



Mid-Michigan Health In All Project

# HEALTH IMPACT ASSESSMENT OF THE URBAN AND RURAL SERVICES MANAGEMENT POLICY

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## ACKNOWLEDGEMENT AND DISCLAIMER

The report is the result of a team effort developed at the Ingham County Health Department by the Community Health Assessment and Improvement Team. The Land Use and Health Resource Team members involved include the Tri-County Regional Planning Commission, Michigan State University, the Urban and Rural Service Management Committee, and others listed in the appendix.

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## **HIA STAKEHOLDERS AND PARTNERS**

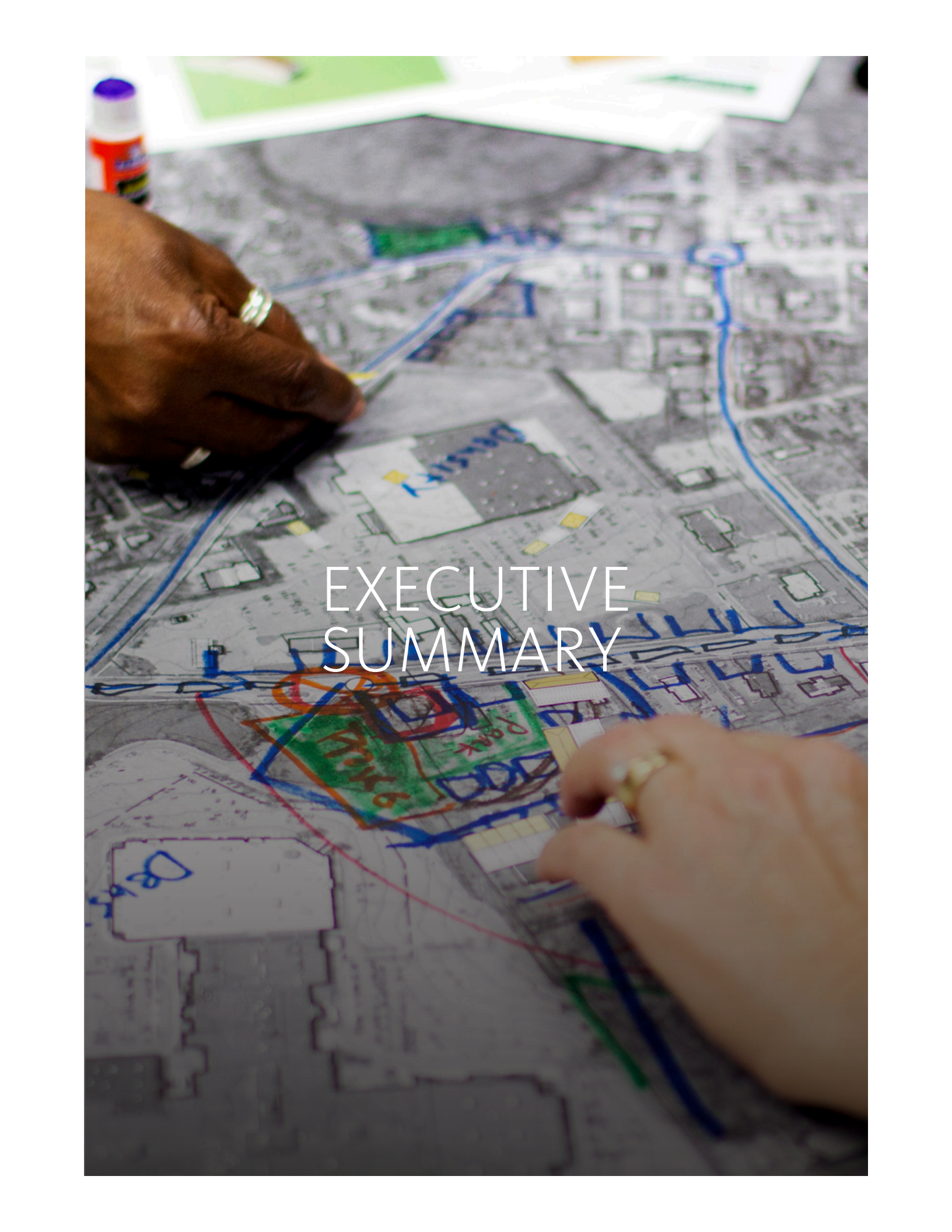
The Mid-Michigan Region Urban and Rural Service Management (URSM) Committee members and other stakeholders participating in the URSM Policy Health Impact Assessment (HIA) development process represented the following government, organizational, and the private sectors.

Tri-County Regional Planning Commission  
Clinton County Board of Commissioners  
Mid-Michigan District Health Department  
Bath Charter Township  
Dallas Township  
DeWitt Charter Township  
Village of Fowler  
Watertown Charter Township  
Eaton County Board of Commissioners  
Barry-Eaton District Health Department  
City of Charlotte  
Delta Charter Township  
Village of Dimondale  
City of Eaton Rapids,  
Eaton Township  
City of Grand Ledge  
Hamlin Township  
Oneida Charter Township  
Windsor Charter Township  
Ingham County Board of Commissioners  
Ingham County Health Department  
Aleidon Charter Township  
Delhi Charter Township  
City of Leslie  
Leslie Charter Township  
City of Mason  
Meridian Charter Township  
Vevay Charter Township  
City of Williamston  
Williamstown Charter Township  
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A hand-drawn map on a grey background, featuring various colored lines (blue, green, orange, red) and labels. The word 'DENSITY' is written in blue in the upper center, and 'PARK' is written in red in a green-shaded area in the lower center. A hand with a ring is visible on the left side, pointing to a specific area on the map. Another hand is visible on the right side, also pointing to a specific area. The map shows a grid of streets and various colored shapes representing different zones or features.

# EXECUTIVE SUMMARY



It is increasingly recognized that many programs and policies once considered incidental to (or even separate from) health can have profound health consequences for local populations.

The health impacts of decisions made by communities, government entities, and the private sector—such as community development, land use, housing, and transportation—go far beyond the basic safety concerns associated with each. For example, decisions on the expansion of urban services like public water and sewer into rural and undeveloped areas in the name of economic development may lead to uncontrolled growth, higher taxes, displacement of poor or elderly residents, and loss of productive farmland, open space, and natural areas. These land-use decisions may disproportionately

affect at-risk populations; adversely affect lifestyle and healthcare choices; expose populations to contaminated air, water, or soils; and ultimately lead to reduced quality of life for individuals or neighborhoods.

In 2006, the Tri-County Regional Planning Commission (TCRPC) released the Tri-County Regional *Growth Plan*, which recommended that growing communities in the region address the economic and environmental costs of uncontrolled growth—often referred to as sprawl—through the adoption of an urban services boundary or management area. An urban services boundary or management area can be a successful tool for managing urban sprawl by placing limits on the location and extent of public services such as water and sewer, telecommunications, and roads. Establishing service management areas may allow a unit

of government to publicly declare that a specific area surrounding a municipality will be the target for urban growth, and thus indicate that areas beyond that boundary will not be supported with public infrastructure services. Limiting water or sewer services, rather than extending them constantly to help support suburban development, typically enforces the boundary lines.

The *Growth Plan* recommended the establishment of an Urban and Rural Services Management (URSM) Policy as a means whereby communities in the mid-Michigan region (also known as the Tri-County Region) might continue to grow economically and provide reliable and sustainable public services such as water and sewer in the urbanized areas of cities, villages, and townships, while protecting farmlands, open spaces, and rural quality of life in undeveloped areas.



Following the release of the *Growth Plan* with its recommendations on how to address sprawl, a number of communities in the mid-Michigan region (primarily those centered in the Greater Lansing area) formed a URSM Policy Committee (TCRPC, 2011). The mission of the committee, which is outlined in the URSM policy statement, is to support the establishment of an urban service management area policy by local communities in the region and provide these communities with tools and policies to:

1. KEEP URBANIZED AREAS VIABLE.
2. PROTECT FARMLAND, OPEN SPACE, AND RURAL QUALITY OF LIFE.
3. PRESERVE PRIORITY CONSERVATION AREAS.
4. UTILIZE EXISTING INFRASTRUCTURE.
5. SAVE COSTS THROUGH INTERGOVERNMENTAL COOPERATION AND ADMINISTRATIVE EFFICIENCY.

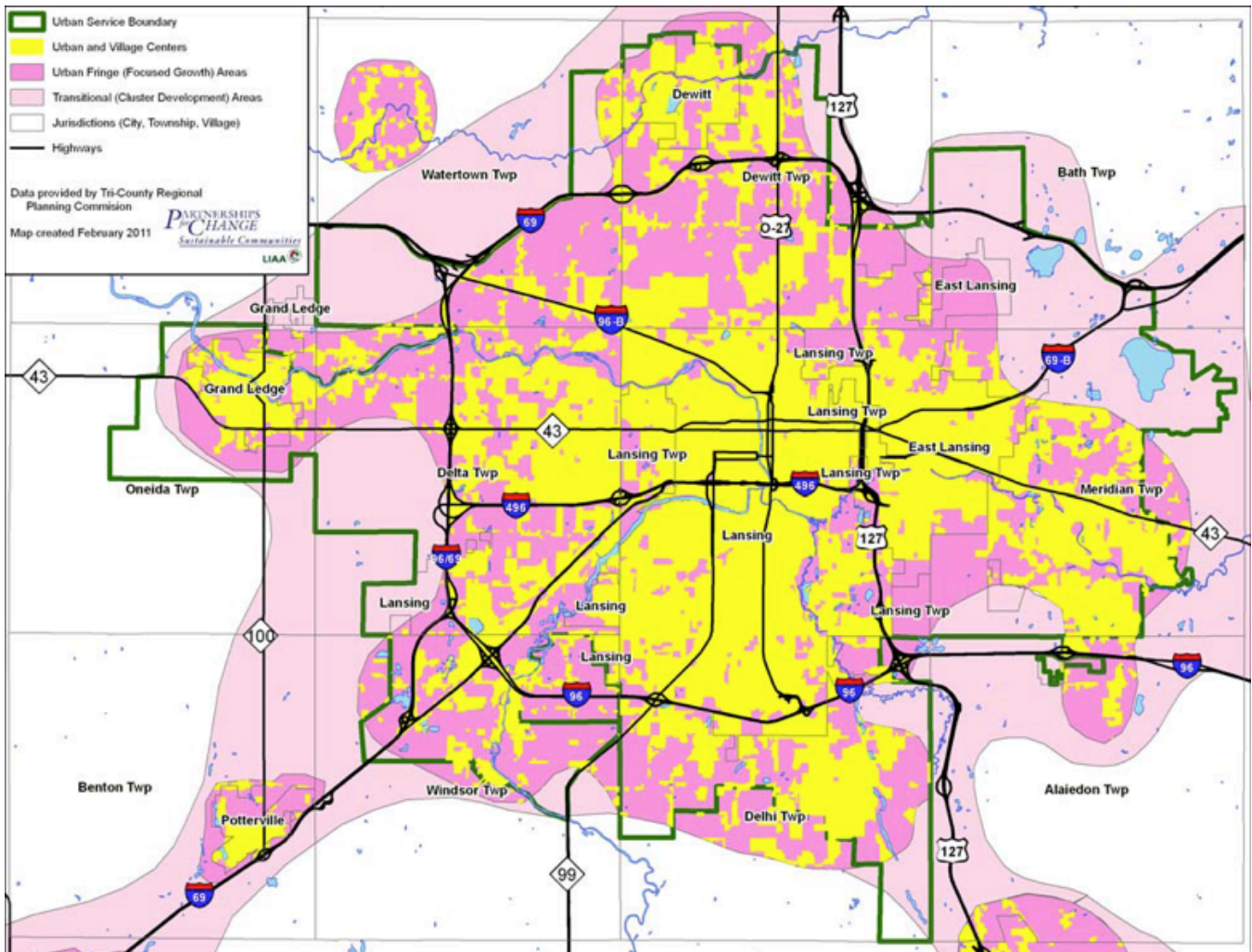
In developing the URSM policy, the committee considered the environmental, social, and economic costs of sprawl. Neither the *Growth Plan* nor the URSM policy statement specifically addressed the potential health impacts and prospective health goals of the establishment of service

management areas. As the policy evolved, the committee increasingly became concerned about health issues related to each of the policy elements. The URSM Committee, which includes representatives from municipal and township governments, non-governmental organizations and other local stakeholders, and TCRPC joined with the health departments of Clinton, Eaton, and Ingham counties and Michigan State University in the development of a Health Impact Assessment (HIA) of the URSM Policy.

The *Growth Plan* included a proposed boundary, shown in the map on page 5, which was adopted by the committee as part of the URSM Policy recommendations.



