all users of the transportation system.
- 3) To provide flexibility for different types of streets, areas, and users.

4. Policy

Policy Statement

1. MORPC will promote the Complete Streets concept throughout the region and, therefore, recommends that all local jurisdictions and the state adopt comprehensive Complete Streets policies, consistent with the Regional Policy. MORPC will seek incorporation of the Complete Streets concept and policy into the development of all transportation infrastructures within the region at all phases of their development, including planning and land use control, scoping, design approvals, implementation, and performance monitoring.
2. MORPC requires that all projects receiving MORPC-attributable federal funding adhere to this policy. MORPC members receiving MORPC-attributable federal funding shall fill out the checklist accompanying this policy. More information on the review and appeals process is available in the Applicability section. Projects utilizing any other funding sources are also encouraged to adhere to this policy.

Applicability

This Complete Streets Policy applies to all projects, including the new construction, reconstruction, rehabilitation, repair, maintenance, or planning of roadways, trails and other transportation facilities that will use federal funds allocated through MORPC.

Review process - The following three steps will be part of the general review process of MORPC-funded projects. A MORPC checklist accompanying the policy was developed to guide project sponsors through the project definition, scoping, funding application, and project design stages.

Step 1: As described in MORPC's funding application process, MORPC staff will perform an initial screening of new requests and discuss with the applicants the competitiveness of their requests in comparison to other projects and available funding. MORPC staff will also be available to discuss the different ways of adhering to the Complete Streets policy and provide technical assistance.

Step 2: Projects sponsors applying for MORPC-attributable federal funding will be asked to provide a statement that their project will comply with the Complete Streets policy by accommodating all users as reasonably as possible. Questions as shown in the Complete Streets checklist *Section A* are only informational. Applicants will respond to these questions as part of completing the funding application itself.

Step 3: After MORPC has committed funding to a project, MORPC staff will review the project throughout the design phase to ensure that the requirements are met and to provide assistance where needed. The completion of the answers in *Section B* of the Complete Streets checklist will assist with this process. Because of the flexibility of the policy and the variety of approaches that a sponsor may take to complete a street, MORPC staff, as stewards of the Complete Streets policy, will work with the project sponsor throughout the project development to find an acceptable solution for both parties. MORPC staff will maintain publically available information describing the nature and extent of the compliance with the Complete Streets policy. The appeals process described below would be used in those instances where sponsors and staff cannot reach an agreement.

Appeal process – Project sponsors may request an exemption or re-review of their projects by the Appeals committee if they cannot reach an agreement with MORPC staff.

The Appeals committee is made up of a total of six (6) people who are appointed by the Policy Committee Chair for two years terms. Members may be reappointed for successive terms. The voting membership consists of three (3) representatives of local communities and two (2) public members who are all knowledgeable about transportation design. This committee is supported by one (1) non-voting MORPC staff. The Appeals committee will meet on an “as needed” basis. MORPC staff will review the requests initially and provide a report with recommendations to the committee in advance of each meeting. The applicant will have the opportunity to review the report and add comments to it prior to its submittal to the committee. During each meeting the committee shall discuss and evaluate the request(s) and vote on a recommendation. The committee may invite the applicant to attend the meeting(s).

A quorum will consist of at least three (3) voting members, and a majority of the voting members of the full appeals committee is needed to act. Members with conflicts of interest on a particular project before the committee must recuse themselves from deliberation on that project. In the event that the sponsor disagrees with the action of the Appeals committee, the sponsor may appeal to the MORPC Policy Committee officers who may or may not elect to hear the appeal request.

Instead of an exemption, the Appeals committee may also suggest a lesser level of accommodation. All exemptions will be kept on record and made publicly available. Over the next year, MORPC staff will prepare an exemption document that will help streamline the appeals process. Exceptions would account for issues of prohibitive costs, highways or other roads where pedestrians are not allowed, and other justifiable reasons that arise during development of projects with allocated MORPC funds.