# GROWTH PLAN PROPOSED BOUNDARY





**ABOUT THE HEALTH IMPACT ASSESSMENT**

An HIA has been described as “a structured process that uses scientific data, professional expertise, and stakeholder input to identify and evaluate public-health consequences of proposals and suggests actions that could be taken to minimize adverse health impacts and optimize beneficial ones” (National Research Council, *Improving Health in the United States*, 2011). The World Health Organization (1985, 1986) and the Asian Development Bank (Konradsen et al., 1992) were among the first organizations to stress the importance of health-impact considerations in project planning. Since then, governments and non-governmental organizations (NGOs) around the world have used HIA to evaluate the health consequences of proposed policies, programs, projects, and plans, often integrating it into an environmental assessment process.

In the United States, the assessment of health effects on individual and community health and wellbeing is in contrast with the assessment of environmental, socioeconomic, and health risk assessments that have been conducted under the National

Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4321 et seq., January 1, 1970). Many aspects of a NEPA-based assessment have been adopted into the practice of HIA. Thus, HIA has become an increasingly popular tool for anticipating the results of a proposed project, both intended and unintended, and ensuring that the health of the entire population potentially affected will be taken into account by decision makers, who otherwise might not have access to health-related data and expertise as well as stakeholder input from potentially-affected communities, when making their decisions.

**CONNECTING TRI-COUNTY'S URSM POLICIES AND HEALTH**

The goal of this HIA was to better understand the health impacts of adopting a URSM policy. There were three main objectives considered in the development of the HIA:

1. To consider health-related issues potentially resulting from the URSM policy;
2. To assess specific health impacts from extending water and sewer services into rural areas and evaluate health outcomes that would

lead to healthy and sustainable communities; and

3. To promote a Health In All Policy to county health departments, local decision makers, and local planning and public services departments.

The impact assessment focused on how the five key elements addressed in the URSM policy (viable urban areas; protected farmland, open space, and rural life; preserved conservation areas; utilization of existing infrastructure; and cost-savings from cooperation and efficiency). In order to address the potential health effects of these elements, the HIA was divided into four priority areas: (1) expanding public water and sewer infrastructure and services in rural and undeveloped areas, (2) maintaining water resources and quality, (3) preserving agriculture and open space, and (4) encouraging URSM policy development and implementation and a regional vision. The HIA examined how these elements could affect the health and wellbeing of residents, particularly on vulnerable populations, as well as the likelihood and severity of health impacts.

# KEY FINDINGS

The HIA finds that the proposed URSM policy would have significant positive impacts on human health, community health, and wellbeing.

In all, eight general findings of the HIA are listed below. The full HIA report provides more detailed information in the findings, including:

1. Costs to expand water and sewer infrastructure place a burden on community resources that would otherwise be available to maintain existing systems, in addition to providing other public services for disadvantaged populations.
2. Additional property taxes to support expansion of water and sewer infrastructure may adversely affect household budgets at the expense of health care affordability.
3. Urban development or land-use change in rural areas resulting from expansion of water and sewer infrastructure may result in loss of productive farmland, recreational opportunities, sensitive natural areas, and sense of wellbeing. These effects may lead to increasing stress and anxiety to residents and family-owned agricultural businesses in rural areas and eliminate a rural lifestyle choice.
4. Urban development or land-use change in rural areas resulting from expansion of water and sewer infrastructure could reduce the availability of healthy locally grown food, which could lead people to substitute unhealthy food options or spend more money to travel and purchase healthy food, potentially impacting obesity rates or household budgets, leading to stress and decreased access to health care.
5. Land-use conflicts and declines in capital improvement budgets create stress and place additional financial burdens on populations least able to adapt to changing growth and development policies in a community. Disadvantaged populations can become economically marginalized and may be forced to relocate.
6. Communities with a mix of urban and rural land uses may have to prioritize between new greenfield development versus redevelopment or infill opportunities, new subdivisions versus preservation of farmland and open space, and so on.
7. Annexation of township land by municipalities may result in conflict between jurisdictions, changes in development priorities and revenue generation, and dramatically increased tax rates for businesses and homeowners. Small businesses and vulnerable populations are often at the greatest risk in annexation proposals.

# ADOPT AN URBAN SERVICE/GROWTH MANAGEMENT AREA OR BOUNDARY POLICY

The table on page 9 is a summary of the findings regarding the potential health effects of a region-wide policy establishing an urban and rural services boundary as described in detail in the Impact Assessment sections of the full URSM HIA. The summary table also indicates the relative availability of supporting research and additional sources of information. The quality/

strength of evidence used in the summary table follows the format and content guidelines provided in the Human Impact Partners 2010 HIA Report Guide. The description of the quality/strength of evidence found in the literature is qualitative and is discussed in more detail in the HIA. The tables provided in the individual sections of the impact assessment

show the applicable health-related references, which were not repeated in the summary table. The summary table also refers to the substantial body of literature on the environmental and socioeconomic effects of land-use change that were not referenced in this executive summary.

## SUMMARY OF HIA FINDINGS—POLICY: ADOPT AN URBAN SERVICE/GROWTH MANAGEMENT AREA OR BOUNDARY

Determinant	Impact/Health Outcome	Direction	Impact Likelihood	Magnitude/Severity on People	Distribution (Populations Most Affected)	Quality of Evidence
<b>Maintain existing water &amp; sewer and discourage expansion of services into rural areas.</b>	Exposure to waste, sewage & infectious diseases; stress.	Decrease.	High impact on moderate number.	Possible.	Residents in areas with deteriorating water & sewer system.	Many strong studies available.
<b>Preservation of farmland &amp; open space.</b>	Access to healthy, locally grown food.	Increase.	High impact on many.	Likely.	General population.	Good studies generally consistent with principles of public health.
	Rural lifestyle and sense of place.	Increase.	High impact on moderate number.	Likely.	Rural residents and general population.	Good studies available.
	Land-use conflict.	Decrease.	High impact on many.	Likely.	General population.	Many strong studies available.
	Healthy lifestyle.	Increase.	High impact on many.	Possible.	Rural residents and general population.	Good studies available.
	Access to recreation.	Increase.	Moderate-high impact on many.	Likely.	General population.	Good studies available.
	Open space & natural areas.	Increase.	High impact on moderate number.	Likely.	General population.	Good studies available.
<b>Access to clean surface &amp; ground water.</b>	Exposure to contaminants & infectious diseases.	Decrease.	High impact on many.	Possible.	General population.	Many strong studies available.
	Overall water quality.	Increase.	High impact on many.	Likely.	General population.	Many strong studies available.
<b>Property values &amp; taxes.</b>	Property values.	Increase.	High impact on high number.	Likely.	All residents.	Good studies available.
	Health care access.	Increase.	High impact on moderate number.	Possible.	Low-income residents.	Many strong studies.
<b>Local government investment in built areas &amp; local business development.</b>	Sense of place & wellbeing.	Increase.	High impact on many.	Possible.	Rural residents and general population.	Good studies and generally consistent with principles of public health.
	Building densities in urban areas.	Increase.	High impact on moderate number.	Possible.	Low-income residents.	Many strong studies available.
<b>Intergovernmental cooperation.</b>	Shared services.	Increase.	High impact on many.	Possible.	All residents.	Good studies available.
	Annexation.	Decrease.	High impact on high number.	Possible.	Low-income residents; small businesses.	Many strong studies available.
<b>Affordable housing &amp; lifestyles.</b>	Social, economic & age discrimination.	Decrease.	High impact on moderate number.	Possible.	Low-income and elderly residents.	Many strong studies available.

# RECOMMENDATIONS

Based on this analysis, recommendations to address the potential health effects include the following:

## **1: ESTABLISH BOUNDARIES**

Responsible, environmentally sound, and socially and economically equitable growth should be a continuing goal of every community. Communities in the mid-Michigan region are encouraged to establish service boundaries or service management areas. The URSM policy provides guidelines and support to communities that desire to manage growth within their jurisdictions.

## **2: USE EXISTING INFRASTRUCTURE**

Communities in the mid-Michigan region are encouraged to locate development within areas that can accommodate growth with existing infrastructure (e.g., water and sewer, roads, etc.) with minimal effect on non-compatible uses. It includes safeguarding sensitive areas such as riparian buffers, wetlands, and critical habitat from development pressures; directing new development to infill, brownfield, and greyfield sites to take

advantage of existing infrastructure and preserve green space; and putting homes, workplaces, and services close to each other in convenient, accessible locations.

## **3: ENCOURAGE HEALTHY PRACTICES**

Communities in the mid-Michigan region are encouraged to consider practices and technologies in which the built environment can protect and enhance health and the quality of life for all residents. In addition to providing safe and cost-effective public services like water and sewer, communities can encourage walkability and bikeability; public open spaces; safe routes to schools and public places; and buildings that are low-impact, energy efficient, and make maximum use of sustainable materials in all new developments within their jurisdictions.

## **4: MINIMIZE ENVIRONMENTAL IMPACTS**

Communities in the mid-Michigan region that are currently growing or likely to grow in the future should consider adopting a policy of directing potential growth into areas within their jurisdictions that can accommodate growth while minimizing adverse impacts to sensitive natural areas and open space, productive agricultural lands, and recreation areas.

## **5: ADOPT A HEALTH IN ALL POLICY**

Communities are encouraged to adopt a Health In All Policy, generally defined as a collaborative approach across all levels and all sectors involved in decision making as a means of ensuring that the health effects of a land-use decision are considered equally with economic, fiscal, and engineering considerations of a proposed development.



## NEXT STEPS

The HIA, and its findings and recommendations, is being provided to all communities in the mid-Michigan region via the HIA Toolkit, accessible to the public via the Mid-Michigan Program for Greater Sustainability (MMPGS) Portal at [www.midmichigansustainability.org](http://www.midmichigansustainability.org) and the Tri-County Regional Planning Commission.

The HIA has identified communities in the mid-Michigan region that have adopted a service management policy. These communities have indicated

their willingness to provide guidance to neighboring communities. In addition, the URSM Committee will continue to assist local communities that have adopted the policy or are considering adopting the policy in the future. TCRPC staff will continue to provide information and education to local communities on adopting recommendations provided in the URSM HIA, as well as general information on adopting a Health In All Policy, integrating health considerations in planning decisions, and conducting local HIAs.

The HIA also includes a monitoring plan to help communities assess the effectiveness of the HIA in informing local planning and decision making regarding health considerations in governance. TCRPC will continue working with the county health departments through the Land Use and Health Resource Team (LUHRT) to monitor the effectiveness of the URSM Policy.



# I. INTRODUCTION

Over the past 50 years, the size of virtually every major metropolitan area in the United States has expanded dramatically, and the rate of land development has outpaced the rate of population growth. Much of this growth has occurred in suburban and rural areas, with much less growth occurring within the urban centers. Dispersed growth patterns and other local land-use practices have had a significant effect on the environment and human health.

In a recent report on urbanization and its effects on land use, transportation, and the environment published by the U.S. Environmental Protection Agency (USEPA, 2013), a number of observations were made as to potential impacts. Examples from around the country described in this report include:

- Land conversion for development has destroyed, degraded, and fragmented habitat, and important ecological functions. The enjoyment of nature has been adversely affected.
- Current community design favoring dispersed development is optimized to accommodate cars, while the percentages of people taking public transit, walking, and biking declined.
- Buildings, roads, and associated impervious surfaces have adversely affected water quality.
- More vehicles have had a negative effect on air quality, affecting human health.
- Residential development trends toward larger homes on larger lots often replace productive agriculture.
- Dispersed community design can make it difficult for people to get adequate physical activity, engage

with neighbors, and participate in community events. It can also increase the risk of injury or death from a vehicle crash.

- The heat island effect and global climate change illustrate just how complex and far-reaching the impacts of our built environment are.

These trends were also noted in the Tri-County Regional Growth Plan for the mid-Michigan region published by the Tri-County Regional Planning Commission (TCRPC, 2005). Projected population growth and demographic trends suggest that the pressure for additional development will continue (USEPA, 2013). These trends are occurring in the mid-Michigan region, as well as the state of Michigan, which has experienced similar growth patterns with varying environmental and health consequences (TCRPC, 2005).



# The Mid-Michigan Response to Urbanization and Future Regional Growth

For purpose of this report, Ingham, Clinton, and Eaton counties are identified as the mid-Michigan region (shown in Figure I-1), recognizing that decisions made in this three-county region may affect surrounding counties as well.

The mid-Michigan region (also known as the Tri-County Region) encompasses the aforementioned counties which comprise 78 governmental jurisdictions, including cities, villages, and townships. As a designated Municipal Planning

Organization (MPO), TCRPC serves the region by planning for and coordinating intergovernmental solutions to growth-related problems, providing technical assistance to local governments, and meeting the planning needs of communities across the region.

In response to regional growth patterns and potentially adverse effects on environmental quality and human health, TCRPC released the Tri-County Regional Growth Plan in 2006 for the mid-Michigan region

(TCRPC, 2005). The Regional Growth Plan encourages intergovernmental cooperation among the local units of government through cooperative planning and shared services, like police, fire, tax assessment, as a way to stretch revenues needed to ensure sustainable public services.