Requirements

- Each project shall use the most appropriate design standards and procedures. For projects using MORPC attributable federal funding, it will be necessary to meet or exceed standards and procedures acceptable to the Ohio and U.S. Departments of Transportation, such as the Ohio Department of Transportation’s Project Development Process and Location & Design Manual.
- Project sponsors shall fill out Section B of the checklist accompanying this policy and provide completed form to MORPC.
- Designs shall include accommodation of all users and be sensitive to the context of the project setting. It is important to note that Complete Streets may look different for every project and road type. For example, wide lanes or paved shoulders may be sufficient in a rural area, whereas sidewalks and/or bike lanes are needed in an urban setting. Also, when re-striping projects are considered, where the right-of-way will not change, options such as bike lanes, sharrows, and pedestrian crosswalks could still be implemented. More information and examples will be provided as part of the checklist and toolkit.
- A systems approach shall be used in developing roadway projects, especially to ensure coordination with nearby jurisdictions, projects, and plans irrespective of the project sponsor.
- If there is another project planned or in development near this project the two should be coordinated to ensure consistency in the facilities serving the corridor.
- Logical termini should be chosen to include connections through “pinch points,” such as overpasses, railroad crossings, and bridges. Logical termini should not be chosen so that the project ends before such a “pinch point” unless there is a compelling reason to do so.

- If the project serves a destination point, such as a school, recreational facility, shopping center, hospital, or office complex, the project shall provide the opportunity for the destination to have access to the project's pedestrian and bicycle facilities.
- Every project shall involve the local transit agency in the design process to ensure that sufficient accommodation of transit vehicles and access to transit facilities is provided. The project sponsor shall provide the local transit agency during Step 1 of the Project Development Process the opportunity to participate throughout the entire process.
- Public transit facilities shall be designed with the goals of Complete Streets in mind, by including sidewalks, bicycle connections, or secure bicycle parking, among others.
- Every project shall provide the opportunity for utility/telecommunications infrastructure to be appropriately accommodated to allow for existing and future growth. Efficient use of right-of-way during construction and maintenance should be considered to improve access to utility systems, including future broadband networks. This policy is not intended to create new rights for utilities outside those provided by existing law and contract.
- Every project shall ensure that the provision of accommodations for one mode does not prevent safe use by another mode (e.g., a bus shelter should not block the clear walking zone on the sidewalk).

5. Recommendations

- All users should be considered during the entire life cycle of a project, including planning, design, construction, operations, and maintenance.
- Street furniture, such as bike racks or benches, should be considered as part of all projects as long as they do not impede any user.
- When designing a facility that includes or crosses an existing or future transit route, ensure that the appropriate pedestrian and wheelchair access is provided to and from the transit stops.
- Traffic-calming elements including, but not limited to, landscaping, street trees, and narrowing of lanes, should be considered where safe and appropriate.
- Project sponsors should consider including street trees and landscape components, with careful analysis of tree, site, and design considerations.
- Special consideration should be given to future planned facilities or services.
- Each project design should be coordinated with appropriate access management strategies. Access management strategies should consider the placement of sidewalks and ramps to eliminate sight distance issues.
- Although this policy focuses on engineering projects, the project sponsor should provide education, encouragement, and enforcement strategies during or after the project. The education component should include government officials, developers, and the public. A toolkit designed by MORPC staff will provide best practices, ideas, and resources to help with these efforts (see Implementation section).
- While this policy focuses on transportation, local governments should review their land use and zoning policies to provide for mixed land use developments and projects that provide direct non-vehicular connections within a given development.
- Each local community should regularly update its project design standards and procedures and train its staff to adhere to them.

- Local governments are encouraged to adopt their own Complete Streets policies, consistent with this regional policy and federal and state design standards. State governments should work with the local Metropolitan Planning Organizations to ensure consistency in policies at the state, regional and local level.

6. Implementation

Upon approval and adoption of this Complete Streets policy, it will become part of MORPC's planning process and project selection for MORPC-attributable funding. The principles of this policy will also guide MORPC staff in the preparation of the Regional Transportation Plan and other plans it prepares or to which it contributes.

A toolkit will be developed and provided to each community in modules as they become available. The objective of this toolkit is to assist project sponsors in developing Complete Streets projects. This toolkit will contain model policies, sample design standards, examples for land use and zoning practices, educational and enforcement strategies, and information on other resources.

7. Evaluation

MORPC shall, at a minimum, evaluate this policy and the documents associated with it on an annual basis. This evaluation may include recommendations for amendments to the Complete Streets Policy, including the development of exemption guidance, and subsequently be considered for adoption by the Policy Committee of MORPC utilizing its then current public and member involvement procedures.

APPENDIX M: Menu of Traffic Calming Strategies and Devices

Comparison of Traffic Calming Devices (Kahn and Kahn Goedecke 2011)

Type	Description	Application		Impacts	
		Arterials	Local	Volumes	Speeds
Speed limits	Reduced speed limits	✓	✓	Yes	Yes
Speed alerts, enforcement	Radar-clocked traffic speeds displayed to drivers. Strong speed limit enforcement.	✓	✓	No	Yes
Vehicle restrictions	Limiting vehicle types (trucks) or users (residents only) on specific roads.	✓	✓	Yes	No
Warning signs and gateways	Signs & gateways, indicating changing road conditions, traffic calming, residential or commercial districts	✓	✓	No	Yes
Speed tables, raised crosswalks	Ramped surface above roadway	With caution	✓	Possible	Yes
Median Island	Raised island in the road center (median) narrows lanes and provides pedestrian with a safe place to stop.	✓	✓	No	Yes
Channelization Islands	A raised island that forces traffic in a particular direction, such as right-turn-only	✓	✓	Possible	Yes
Speed humps	Curved 7-10 cm high	✓	✓	Possible	Yes
Rumble Strips	Low bumps across road make noise when driven over.	✓	✓	No	Yes
Mini-circles	Small traffic circles at intersections		✓	Possible	Yes
Roundabouts	Medium to large circles at intersections	✓			Yes
Pavement treatments	Special treatment textures (cobble, bricks, etc.) and markings to designate special areas.	✓	✓	Not likely	Yes
Bike lanes	Marking bike lanes narrow traffic lanes.	✓	✓	No	Possible
Curb extensions (bulbs, chokers)	Extending curb a half-lane into the street to control traffic and reduce pedestrian crossing distances	✓	✓	Possible	Yes
Road diets	Reducing the number of traffic lanes	✓		Yes	Yes
Land narrowings, “pinch points”	Curb extensions, planters, or centerline traffic islands that narrow traffic lanes. Also called “chokers”	✓	✓	Not likely	Yes
Horizontal shifts	Lane centerline that curves and shifts	✓	✓	No	Yes
Chicanes	Curb bulges or planters (usually 3) on alternating sides, forcing motorists to slow down.		✓	Possible	Yes
2-lanes narrow to 1-lane	Curb bulge or center island narrows 2-lane road down to 1-lane, forcing traffic for each direction to take turns.		✓	Possible	Yes
Semi-diverters, partial closures	Restrict entry/exit to/from neighborhood. Limit traffic at intersections.	✓	✓	Yes	Possible
Street closures	Closing off streets to through traffic at intersections or midblock.		✓	Yes	Yes
Stop signs	Additional stop signs, such as 4-way stop intersections		✓	Possible	Yes
“Neotraditional” street design	Streets with narrower lanes, shorter blocks, T-intersections, and other design features to control traffic speed and volumes.	✓	✓	Yes	Yes
TDM	Various strategies to reduce total motor vehicle use.	✓	✓	Yes	No
Woonerf	Very low-speed residential streets with mixed vehicle and pedestrian traffic.		✓	Yes	Yes

Speed Impacts of Traffic Calming Measures (Ewing 1999)

	Sample Size	Avg. Speed Afterward (mph)	Avg. Speed Change	Avg. % Change
12' Humps	179	27.4	-7.6	-22
14' Humps	15	25.6	-7.7	-23
22' Tables	58	30.1	-6.6	-18
Longer Tables	10	31.6	-3.2	-9
Raised Intersections	3	34.3	-0.3	-1
Circles	45	30.2	-3.9	-11
Narrowings	7	32.3	-2.6	-4
One-Lane Slow Points	5	28.6	-4.8	-14
Half Closures	16	26.3	-6.0	-19
Diagonal Diverters	7	27.9	-1.4	-0.5



Speed table (Photo courtesy of Urban Engineers)

Traffic Calming best practices:

1. Traffic Calming planning should include adequate public involvement.
2. Involve experts familiar with the latest Traffic Calming resources and design standards.
3. Planners should consider a variety of Traffic Calming devices, rather than relying on a single type, such as speed humps or rumble strips.
4. Traffic Calming projects should support multiple objectives, including enhanced street aesthetics, improved walking and cycling conditions, as well as controlling traffic speeds.
5. Stop signs should not be used as Traffic Calming devices.
6. Devices that are new to an area should be implemented on a trial basis with adequate signing. For example, the first traffic circles in an area should have signs showing the path vehicles should follow. After a few years such signs become unnecessary.