Chapter 2 of the Regional Growth Plan provides a detailed description of land use patterns, demographics, and socioeconomic conditions, as well as growth trends through 2045. This material was extensively used in the development of the URSM policy and the organization of the research questions addressed in the HIA report. As stated in the Introduction:

*The project's primary purpose was to develop a shared regional vision of future land use and development patterns. TCRPC used a combination of regional trends analysis, build-out analysis based on composites of local comprehensive plans/zoning ordinances and alternative growth scenarios to develop a set of policies and action strategies to guide public and private investment decisions. Actual land*

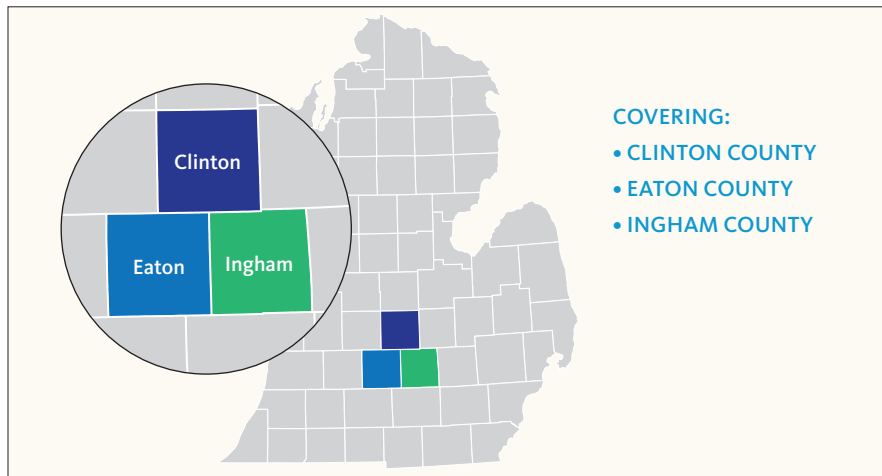


Figure I-1. Mid-Michigan Region (TCRPC, 2014)

*use and growth alternatives evaluated were formulated based on input gathered from citizens, non-traditional partners and Stakeholders/Steering Committees. Specifically, the following alternatives were considered:*

1. TREND FORECAST ALTERNATIVE (DO NOTHING) ENTITLED, "BUSINESS AS USUAL."
2. "BUILD-OUT" ANALYSIS BASED ON COMPOSITES OF LOCAL ZONING ORDINANCES.
3. AN ALTERNATIVE GROWTH SCENARIO BASED ON REGIONAL LAND USE VISIONS AND GOALS, AS FORMULATED IN THE PROCESS, ENTITLED "WISE GROWTH."
4. A "WISE GROWTH BUILD-OUT" SCENARIO.

*These alternatives were evaluated using traditional planning methods and performance measures such as: travel demand models, emissions models, environmental and community impact assessment techniques, environmental justice analysis, accessibility analysis, sketch*

*planning techniques, a proactive citizen participation and media involvement process and using related performance measures, such as vehicle miles of travel, vehicle hours of travel, congested vehicle miles and hours of travel, etc.*

*To achieve implementation consensus, the TCRPC involved 78 communities, each with a strong home rule form of government, hundreds of local officials, thousands of citizens and numerous non-traditional partners. All are making individual land use and development decisions within local political jurisdictions with virtually no oversight or coordination on collective, long-term regional impacts of these decisions.*

As a collaborative action in 2008, the Tri-County Land Use and Health Resource Team (LUHRT) held a series of community health assessment listening sessions in Clinton, Eaton, and Ingham counties and the City of Lansing. More than 80 people attended included local planners, elected officials, and representatives of the private sector and the general

public. The overarching question was: "To ensure that our environment supports an attractive, healthy, livable and sustainable community for all, what are the issues we primarily need to think about?" A list of 49 priorities was compiled and has since been used to guide action plans for the LUHRT. The list included such priorities as promoting access to clean water and air, healthy locally grown foods, transportation options, fair and affordable housing, protection of farmland and open space, walkability and bikeability, and intergovernmental cooperation. The recommendations were provided to county, city, and township governments and various regional authorities. The recommendations are being actively integrated into local actions and continue to support the Growth Plan.

1. A Metropolitan Planning Organization (MPO) is a federally mandated and federally funded transportation policy-making organization authorized by the United States Congress under the Federal-Aid Highway Act of 1962, which required the formation of an MPO for any urbanized area with a population greater than 50,000.
2. The Tri-County Land Use and Health Resource Team includes representatives from the Ingham, Barry-Eaton, and Mid-Michigan Health Departments; Tri-County Regional Planning Commission; Power of We Consortium; Michigan State University; a number of community and environmental health on-governmental organizations; and members of the public.

# Regional Growth Management and the URSM Policy

The recommendations presented in the Growth Plan include promoting shared public services and engaging in joint planning efforts while ensuring the protection of rural and natural resources. The Growth Plan advocates the establishment of an urban and rural services management policy as a means of preserving quality, sustainable public services, such as water and sewer, throughout the urbanized areas while protecting farmlands, open spaces and rural quality in undeveloped areas. A 2000 policy brief for the Michigan Legislature, published by the Urban and Regional Planning Program, Department of Geography, Michigan State University defines an Urban and Rural Services Management Area (URSMA) as:

*A successful tool for managing urban sprawl. Such boundaries allow a unit of government to publicly declare that a specific area surrounding a municipality will be the target for urban growth, and thus indicate that areas beyond that boundary will not be supported with public infrastructure services. Such boundary lines are typically enforced by limiting water or sewer services, rather than extending them constantly to help support suburban development.*

The Growth Plan provides growth management recommendations to local units of government participating in the development of the Growth Plan. A preliminary urban service boundary was developed for the central urban and suburban areas projected to see increasing development and growth

in the Greater Lansing or mid-Michigan region. Figure I-2 shows the preliminary services boundary map. Areas that are suitable for growth and the preliminary urban services boundary are shown in Figure I-3, in which a “Wise Growth” scenario is proposed.

In response, a number of local governments formed the Urban and Rural Service Management Committee (URSM Committee or Committee). The committee was created in the mid-Michigan region to help implement the land use vision in the Growth Plan. The committee includes representatives from multiple jurisdictions who are charged with analyzing development patterns and promoting policies that ensure sustainable urban and rural services. Member jurisdictions on the committee include communities that have experienced rapid urbanization over the past 15-20 years and are likely to see continued population growth and development into the foreseeable future. The committee also includes representatives from several communities outside of the Greater Lansing area that are experiencing more limited growth beyond their jurisdictional boundaries.

The mission of the committee is to develop and promote a URSM policy statement and support local communities tackling issues of public water and sewer infrastructure extensions and offer recommendations on the efficacy of related intergovernmental policies and plans

(TCRPC, 2011). The stated goals of the URSM policy are to:

1. Keep urbanized areas viable;
2. Protect farmland, open space, and rural quality of life;
3. Preserve priority conservation areas;
4. Utilize existing infrastructure; and
5. Cost-save through cooperation and efficiency.

The URSM policy guides the public decision-making process for locating future public water and sewer services (TCRPC, 2011). Adopting the proposed URSM policy may lead to the establishment of a service management area (SMA) that may be referred to by a community as a service boundary (SB). A service management area may also refer to a shared-services agreement between two or more units of government. An URSM policy can be a successful tool for managing urban sprawl, promoting downtown redevelopment, and protecting our natural resources and farmland at the same time. In operation, an SMA/SB allows a unit of government to publicly identify specific areas targeted for growth or reinvestment and suggests that areas beyond the SMA/SB will not receive public infrastructure service. Municipalities typically enforce an SMA/SB by limiting water and sewer services or not extending them to new development outside the services management area.

3. Member jurisdictions on the URSM Committee include the counties of Clinton, Eaton, and Ingham; the cities of Lansing, East Lansing, Grand Ledge, DeWitt, and Mason; the Village of Dimondale; and the Townships of Meridian, Delta, Bath, Windsor, Williamstown, Delhi, Watertown, DeWitt, Oneida, and Lansing. The Clinton and Ingham Agricultural Preservation Boards are also members of the URSM Committee.

FIGURE I-2.  
PRELIMINARY SERVICE BOUNDARY

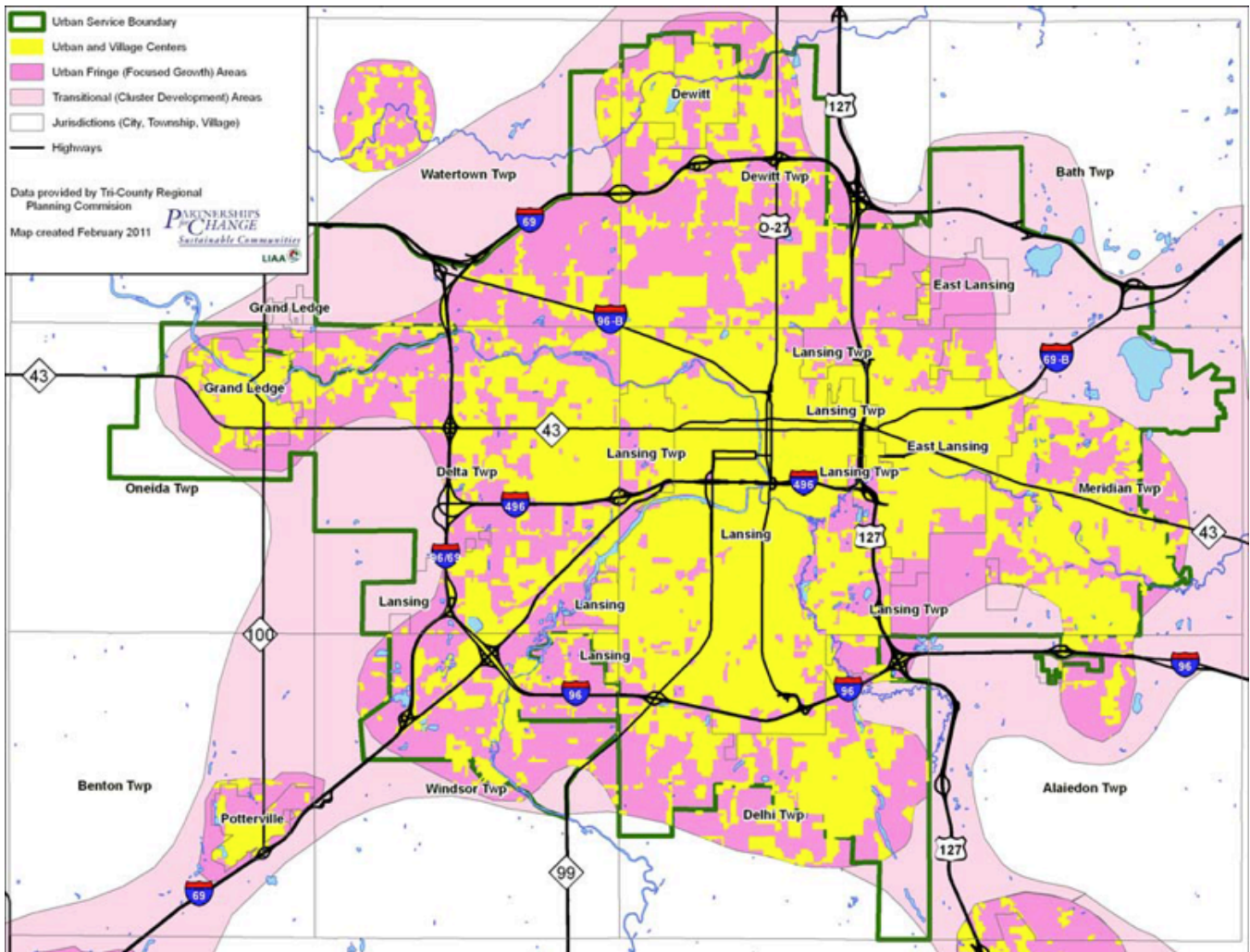


Figure I-2.  
Preliminary Mid-Michigan Urban Service District Area & Boundary (Tri-County Regional Growth: Choices for Our Future)

FIGURE I-3.  
PRELIMINARY SERVICE BOUNDARY

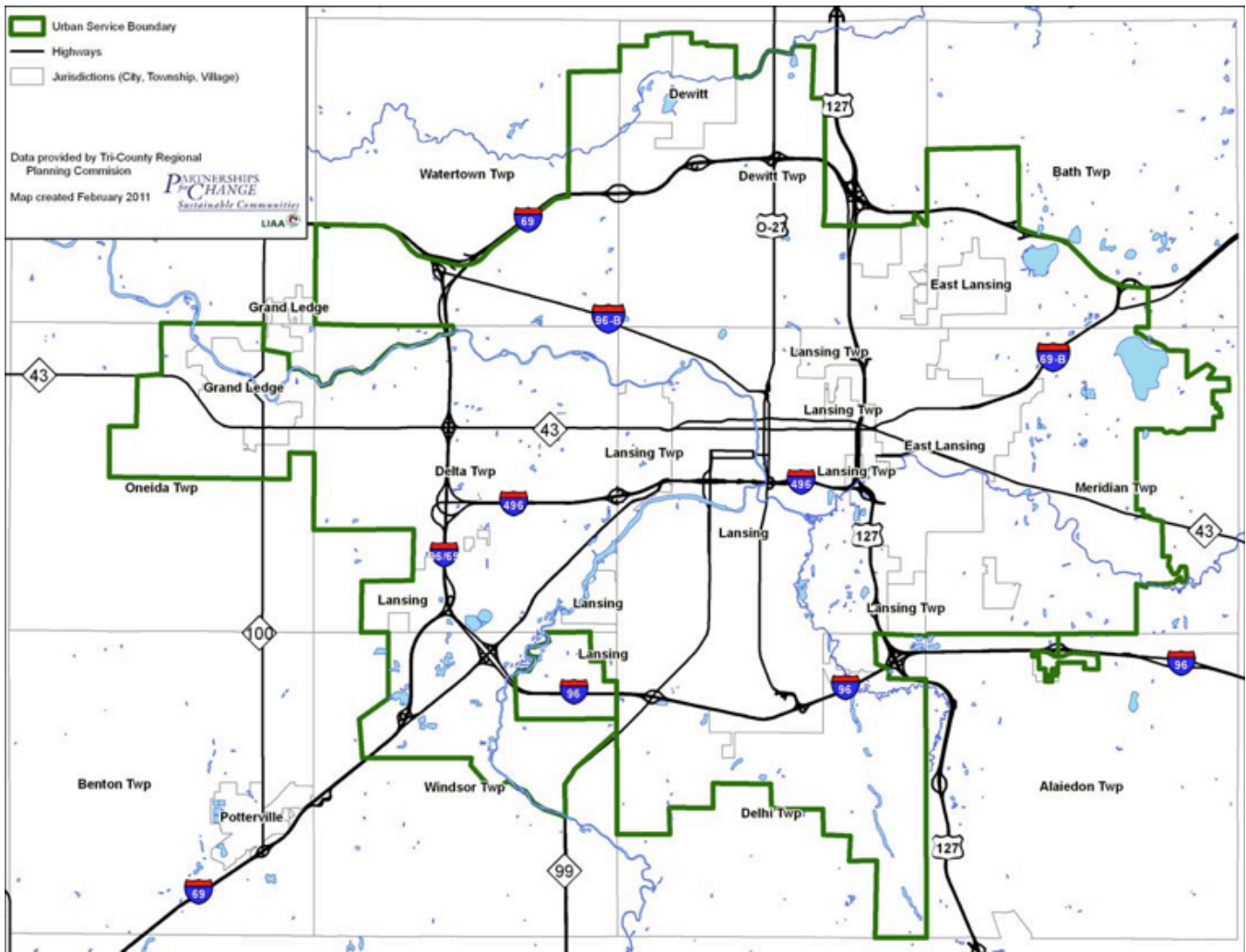


Figure I-3.  
The Preliminary Urban Service Boundary (in green) shown in context with the Future Regional “Wise Growth” Scenario (Tri-County Regional Growth: Choices for Our Future)

## II. HIA OVERVIEW AND GOALS



## HIA Background and Potential Health Impacts of a Proposed Policy

It is increasingly recognized that many programs and policies once considered incidental to (or even separate from) health can have profound health consequences for local populations. The health impacts of decisions made by communities, government entities, and the private sector—such as community development, land use, housing, and transportation—go far beyond the basic safety concerns associated with each. For example, decisions on the expansion of urban services like public water and sewer into rural and undeveloped areas in the name of community growth may lead to uncontrolled growth, higher taxes, displacement of poor or elderly residents, and loss of productive farmland, open space, and natural areas. These land-use decisions may disproportionately affect at-risk populations; adversely affect lifestyle and healthcare choices; expose

populations to contaminated air, water, or soils; and ultimately lead to reduced quality of life for individuals or neighborhoods.

In developing the URSM policy, the URSM Committee considered the environmental, social, and economic costs of sprawl. Neither the Growth Plan nor the draft URSM policy statement specifically addressed the potential health impacts and prospective health goals of the establishment of service management areas. As the policy evolved, the committee increasingly became concerned about health-related issues related to each of the policy elements. The URSM Committee, which includes representatives from municipal and township governments, non-governmental organizations and other local stakeholders, and TCRPC joined with the health departments of Clinton, Eaton, and Ingham counties

and Michigan State University in the development of a Health Impact Assessment (HIA) of the URSM Policy.

The HIA is a collaborative effort of the committee, TCRPC, LUHRT, and the School of Planning, Design, and Construction at Michigan State University (MSU). The recommendations of the HIA Team will be integrated into a formal decision making process that has been developed over the past ten years for similar programs and policies by the LUHRT and project partners. The HIA will be instrumental in helping mid-Michigan communities integrate health considerations in local land-use planning and encouraging communities adopt a Health In All Policy, which is being promoted by the health departments in Clinton, Eaton, and Ingham counties.

## Objectives of Conducting the HIA

Potential health effects of establishing a URSM policy have been analyzed using a process called Health Impact Assessment (HIA), which has been described as “a structured process that uses scientific data, professional expertise, and stakeholder input to identify and evaluate public-health consequences of proposals and suggests actions that could be taken to minimize adverse health impacts and optimize beneficial ones” (National Research Council, *Improving Health in the United States*, 2011). The World Health Organization (1985, 1986) and the Asian Development Bank (Konradson et al., 1992) were among the first organizations to stress the importance of health-impact considerations in project planning. Since then, governments and non-governmental organizations (NGOs) around the world have used HIA to evaluate the health consequences of proposed policies, programs, projects, and plans, often integrating it into an environmental assessment process.

In the United States, the assessment of health effects on individual and

community health and wellbeing is in contrast with the assessment of environmental, socioeconomic, and health risk assessments that have been conducted under the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4321 et seq., January 1, 1970). Many aspects of a NEPA-based assessment have been adopted into the practice of HIA (Canter, 1996). Thus, HIA has become an increasingly popular tool for anticipating the results of a proposed project, both intended and unintended, and ensuring that the health of the entire population potentially affected will be taken into account by decision makers, who otherwise might not have access to health-related data and expertise as well as stakeholder input from potentially-affected communities when making their decisions.

In 2012, the Tri-County Land Use and Health Resource Team (LUHRT) began discussions with the URSM Committee and TCRPC about conducting an HIA on the potential health effects of the proposed URSM policy, its implementation by local

units of government, and how the policy has influenced local land use planning. The committee members saw a direct connection between its mission to support local communities tackling issues of public water and sewer infrastructure extensions, reduce sprawl, and promote healthy communities and lifestyles. The committee recognized the potential value of an HIA as a means of advancing its mission.

This HIA has been developed by the HIA Project Team to meet three objectives:

1. To consider health-related issues potentially resulting from the URSM policy;
2. To assess specific health impacts from extending water and sewer services into rural areas and evaluate health outcomes that would lead to healthy and sustainable communities; and
3. To promote a Health In All Policy to county health departments, local decision makers, and local planning and public services departments.





There is substantial research on the environmental, social, and economic effects of land-use decisions resulting in urban sprawl, loss of natural areas and productive farmland, and decrease in quality of life of disproportionately affected populations. An assessment of the potential environmental, social, economic, and health effects of a proposed public policy is inherently different than an assessment of a project or development. It is only within the past several years that health

effects of land-use policies and actions have been systematically assessed and added to the body of research. A search on the Internet using a search term such as “land use and health” provides access to significant resources that can help communities assess the potential health effects of their decisions on growth priorities, growth management strategies, and growth management areas. In addition, the body of evidence linking health impacts and outcomes of land-use practices is growing. (To

review health impact studies in greater depth, see, for example, Frank, et al., 2006; Dannenberg, et al., 2003; and many others). Organizations like the Centers for Disease Control and Prevention (2006), the National Association of County and City Health Officials (2014), and Human Impact Partners (2014) are providing guidelines and tools for incorporating public health in local land-use decision making.

# Assessing the Potential Health Effects of a Policy Versus a Project

The goal of a public policy is to provide support for a course of action to be taken by a governmental entity, whether this action is in response to a law or ordinance, a regulatory matter, or a spending decision (Liroff, 1976; Thornton and Weissert, 2002). Although many actors or stakeholders are involved in the formulation of a policy, government officials generally have the ultimate decision on the policy and how it is implemented. And, since policies are goal-oriented, outcomes are measured by how the policy has affected change (i.e., a goal has been met or not) and how decisions are implemented as opposed to assessing the effects of a project – was it built according to plan, did it meet requirements, or did it result in adverse impacts?

The effects of a policy may differ substantially from those resulting from a project. The primary effects of a project are generally locational and can often be measured. For example, airborne particulates and emissions from vehicles used in construction of a project may result in respiratory illness. Exposure to hazardous materials, noise, and other biological, epidemiological, and physical traumas generated by a project could have both short- and long-term adverse health effects. Potential physical determinants of health associated with the URSM policy considered in this HIA, however, include changes

in housing densities and other land uses within the urbanized areas and rural areas that may conflict with farming and access to open space, opportunity costs associated with upgrading existing water and sewer infrastructure versus extending these services into rural areas, and water quality concerns in rural areas that would not normally be provided with public services. Public health and personal health determinants associated with policy include potential exposure to contaminants due to failed or deteriorating water and sewer systems; decreased access to health care due to more limited household budgets; increases in stress, depression, or anxiety; and increases in obesity and other health problems due to limited access to open space, recreation, or walkability.

The potential effects of adopting or not adopting a policy on health may depend on whether or not someone supports the policy and whether someone is directly or indirectly affected by the implementation of the policy. An individual's or group's position on (or attitude towards) a policy can affect their health, even outside of the health effects of the policy itself. If someone does not support a policy, or is not comfortable discussing the policy in a public forum, feelings of stress or anxiety may lead to chronic adverse effects on mental health (Evans, 2003). Once a policy

decision is made, the potential health effects of a project resulting from that policy decision would then need to be assessed by using the traditional site-specific impact assessment procedures.

As shown in Table II-1, health effects manifested by acute stress and anxiety may include digestive problems, headaches, sleeplessness, depressed mood, anger, and irritability. In addition, chronic stress may result in frequent and severe viral infections, such as the flu or common cold, heart disease, high blood pressure, diabetes, depression, anxiety disorder, and other illnesses. If someone becomes depressed as the result of policy implementation perceived as unfair, they may experience persistent sad, anxious, or “empty” feelings; feelings of hopelessness, pessimism, guilt; irritability, restlessness; fatigue; difficulty concentrating; insomnia, thoughts of suicide, suicide attempts; aches or pains, headaches, cramps, or digestive problems. (National Institutes of Health, 2014; National Institutes of Mental Health, 2014; CDC, 2014).

In the case of expanding water and sewer infrastructure into undeveloped or rural areas, the potential adverse effects of a pro-growth policy may be ameliorated by passing costs of a new development to land developers and residents of the development instead of onto at-risk populations. This could have a positive health effect in the community.