APPENDIX N. Is My Area Walkable?

Some Questions To Help You Assess The Walkability Of A Locality And How It Can Be Improved.

Anne Matan, Curtin University Sustainability Policy (CUSP) Institute

Use/Network

1. What is the volume of pedestrian traffic on this street? (pedestrian counts)
2. Who are the people using this street? Do they have special walking needs given their age or disability?
3. What is the pedestrian density of particular footpaths (numbers of pedestrians per metre width of footpath per minute)?
4. What are the main pedestrian routes in the area (day time and night time)?
5. What types of pedestrian facilities are in the area (dirt paths, paved footpaths/sidewalks, shared streets, pedestrian only streets, plazas, squares)?
6. What is the length and area of these pedestrian facilities?
7. What are the main arrival and exit points to the area? Are they connected via walkways?
8. How easy is it to walk through the area? (Do test walks to establish this.)
9. How adequate are footpaths/sidewalks in the area?(Some possible problems: no sidewalks, discontinuous, too narrow)
10. What proportion of streets have footpaths/sidewalks?
11. Are the footpaths/sidewalks complete on both sides of streets?
12. Is the footpath/sidewalk provision satisfactory in both major and smaller streets?
13. Are footpaths wide enough to cater for the number of people who walk on them?
14. What are the footpaths/sidewalks made from? (asphalt, concrete, paving bricks, flagstones, dirt, gravel, etc)
15. Are the sidewalks well maintained? (free from cracks, holes, rubbish, etc)
16. Are the block lengths short? (If they are long there may need to be walkways through the block.)
17. Does the pedestrian network connect major areas/destinations in the city?
18. Does the pedestrian network connect to primary destinations such as schools, hospitals, transit stations?
19. Is the pedestrian network itself well connected (with, for example, few pedestrian cul-de-sacs)?

Barriers

1. Is the area accessible to those with disabilities? Are there ramps instead of steps where possible?
2. Are there obstacles on the footpaths (for example, street trade, shanty dwellings, piles of rubbish, parked cars, animals, road or building construction materials, or a large number of poles and signs)?
3. Are there buffers between the road and the footpath, such as fences, bollards, trees, hedges, parked cars and landscaping? (Buffers have advantages and disadvantages, but they can screen walkways from traffic and prevent parking on the walkways.)
4. Are there many small interruptions to the pedestrian networks (e.g., minor road crossings, parking lot crossings, driveway crossings)?
5. Are there other major barriers to walking in the area (major roads, train tracks, rivers, hills, gated land uses, etc)?
6. Does the slope of the area make it hard to walk?

Intersections

1. How convenient is it to cross the street? Where are the pedestrian crossings?
2. What type of traffic intersections are used?
3. Are pedestrians given priority at intersections?
4. What are the crossing aides used at traffic intersections (pavement markings, different road surface or paving, signs, traffic lights, median traffic islands, curb bulbouts, underpasses, overpasses, etc.)?
5. Is crossing made easier either by curb cuts or road raising?
6. How safe is it to cross the street (at designated pedestrian crossings)?
7. Do drivers obey road laws and traffic signals?
8. Are pedestrian crossings clearly marked?
9. Do traffic signals indicate how long you need to wait before crossing, and how much remaining time you have to complete the crossing?

10. Do you need to press a button for a pedestrian signal to permit you to cross?

11. Are there any mid-block crossings? Are these adequate?

Public Transport Connection

1. Is the area connected to public transport? Where are the public transport nodes?

2. Are the public transport waiting areas of high quality (weather protection, information, signage, seating, waste receptacles, etc)?

Land use

1. What are the primary land uses of the area? (This will suggest the numbers of pedestrians at different times of the day.)

2. What are the primary destinations (industrial, commercial, governmental, recreational, community) in the area?

3. What is the population of residents and workers in the area?

Enjoyment

1. What are the main public areas (square, parks, plazas, etc)? Are they public (open to everyone) or private (limited access, controlled use)?