**TABLE II-1.  
POTENTIAL HEALTH-RELATED CONCERNS FROM THE LOCAL DECISION MAKING PROCESS**

Determinant	Health Risk	Information Resource
<p><b>Municipality budget constraints.</b></p> <p><b>Household budget constraints.</b></p>	<p>Road and sidewalk maintenance deficient; increased transportation-related injuries or death; strain on maintaining existing water/sewer.</p> <p>Budget constraints may force local governments to pass along costs to developers and new residents.</p> <p>Less household income available for at-risk residents to spend accessing health services.</p>	<p><a href="http://news.jrn.msu.edu/bathdewittconnection/category/dewitt-township/">http://news.jrn.msu.edu/bathdewittconnection/category/dewitt-township/</a></p> <p>2011-2013 Capital Area Behavioral Risk Factor Survey</p>
<p><b>Land-use change and unmanaged growth; reduced concern for health equity.</b></p>	<p>More impervious land/stormwater runoff leading to gastrointestinal illnesses (see Table V-1 regarding water quality and Table V-3 regarding land-use conflicts). Loss of farmland and access to recreation.</p> <p>Access to healthy, locally grown food.</p>	<p><a href="http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1448005/">http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1448005/</a></p> <p>2011-2013 Capital Area Behavioral Risk Factor Survey</p> <p><a href="http://www.foodsystemsworkgroup.org">www.foodsystemsworkgroup.org</a></p> <p>USDA Food Environment Atlas</p>
<p><b>Changes in health behavior: Acute and chronic stress, anxiety, and depression.</b></p>	<p>Digestive symptoms, headaches, sleeplessness, depressed mood, anger and irritability; frequent and severe viral infections, such as the flu or common cold; heart disease, high blood pressure, diabetes, depression, anxiety disorder, and other illnesses; persistent sad, anxious, or “empty” feelings; feelings of hopelessness, pessimism, guilt; irritability, restlessness; fatigue; difficulty concentrating; insomnia, thoughts of suicide, suicide attempts; aches or pains, headaches, cramps, or digestive problems.</p>	<p><a href="http://www.nlm.nih.gov/health/publications/stress/index.shtml">http://www.nlm.nih.gov/health/publications/stress/index.shtml</a></p> <p><a href="http://www.nlm.nih.gov/health/publications/depression/index.shtml">http://www.nlm.nih.gov/health/publications/depression/index.shtml</a></p> <p>2011-2013 Capital Area Behavioral Risk Factor Survey</p>
<p><b>Reduced physical activity and unhealthy lifestyles: Overweight/Obesity and susceptibility to chronic diseases.</b></p>	<p>Coronary heart disease; type 2 diabetes; cancers (endometrial, breast, and colon); hypertension (high blood pressure); dyslipidemia (for example, high total cholesterol or high levels of triglycerides); stroke; liver and gallbladder disease; sleep apnea and breathing problems; osteoarthritis; gynecological problems.</p>	<p><a href="http://www.cdc.gov/healthyweight/effects/index.html?s_cid=tw_ob245">http://www.cdc.gov/healthyweight/effects/index.html?s_cid=tw_ob245</a></p> <p>2011-2013 Capital Area Behavioral Risk Factor Survey</p>

## HIA Process and Methodology

The benchmark for assessing the effects of a public policy on the human and natural environment is the National Environmental Policy Act of 1970. The health impact assessment process followed in this HIA is closely related to the process established in EIA/EIS. Figure II-1 shows the steps in HIA that will be used in this report.

Scoping is used in the HIA process to define priority issues and concerns, research questions and methods used to address issues, and determine the roles of participants, stakeholders, and decision makers in the process. Scoping for the proposed URSM HIA was focused on the work being conducted by the URSM Committee and local units of government in the mid-Michigan region. The committee, working closely with TCRPC, LUHRT, the three county environmental health departments, planners and decision makers in several local jurisdictions, and researchers and outreach specialists at MSU, developed a Memorandum of Agreement to address potential health benefits and concerns associated with the URSM policy. This agreement added health perspective to committee meetings, interactions with stakeholders, and revisions to original policy recommendations culminating with the preparation of an HIA.

The primary scoping session was held in June 2013. During this meeting, approximately 20 planners and decision makers from various communities in the mid-Michigan region and representatives of the signers of the Memorandum of Agreement identified health issues experienced in the region and the immediate and intermediate social and physical determinants resulting from the adoption of the URSM policy. This meeting was followed by an online survey that asked the same participants to confirm the importance and establish priorities of the health issues the proposed URSM policy should address.

Priority health-related issues, concerns, and possible areas for further study that resulted from the scoping process included the following:

1. ARE THERE EXISTING OR FUTURE RISKS TO PUBLIC HEALTH FROM DETERIORATING PUBLIC WATER AND SEWER SYSTEMS IN THE REGION?
2. ARE THERE SPECIFIC LOCATIONS WHERE THESE HEALTH RISKS MUST BE ADDRESSED BY UPGRADING EXISTING PUBLIC INFRASTRUCTURE?
3. DOES EXPANSION OF PUBLIC INFRASTRUCTURE INTO UNDERSERVED AREAS PLACE UNDUE FINANCIAL BURDENS ON AT-RISK RESIDENTS? INCREASE LEVELS OF STRESS?

4. LOCALLY, ARE THERE ANY LAND USES THAT ARE RESULTING IN ADVERSE IMPACTS TO SURFACE WATER QUALITY AND PUBLIC HEALTH?

5. WOULD EXPANSION OF NEW INFRASTRUCTURE INTO UNDERSERVED AREAS REDUCE THE PUBLIC'S ACCESS TO LOCALLY GROWN FOODS? TO RECREATION AND OPEN SPACE OPPORTUNITIES?

6. ARE THERE NEW REGIONAL OR LOCAL OPPORTUNITIES FOR SHARED WATER AND SEWER SERVICE THAT COULD CONSERVE REVENUES NEEDED TO MAINTAIN PUBLIC SERVICES, REDUCE SPRAWL, AND INCENTIVIZE DOWNTOWN INFILL OR CLUSTERED GROWTH?

This process is summarized in a table in Appendix A, which links the priority health-related issues and prevailing land-use practices to determinants of health based on Healthy People 2020, with examples given by stakeholders and discussion notes for each area.

TCRPC and MSU conducted a series of interviews with URSM Committee members and other leaders in communities. Interviews were completed in June 2014. The interview questionnaire and responses are provided in Appendix B.

FIGURE II-1.

# STEPS OF THE URSM HEALTH IMPACT ASSESSMENT

<b>Steps of the URSM HIA</b>	
<b>1</b>	<b>SCREENING</b> HIA Project Team, URSM Committee and stakeholders determine that the URSM Policy could have significant health impacts and an HIA is needed.
<b>2</b>	<b>SCOPING</b> Focus groups, community meetings, and expert interviews establish the questions and outreach methods and develop a plan for the HIA, including the identification of potential health risks and benefits.
<b>3</b>	<b>RECOMMENDATIONS</b> The HIA Project Team describes the baseline health conditions and considers the nature and magnitude of the potential health impacts of the URSM policy development, planning, and implementation by local governments.
<b>4</b>	<b>ASSESSMENT</b> The HIA Project Team, URSM Committee and stakeholders develop practical solutions that can be implemented within the political, economic, or technical limitations of communities considering the URSM policy.
<b>5</b>	<b>REPORTING</b> The HIA Project Team disseminates the findings to decision makers, affected communities, and other stakeholders.
<b>6</b>	<b>MONITORING &amp; EVALUATION</b> The URSM Committee and community partners will monitor the changes in health or health risk factors, evaluate the efficacy of the measures that are implemented in local communities, and the HIA process as a whole.
<i>The HIA process encourages public input at each step.</i>	

Source: Health Impact Project 2014 (<http://www.pewtrusts.org/en/projects/health-impact-project/health-impact-assessment/hia-process>).

## Components of This Report

The intent of this report is to inform the development and implementation of the URSM policy for the mid-Michigan region, and for other land use decisions that affect water quality, health, and equity. This report is divided into six sections:

### **1. INTRODUCTION:**

This section describes health impact assessment and its importance in introducing health and health equity considerations in local land-use decisions.

### **2. POLICY BASELINE:**

Describes land-use change in the mid-Michigan region, the development of the URSM policy, and demographic, income, and urban and rural characteristics.

### **3. IMPACT ASSESSMENT:**

The HIA report addresses the potential health effects of four main priority areas linking local planning and decision making and health issues, including (1) expanding public water and sewer infrastructure and services in rural and undeveloped areas,

(2) maintaining water resources and quality, (3) preserving agriculture and open space, and

(4) encouraging URSM policy development and implementation and a regional vision. The Impact Assessment section also provides a summary of findings, which incorporate both qualitative and quantitative data about the current status and the future needs of mid-Michigan communities related to urban sprawl and growth management.

### **4. CONCLUSIONS AND RECOMMENDATIONS:**

This section provides concluding remarks based on the results of the research-based impact assessment, proposes recommendations for promoting the positive health impacts of the URSM policy, and addresses areas of concern where the findings suggest that unintended consequences of expanding water and sewer infrastructure into rural and undeveloped areas might negatively affect the health of local communities.

### **5. MONITORING AND FUTURE GOALS:**

A critical component following the HIA process, the LUHRT and local community participants will continue to evaluate and monitor the implementation of the URSM policy and HIA recommendations.



The URSM Committee and HIA Team used the results of scoping to identify priority health-related areas in local decision making that would most likely be affected through the adoption of a URSM policy. The questions posed during scoping focused on the five stated goals of the URSM policy:

1. KEEP URBANIZED AREAS VIABLE;
2. PROTECT FARMLAND, OPEN SPACE, AND RURAL QUALITY OF LIFE;
3. PRESERVE PRIORITY CONSERVATION AREAS;

4. UTILIZE EXISTING INFRASTRUCTURE;  
AND

5. COST-SAVE THROUGH COOPERATION  
AND EFFICIENCY.

It became clear to the committee members and local stakeholders that addressing the priority of water and sewer expansion in an HIA would consequently lead to addressing agriculture, open space, and transportation issues, and to more discussions on shared services. The committee decided to study three possible scenarios or options

described below in determining where and when to extend water and sewer infrastructure into undeveloped areas. This led to the development of HIA pathways and health outcomes organized and depicted in a separate pathway diagram for each option. See Figures III-1, III-2, and III-3. Pathway diagrams are helpful in illustrating and communicating (a) what decision processes may lead to health concerns and (b) what measures might be taken to mitigate adverse impacts and plan for desired health outcomes.

# Option 1: No URSM Policy with Onsite Water Wells and Decentralized Wastewater Management (Figure III-1)

In choosing this option, communities would allow new development in under-served areas with onsite well and septic systems. Changes in costs incurred by local governments to maintain existing systems, additional services, and infrastructure could lead to change in water contamination levels and consequently changes in infectious diseases. If cost is transferred to property owners through taxes, this may lead to changes in disposable income that could be used for access to healthier lifestyle and access to preventive care.

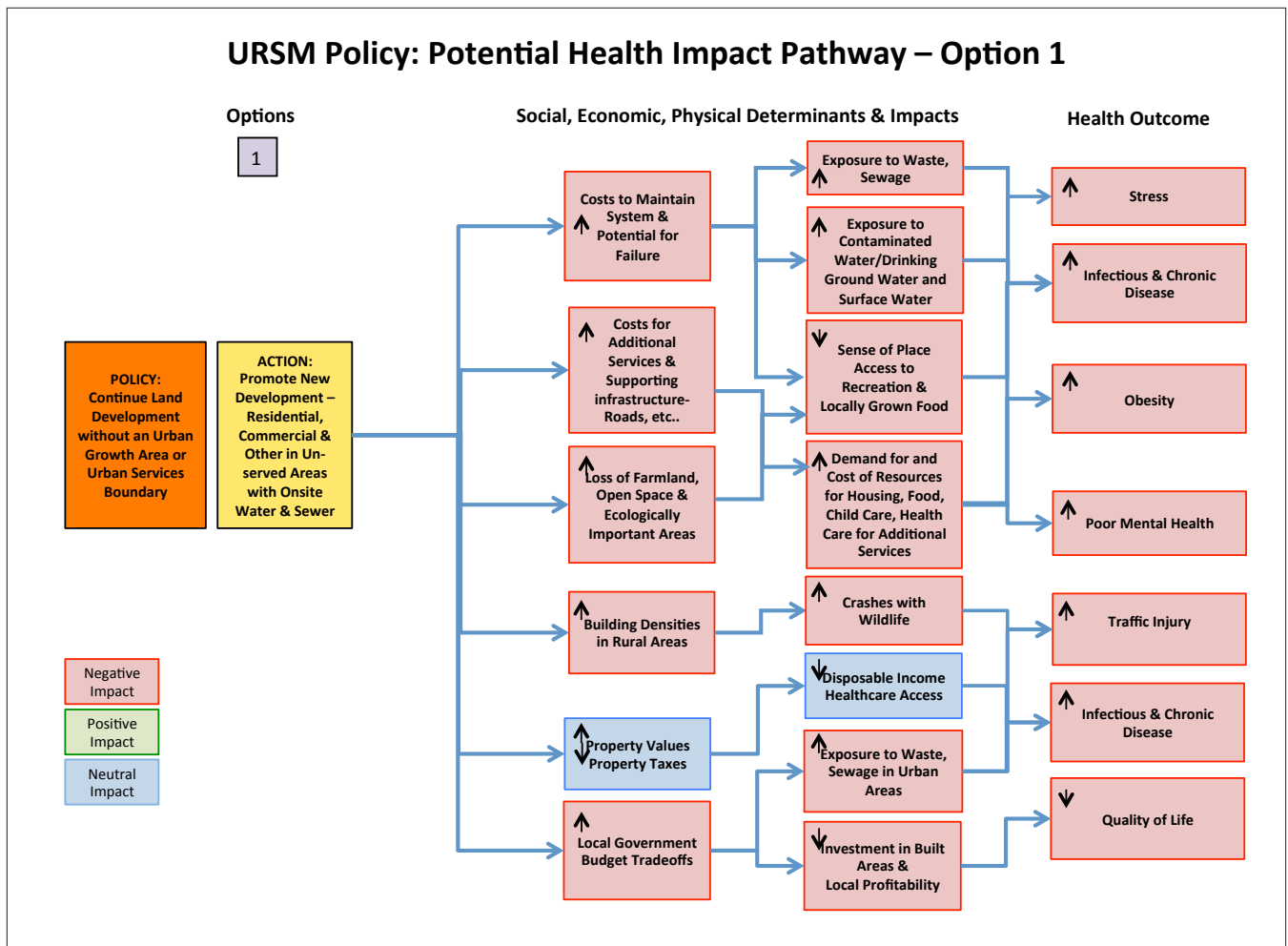


Figure III-1. Option 1: Potential Health Impact Pathway Resulting From a Land Development Policy That Allows Onsite Water Wells and Decentralized Wastewater Management



# Option 2: No URSM Policy with Expansion of Water and Sewer Infrastructure (Figure III-2).

In choosing this option, communities would allow the building and maintenance of water and sewer systems in under-served areas beyond the current growth area. New development beyond a determined growth area could lead to changes in local government, economic, and natural resources, and the cost if transferred to the community will contribute to changes in disposable income that could be used for healthier lifestyles and access to preventive care. However, to a private developer, lower development costs translate into more housing and business spaces at competitive market rates; this in turn could be perceived by some officials as driving more business in their areas and more immediate revenues. For individuals, lower housing costs could free disposable income for healthier food and access to preventive care, until the additional cost of extending water and sewer beyond the service area is transferred through taxes to outweigh the lower cost of living.

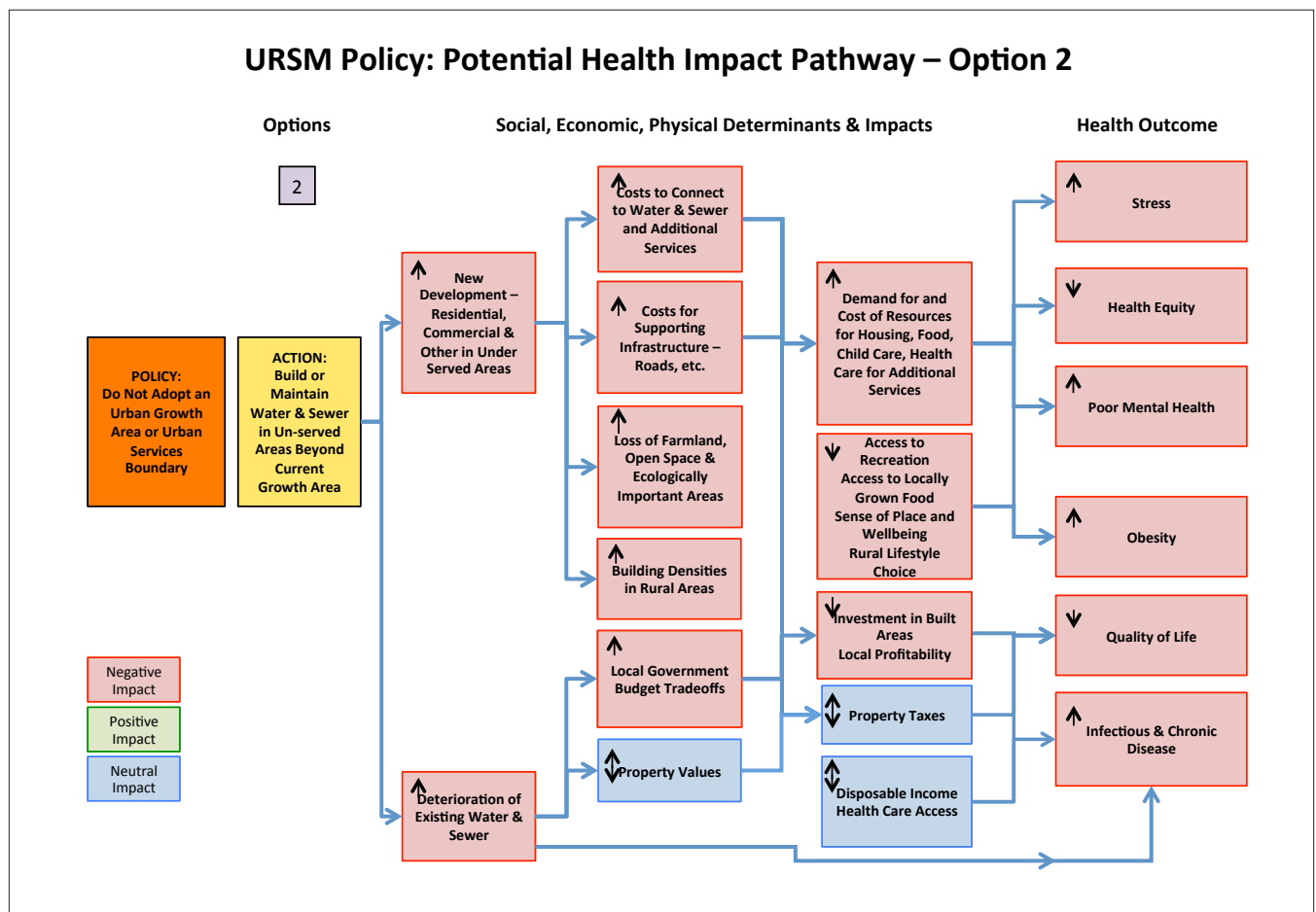


Figure III-2. Option 2: Potential Health Impact Pathway Resulting From Policies That Promote Expansion of Water and Sewer Infrastructure in Rural or Undeveloped Areas

## Option 3: Adopt a Growth Management or URSM Policy (Figure III-3).

In choosing this option, communities would maintain existing water and sewer infrastructure within the current growth area and would not allow expansion of water and sewer facilities in undeveloped or rural areas outside the growth management area. URSM policy proponents favor this option because it reduces local government budget tradeoffs, promotes accessible businesses and services, and consequently allows more disposable income for a healthier lifestyle and access to preventive care. However, this option often is challenged because it is not commonly a priority for a private developer interested in lowering immediate development costs outside the growth areas. Communities have addressed this issue by allowing development only if the cost of construction, interconnection, and long-term maintenance is paid for by the developer and future residents. The tension here is between a short-term cost saving and revenue generating to small governments versus a long-term sustainable solution through implementation of an agreed upon urban service management area policy.

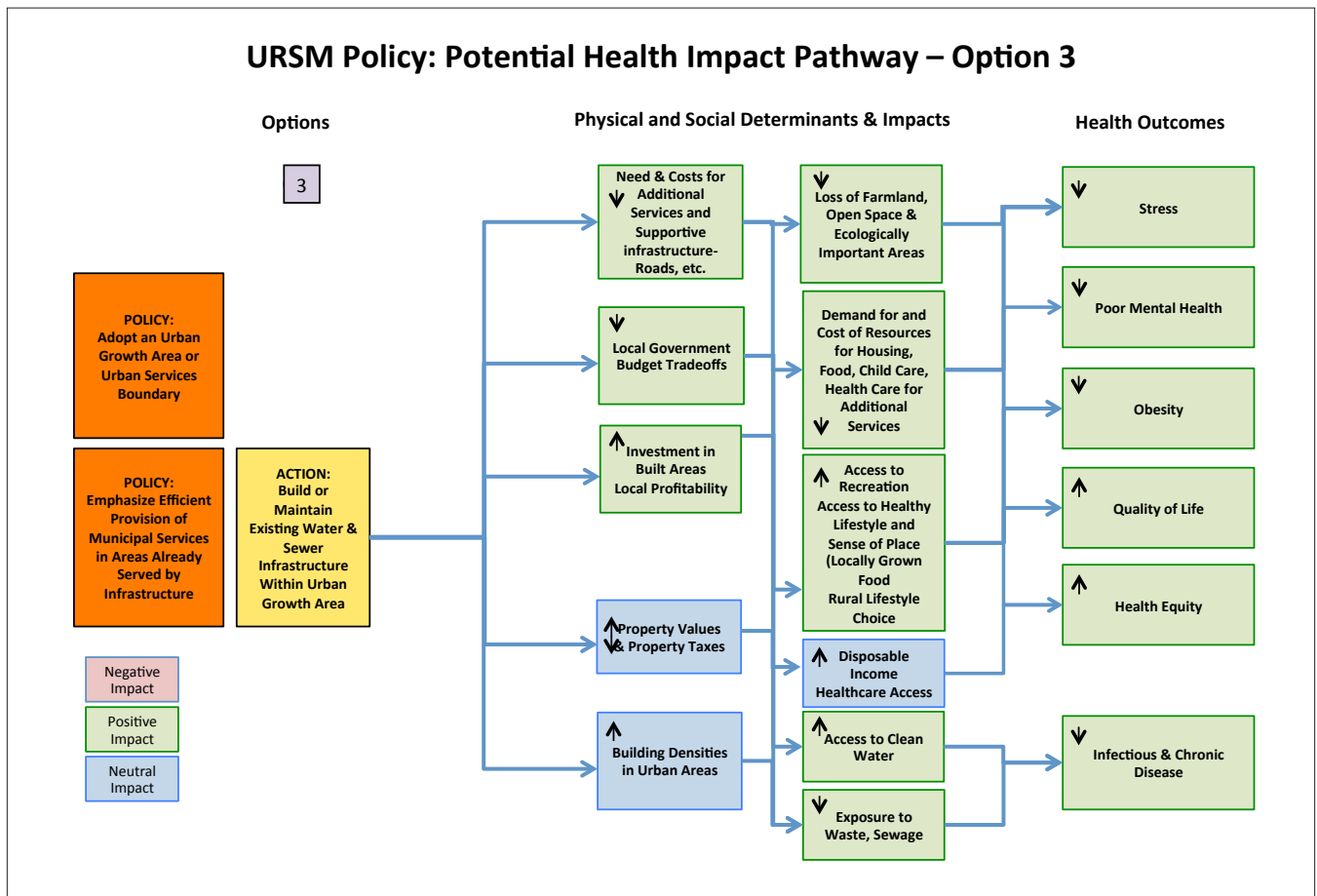


Figure III-3. Option 3: Potential Health Impact Pathway Resulting From Policies That Promote Service Boundaries or Management Areas

# Overarching Questions Considered in the URSM Policy HIA

The HIA uses the three scenarios to focus the assessment of health impacts of actual decisions a local community might face in developing land within its jurisdiction. Research was then focused on two overarching themes:

1. Does the adoption of an Urban and Rural Services Management Area Policy by a local unit of government result in promotion of healthy lifestyles and an overall improvement in public health?
2. Conversely, does the decision to extend public water and sewer systems into rural areas result in an overall decline in public health or access to healthy lifestyles?

The overarching themes were then broken down into a series of priority study areas and research questions that will be addressed in the impact assessment section of the HIA. Table III-1 provides a list of HIA priority areas and research questions.

## URSM Policy and HIA Priority Areas Research Questions

### **PRIORITY AREA 1: EXPANDING PUBLIC WATER AND SEWER INFRASTRUCTURE AND SERVICES**

(1) Are there existing or future risks to public health from deteriorating public water and sewer systems in the region?

(2) Are there specific locations where these health risks must be addressed by upgrading the public infrastructure?

(3) Are there existing or future public health risks from deteriorating septic and well systems on private land?

(4) When required to connect to public services, or required to upgrade their onsite systems, would low-income homeowners' ability to pay for health care be adversely affected?

### **PRIORITY AREA 2: MAINTAINING SURFACE WATER QUALITY**

(5) Locally, are there any land uses that are resulting in adverse impacts to surface water quality and public health concerns?

(6) Would a locally adopted Urban Service Boundary or Urban Service Management Area result in any change in the water quality in urban or rural areas?

### **PRIORITY AREA 3: PRESERVATION OF AGRICULTURE AND OPEN SPACE**

(7) In our region, do you know of any conflicting land uses that result in adverse public health impacts? If so, would the provision of public water and sewer infrastructure into areas without service decrease land use conflicts and mitigate public health issues?

(8) Would expansion of new infrastructure into areas without service reduce the public's access to local foods, recreation, and open space?

(9) Are there any land uses in the region that adversely impact air quality?

### **PRIORITY AREA 4: ENCOURAGING POLICY DEVELOPMENT AND IMPLEMENTATION AND A REGIONAL VISION**

(10) Do local existing public infrastructure policies encourage or discourage sprawl-type development?

(11) Are there new regional or local opportunities for shared water and sewer service that could incentivize downtown infill or clustered growth?

(12) Are there specific impediments to the sharing of water and sewer services that lead to competition between jurisdictions?

(13) Does the community participate in shared services with neighboring communities (an Authority, PA 425, other)?