2. What is the quality of the public spaces (comfort, appearance, maintenance, possibilities for use)?

3. How many people are using these spaces? How are they using this space? (can be assessed through stationary activity counts or behavioral mapping)

4. Are there any spaces for children/elderly/youth within the city?

5. Does the area allow for physical activity, play, interaction and/or entertainment?

6. Are there any identifying features in the area (monuments, land marks, neighborhood character)?

7. Is there any indication that one is entering a special district or area? (It's good to have the neighborhood character indicated in some way along the walkway.)

8. Are the walking areas interesting?

9. Are there interesting views?

10. Are there temporary activities in the area (markets, festivals, buskers, street performers, etc)?

11. Does the area allow for resting, for meeting others, for social interaction?

12. Is there adequate greening in the area (plants, trees, etc)?

13. Is the area of a high visual quality (pavements, facades, art, etc)?

Streetscapes

1. Where buildings meet the street, is it clear what is private and what is public space?

2. Are the dimensions of the buildings lining the footpaths at human scale?

3. Are the facades of the buildings lining the street transparent/active (i.e., do the buildings have many doors and windows opening onto the street, 'soft edges', with many niches, detailed facades)?

Infrastructure

1. What is the amount of seating available?

2. Is the seating in the right place (with regard to views, comfort and protection from climatic conditions, located at the edge of spaces)? Does the seating maximize the natural advantages of the area?

3. Are the seating arrangements appropriate (can you talk to friends)?

4. What is the quality of the seating?

5. Are there places to stand? To lean against? Attractive edges?

6. Are waiting areas adequate, providing comfort and protection to pedestrians waiting for transit or to cross the street?

7. Are there enough trash bins?

8. Is there any public art?

9. Are there water fountains?

10. Are there wayfinding devices?

11. Are there public toilets?

Comfort

1. Is there adequate protection from the sun, rain and wind?
2. Is there adequate protection from negative aspects of vehicle traffic (pollution, noise etc)?
3. Are the ambient noise levels low and comfortable?
4. Do the site lines allow you to see where you are going?
5. Is the area well maintained (footpaths, buildings lining the sidewalks, etc)?
6. Is the area clean (free from rubbish, broken glass, inappropriate graffiti)?

Safety

1. Is the area lively and active?
2. Is there street life?
3. Is there passive surveillance of the area? In other words, are there people around to watch out for each other? (This is especially important when it comes to night-time usage.)
4. Is the area safe? (both perceived and real)
5. Is the lighting from street lights and buildings adequate at night time?
6. Are there signs of other people at night time?
7. Are there night time uses of the area?
8. Is there a mix of land uses in the area?
9. Are there many small land uses?
10. Are the facades of buildings 'closed' at night?
11. Is there adequate visibility between modes of transport?
12. Is there protection from vehicle traffic?

Vehicle traffic

1. What is the traffic volume of the street? Does it make it hard/unpleasant for walking?
2. Is there street parking (on/off street)
3. What is the speed limit of the street? Does this make it hard/unpleasant for walking?
4. Are there any traffic calming or traffic control devices in the area?
5. How many lanes of traffic are there?
6. What are the traffic control devices used (traffic lights, stop signs, roundabouts, speed bumps, etc)?

Perception of the area

1. Is the area perceived as safe?
2. Is the area perceived as pleasant?

Elements of pedestrian friendly streets

- Streets that are interconnected and small block patterns that provide good opportunities for pedestrian access and mobility.
- Narrower streets, scaled down for pedestrians and less conducive to high motor vehicle speeds.
- Traffic-calming treatments to help ensure that motor vehicles are operated at or below compatible speeds
- Wide and continuous sidewalks that are fully accessible, that maintain a fairly level cant, and that are well maintained.
- Well-designed and marked crosswalks, both at intersections and, where needed, at mid-block locations.
- Appropriate use of signs and signals for both pedestrians and motorists, with equitable treatment for pedestrians.
- Median islands on wider streets to provide a refuge area for crossing pedestrians.
- Planting buffers, with landscaping and street trees that provide shelter and shade without obstructing sight distances.
- Street furnishings and public art intended to enhance the pedestrian experience, such as benches, trash receptacles, drinking fountains, and newspaper stands, placed so as not to interfere with pedestrian travel.

References for the APPENDICES

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