**TABLE III-1.  
URSM POLICY PRIORITY AREAS AND RESEARCH QUESTIONS CONSIDERED IN THE HIA**

URSM Policy and HIA Priority Areas	Research Questions
<b>Priority Area 1: Expanding Public Water and Sewer Infrastructure and Services</b>	<ul style="list-style-type: none"> <li>(1) Are there existing or future risks to public health from deteriorating public water and sewer systems in the region?</li> <li>(2) Are there specific locations where these health risks must be addressed by upgrading the public infrastructure?</li> <li>(3) Are there existing or future public health risks from deteriorating septic and well systems on private land?</li> <li>(4) When required to connect to public services, or required to upgrade their onsite systems, would low-income homeowners' ability to pay for health care be adversely affected?</li> </ul>
<b>Priority Area 2: Maintaining Surface Water Quality</b>	<ul style="list-style-type: none"> <li>(5) Locally, are there any land uses that are resulting in adverse impacts to surface water quality and public health concerns?</li> <li>(6) Would a locally adopted Urban Service Boundary or Urban Service Management Area result in any change in the water quality in urban or rural areas?</li> </ul>
<b>Priority Area 3: Preservation of Agriculture and Open Space</b>	<ul style="list-style-type: none"> <li>(7) In our region, do you know of any conflicting land uses that result in adverse public health impacts? If so, would the provision of public water and sewer infrastructure into areas without service decrease land use conflicts and mitigate public health issues?</li> <li>(8) Would expansion of new infrastructure into areas without service reduce the public's access to local foods, recreation, and open space?</li> <li>(9) Are there any land uses in the region that adversely impact air quality?</li> </ul>
<b>Priority Area 4: Encouraging Policy Development and Implementation and a Regional Vision</b>	<ul style="list-style-type: none"> <li>(10) Do local existing public infrastructure policies encourage or discourage sprawl-type development?</li> <li>(11) Are there new regional or local opportunities for shared water and sewer service that could incentivize downtown infill or clustered growth?</li> <li>(12) Are there specific impediments to the sharing of water and sewer services that lead to competition between jurisdictions?</li> <li>(13) Does the community participate in shared services with neighboring communities (an Authority, PA 425, other)?</li> </ul>



# IV. URSM POLICY BASELINE:

Implementation at the Community Level

## Baseline Conditions in the Mid-Michigan Region

The baseline description provided in this section of the HIA is summarized from Chapter 2 of the Tri-County Regional Growth Plan (Growth Plan, TCRPC, 2005), which provides a detailed description of the mid-Michigan region. Mid-Michigan is centered by the City of Lansing, the state capital, and includes Ingham, Clinton, and Eaton counties. The region consists of 78 jurisdictions including the cities of East Lansing, Grand Ledge, Charlotte, Eaton Rapids, Holt, Williamston, DeWitt, and St. Johns. Major suburban townships surrounding Lansing include Meridian, Bath, DeWitt, Delta, and Delhi. There are a number of smaller rural villages and townships within the three-county region.

According to the Growth Plan, the 2000 regional population was approximately 447,728. The regional population in the 2010 Census was 464,036, demonstrating an increase of approximately 3.6 percent. By the year 2045, the area's population is projected to increase to 506,835, a 13.2% increase. Between 2005 and 2045, the population in Clinton County is expected to grow by 21.6% (from 69,359 to 84,353), Eaton County by 14.6% (from 107,190 to 122,820), and Ingham County by 7.8% (from 278,119 to 299,662). Households in Clinton County are expected to grow by 48.1% (from 27,828 to 41,219), Eaton County by 35.8% (from 43,680

to 59,318), and Ingham County by 21.7% (from 103,692 to 126,178). While this growth rate is less than 0.5% per year, if current trends continue, each additional family of four will result in approximately four additional acres of land being converted to urban use. In addition, much of this conversion is occurring in rural areas of the region outside existing urban service areas.

The developed area of the mid-Michigan region has grown faster than its population in recent years. For example, from 1978-1999 the total urbanized area increased from 103.34 square miles to 125.76 square miles or 21.7%. In contrast, the area covered by rural residential development grew from 102.94 square miles to 202.83 square miles or 97.04%. This has resulted in an increase of population in rural and suburban areas and a decrease in urban areas. As population (and the necessary housing units and demand for services) has continued to move into rural areas, there has been a decrease in active farms and publically accessible open space.

Regional population growth, distribution, and land-use trends addressed in the Growth Plan provided much of the impetus for the formation of the URSM Committee, which looked at land-use issues and trends in greater detail. The resultant 2011 Urban Service Management Study (TCRPC, 2011) provides additional

baseline information pertaining to local decision making that may be affected by a service boundary or service management area (SB/SMA) considerations during the planning process. This includes the current extent of water and sewer infrastructure, proposed water and sewer, zoning districts by location, buildable land and rural areas, and so on. This information is provided in the TCRPC study as a series of regional maps, which are reproduced with permission in the HIA as follows:

- Preliminary Greater Lansing Area Urban Service District Area & Preliminary Boundary Map (HIA Introduction, Figure I-1).
- Preliminary Urban Service Boundary and the Tri-County Regional Growth: Choices for Our Future, “Wise Growth” Scenario Map (HIA Introduction, Figure I-2).
- Existing and Planned Water Service Areas Map (HIA Impact Assessment, Figure V-1).
- Existing and Planned Sewer Service Areas Map (HIA Impact Assessment, Figure V-2).
- Developable Lands within the Proposed Urban Service Boundary Map (HIA Impact Assessment, Figure V-6).
- Compiled Zoning Districts Map (HIA Impact Assessment, Figure V-7).

4. The term mid-Michigan region is used in the HIA. The region is also known as the “Tri-County Region,” the “Greater Lansing Region,” and the “Capital Area Region.”

# Current Status of Communities Toward Adopting a URSM Policy

The URSM Committee also provides a forum for members to share information about the status of public service policy discussions in their communities or with adjacent communities; develop strategies to assist policy-related communications, adoption, and implementation; and request technical support as needed. The 2011 Tri-County Urban Service Management Study suggests two mechanisms that Michigan communities may employ to legally establish growth management policies that can limit sprawl by controlling the expansion of water and sewer service areas into rural or undeveloped areas. The first is to develop and pass a growth management policy that includes an urban services boundary. Examples of Michigan communities that have set a USB include Grand Rapids, Midland, Newaygo, Frankenmuth, and Kalkaska. The second mechanism is to establish what are known as 425 agreements. The Intergovernmental Conditional Transfer of Property by Contract Act, PA 425 of 1984, otherwise known as PA 425, and the Urban Cooperation Act, PA 7 of 1967, enable tax revenue sharing. These agreements allow communities to share tax revenues from new developments, which can reduce pressure potentially caused by annexation on undeveloped parcels in rural townships by municipalities.

As of September 2014, 23 local units of government in the mid-Michigan

region, listed below, have adopted the URSM policy language, in part, established growth management areas, revised their master plans and ordinances, or are considering growth management policies.

## CLINTON COUNTY

- VILLAGE OF FOWLER INCLUDES A SERVICES MANAGEMENT AREA POLICY IN ITS MASTER PLAN.
- DALLAS TOWNSHIP INCLUDES A SERVICES MANAGEMENT AREA POLICY IN ITS MASTER PLAN.
- DEWITT CHARTER TOWNSHIP IS CONSIDERING SERVICES MANAGEMENT BOUNDARY LANGUAGE.
- BATH CHARTER TOWNSHIP IS UPDATING ITS MASTER PLAN WITH SERVICES MANAGEMENT LANGUAGE.
- WATERTOWN CHARTER TOWNSHIP USES I-96 AS A NORTHERN DEVELOPMENT BOUNDARY.

## EATON COUNTY

- DELTA CHARTER TOWNSHIP INCLUDES A SERVICES MANAGEMENT POLICY AND BOUNDARY IN ITS MASTER PLAN.
- VILLAGE OF DIMONDALE AND WINDSOR CHARTER TOWNSHIP HAVE JOINTLY PLANNED SERVICES.
- CITY OF CHARLOTTE INCLUDES A SERVICES MANAGEMENT POLICY IN ITS MASTER PLAN.
- CITY OF GRAND LEDGE IS CONSIDERING A SERVICES MANAGEMENT POLICY.

- ONEIDA CHARTER TOWNSHIP IS CONSIDERING A SERVICES MANAGEMENT POLICY.
- CITY OF EATON RAPIDS, EATON TOWNSHIP, AND HAMLIN TOWNSHIP USES A PA 425 MAP AS A SERVICES MANAGEMENT AREA.

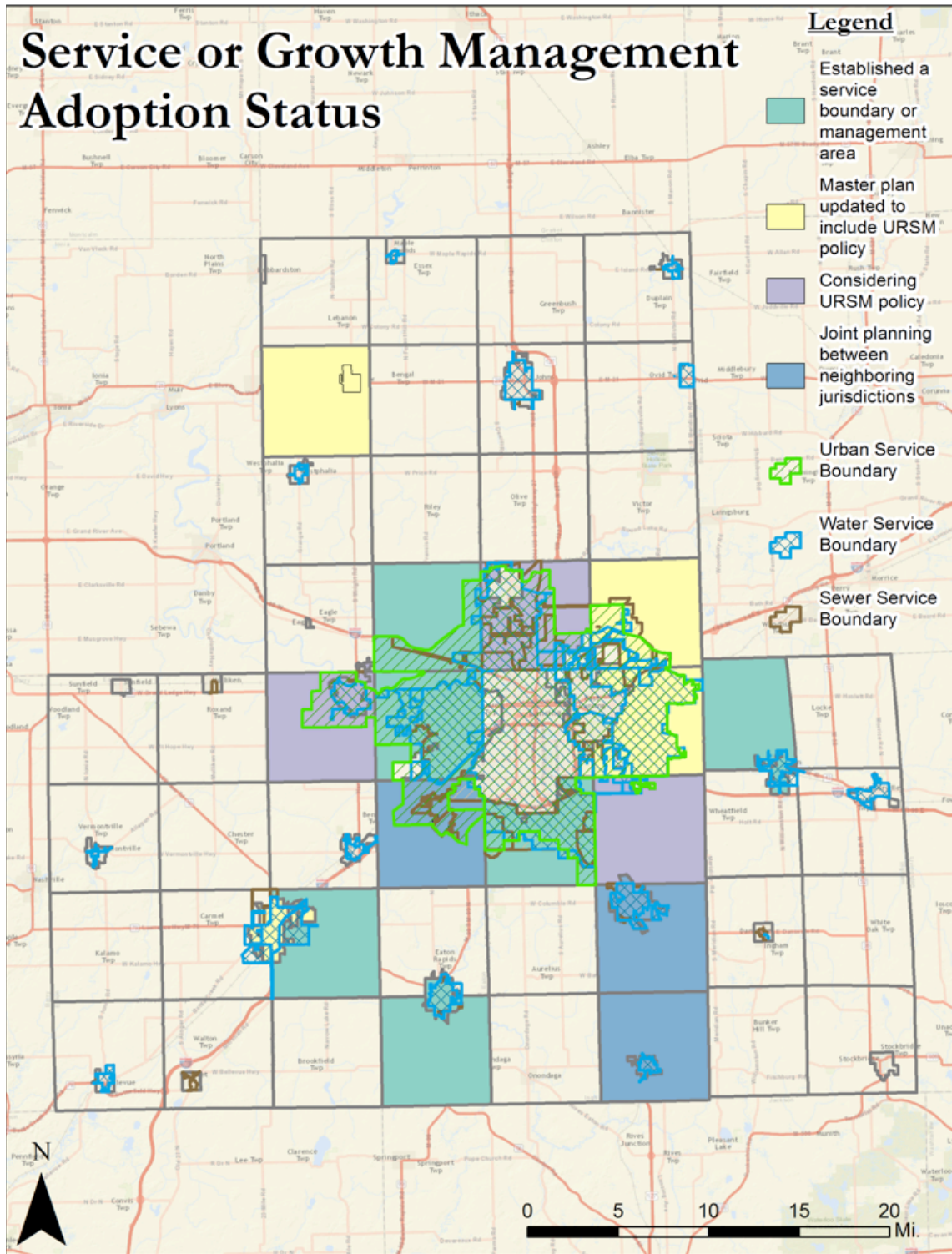
## INGHAM COUNTY

- DELHI CHARTER TOWNSHIP INCLUDES A SERVICES MANAGEMENT POLICY AND BOUNDARY IN ITS MASTER PLAN.
- CITY OF MASON AND VEVAY CHARTER TOWNSHIP HAVE CREATED A JOINT UTILITY SERVICES AGREEMENT.
- CITY OF WILLIAMSTON USES A PA 425 MAP AS A SERVICES MANAGEMENT AREA.
- WILLIAMSTOWN CHARTER TOWNSHIP USES A PA 425 MAP AS A SERVICES MANAGEMENT AREA.
- MERIDIAN CHARTER TOWNSHIP AMENDED ITS MASTER PLAN TO INCLUDE LANGUAGE DESIGNATING AN URBAN SERVICES DISTRICT.
- ALEIDON CHARTER TOWNSHIP IS CONSIDERING A SERVICES MANAGEMENT POLICY.
- CITY OF LESLIE AND LESLIE CHARTER TOWNSHIP HAVE A JOINT MASTER PLAN.

Figure IV-1 shows the distribution of communities in the mid-Michigan region adopting or considering a URSM policy and their proximity to the proposed service boundary or service management area.

FIGURE IV-1.

# CURRENT STATUS OF COMMUNITIES IN THE MID-MICHIGAN REGION ADOPTING A URSM POLICY OR GROWTH MANAGEMENT AREA





A photograph of a blue water tower on a hill overlooking a lake. The tower is the central focus, standing tall against a clear blue sky. The hill is covered in lush green trees. In the foreground, a calm lake reflects the surrounding greenery. A small white canoe with two people is on the water in the lower left. The text 'V. ASSESSMENT OF IMPACTS OF ACHIEVING A REGION-WIDE URSM POLICY' is overlaid in white, sans-serif font across the middle of the image.

V. ASSESSMENT  
OF IMPACTS OF  
ACHIEVING A  
REGION-WIDE  
URSM POLICY

# Health Impact Assessment Process Overview

The HIA on the URSM policy for the mid-Michigan region focuses on the ways in which the establishment of a URSM policy provides safe, high-quality, and sustainable public services such as water and sewer throughout the urbanized areas while: (a) preserving farmlands, open spaces, priority conservation areas, and rural lifestyles and sense of place in undeveloped areas; (b) keeping urbanized areas viable; (c) promoting intergovernmental cooperation and cost-sharing; and (d) utilizing existing infrastructure where appropriate can lead to improved health outcomes in the region.

As described in Sections II and III of this report, the HIA Project Team and the URSM Committee engaged community leaders, local elected officials, public agency employees, and members of the private sector. The HIA process was facilitated by holding numerous discussions during committee meetings, conducting a survey of committee members and other local decision makers, and conducting a series of follow-up interviews with leaders in communities that have adopted URSM or are currently in the process of adopting

a policy. This process was used to identify and prioritize: (a) local issues regarding decisions to expand water and sewer facilities into rural or underserved areas, and (b) helping to ensure that health considerations are included in the decision process.

Results of the survey are provided in Appendix B. With the results of the survey and help of the committee, four main priority areas linking local planning and decision making and health issues were identified (not ranked in order of importance):

- Expanding Public Water and Sewer Infrastructure and Services
- Maintaining Water Resources and Quality
- Preserving Agriculture and Open Space
- Encouraging Policy Development and Implementation and a Regional Vision

The HIA provides an assessment of potential health effects and outcomes for each of these priority areas. The health impact assessment process includes the following content:

- INTRODUCTORY DESCRIPTION OF THE POLICIES AND ISSUES RELATED TO EACH PRIORITY AREA;
- RESEARCH QUESTIONS THAT WERE DEVELOPED THROUGH SCOPING AND STAKEHOLDER ENGAGEMENT;
- DESCRIPTION OF EXISTING CONDITIONS IN THE REGION AND IN LOCAL COMMUNITIES;
- ASSESSMENT OF HEALTH IMPACTS AND FINDINGS, IN NARRATIVE AND TABULAR FORMATS;
- INFORMATION RESOURCES USED IN THE ASSESSMENT AND AVAILABLE FOR FUTURE ASSESSMENTS; AND
- INDICATORS THAT CAN BE MONITORED FOLLOWING ADOPTION OF THE URSM POLICY BY LOCAL GOVERNMENTS.

While research on certain aspects of the relationship between health and the establishment of local policies on the expansion of public services into rural areas is very strong, the research base is more preliminary for other aspects. The analysis notes when applicable the relative strength of the research base in each area.

# PRIORITY AREA 1:

## Expanding Public Water and Sewer Infrastructure and Services

Framing the potential health issues of expanding water and sewer infrastructure into undeveloped areas resulted in two subsets of research questions. The first subset addresses the Option 1 scenario (described in Section III and listed in Table III-1), in which communities would permit new development in underserved areas by allowing onsite well and septic systems. The second subset of research questions focuses on Options 2 and 3, in which communities would either (a) permit new development in underserved areas by extending water and sewer infrastructure, or (b) discourage urbanization of undeveloped land, instead using revenues to build and maintain water and sewer infrastructure within a defined service management area. In either case, communities would require that land developers cover the cost of constructing and maintaining new water and sewer systems.

### RESEARCH QUESTIONS

Research questions were developed through interactions with the URSM Committee and stakeholder groups and an online community survey developed by the HIA Team and administered as part of the stakeholder engagement program. Research questions regarding the potential health effects of discouraging the expansion of water and sewer infrastructure through the establishment of a URSM Policy include the following:

- (1) Are there existing or future risks to public health from deteriorating public water and sewer systems in the region?
- (2) Are there specific locations where these health risks must be addressed by upgrading the public infrastructure?
- (3) Are there existing or future public health risks from deteriorating septic and well systems on private land?
- (4) When required to connect to public services, or required to upgrade their onsite systems, would low-income homeowners' ability to pay for health care be adversely affected?

### INFORMATION REQUIREMENTS AND SOURCES TO ADDRESS THE RESEARCH QUESTIONS

The environmental health departments of the three counties in the mid-Michigan region and the Michigan Department of Environmental Quality maintain records of known areas of contaminated groundwater resources and recorded failures of private well and septic systems. Specific locations will not be identified in this assessment due to privacy concerns. County health departments in Michigan maintain extensive databases in the following areas:

- Records of exposure to toxic substances and other physical hazards.
- Records of water and sewer failures.
- Data from county health departments of known areas of contaminated groundwater resources.
- Data from county health departments of recorded failures of private well and septic systems.
- Lansing Board of Water and Light Well-head Protection Program and annual water quality reports (<https://www.lbwl.com/WaterQualityReport/>).

- U.S. Environmental Protection Agency Health Effects Summary Tables (HEAST), <http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=2877>.

Engineering departments or water and sewer authorities (e.g., Lansing Board of Water and Light, East Lansing-Meridian Township, Grand Ledge-Delta Township, and so on) in local jurisdictions also maintain electronic files of existing public water and sewer infrastructure. Location of infrastructure within urban and suburban areas that continue use of private well and septic systems will also be important.

The Ingham County Environmental Health Viewer (<http://hdgis.ingham.org/ICHHD/Map.aspx>) was used to determine geographic areas that may contain contaminated wells, contaminated soils, or potential sources of surface or ground water pollution. In addition, U.S. Census data are used to identify urban and suburban areas containing populations at risk for exposure to surface or groundwater contamination of private wells and increased costs of either maintaining private water and septic as well as increasing taxes to pay for public water and sewer infrastructure expansion or maintenance.

### EXISTING CONDITIONS – PUBLIC WATER AND SEWER SYSTEMS

Preliminary review of baseline water quality in the region was used to address research questions 1 and 2: First, are there existing or future risks to public health from deteriorating public water and sewer systems in the region? And second, are there specific locations where these health risks must be addressed by upgrading the public infrastructure? Moreover, many communities are facing long-term issues regarding both operational and financial gaps that may have an adverse affect on the future quality and quantity of water resources and public health as funding to support infrastructure decreases.

One of the biggest challenges facing Michigan communities and metropolitan areas is aging and deteriorating infrastructure. In the 2013 Report Card for America's Infrastructure, the American Society of Civil Engineers' (ASCE) estimated that about \$3.6 trillion needs to be invested in infrastructure by 2020, with an estimated \$1.6 trillion shortfall in the amount. ASCE estimates an

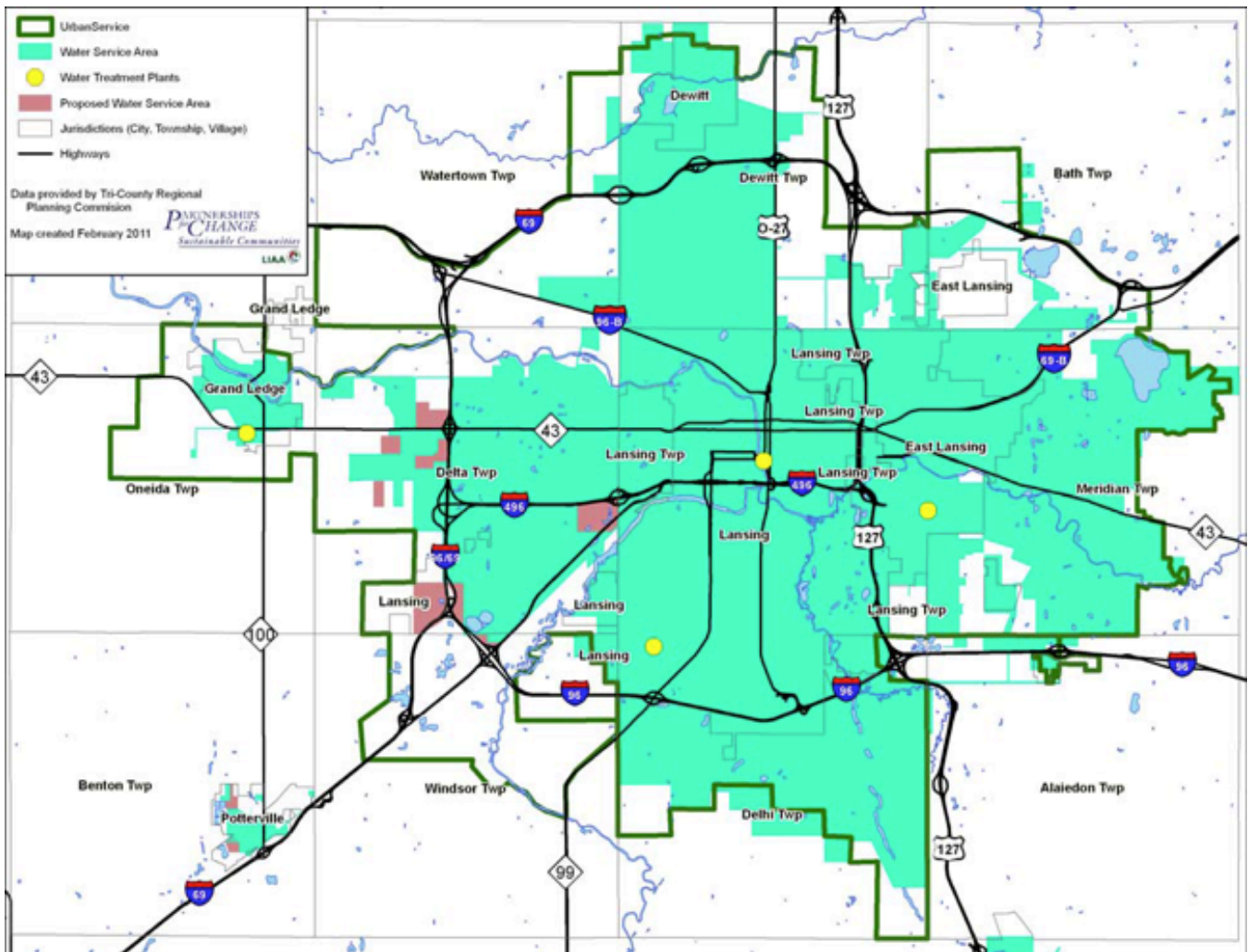
approximately \$930 billion funding gap for surface transportation and water and wastewater infrastructure. Michigan received a "D" on the most recent report card for America's infrastructure. With inadequate funding to support the current water infrastructure, there would be little reason to hope that the state can improve on the "D" performance.

In the mid-Michigan region, all municipalities and the more developed townships provide public water and sewer services. Review of information provided by the environmental health divisions in Clinton, Eaton, and Ingham counties and the Lansing Board of Water and Light Well-head Protection Program indicates that there are no significant or long-term impacts to the public from the primary source of potable water, which includes the deep Saginaw aquifer and shallow glacial water deposits, although the Lansing Board of Water and Light indicates that the deep aquifer is highly susceptible to contamination (BWL, 2014). There are isolated areas within the shallow glacial aquifers that are contaminated,

primarily from agricultural practices in rural areas and industrial practices in more urbanized areas. Most of the contaminated sources have been mapped and archived by the Michigan Department of Environmental Quality and the county health departments. Contaminated water supplies are considered neither extensive nor do they pose a significant health concern, and all local water authorities report compliance with US EPA drinking water standards.

Current and proposed water and sewer service areas are shown in Figure V-1 and Figure V-2, respectively (TCRPC, 2011). Rural areas are almost exclusively served by private wells and septic systems. Increasingly, local jurisdictions have required engineered septic systems on all new development due to the heavy clay soils found throughout the region. Septic system failures are an ongoing issue in rural areas and in some urban areas that have not "hooked into" public sewer systems. Failed septic systems may also adversely affect water quality in shallow wells.

FIGURE V-1.  
EXISTING AND PLANNED WATER SERVICE AREAS



As shown in Figure V-1, the existing and planned water service areas focus on the metropolitan Greater Lansing region. The figure shows the major urban core along with the suburban areas that have experienced the most consistent growth over the past 20 to 30 years. The proposed USM boundary (depicted as the solid green line) encompasses the growth areas and provides additional areas for future growth and expansion of public water infrastructure.

FIGURE V-2.  
EXISTING AND PLANNED SEWER SERVICE AREAS

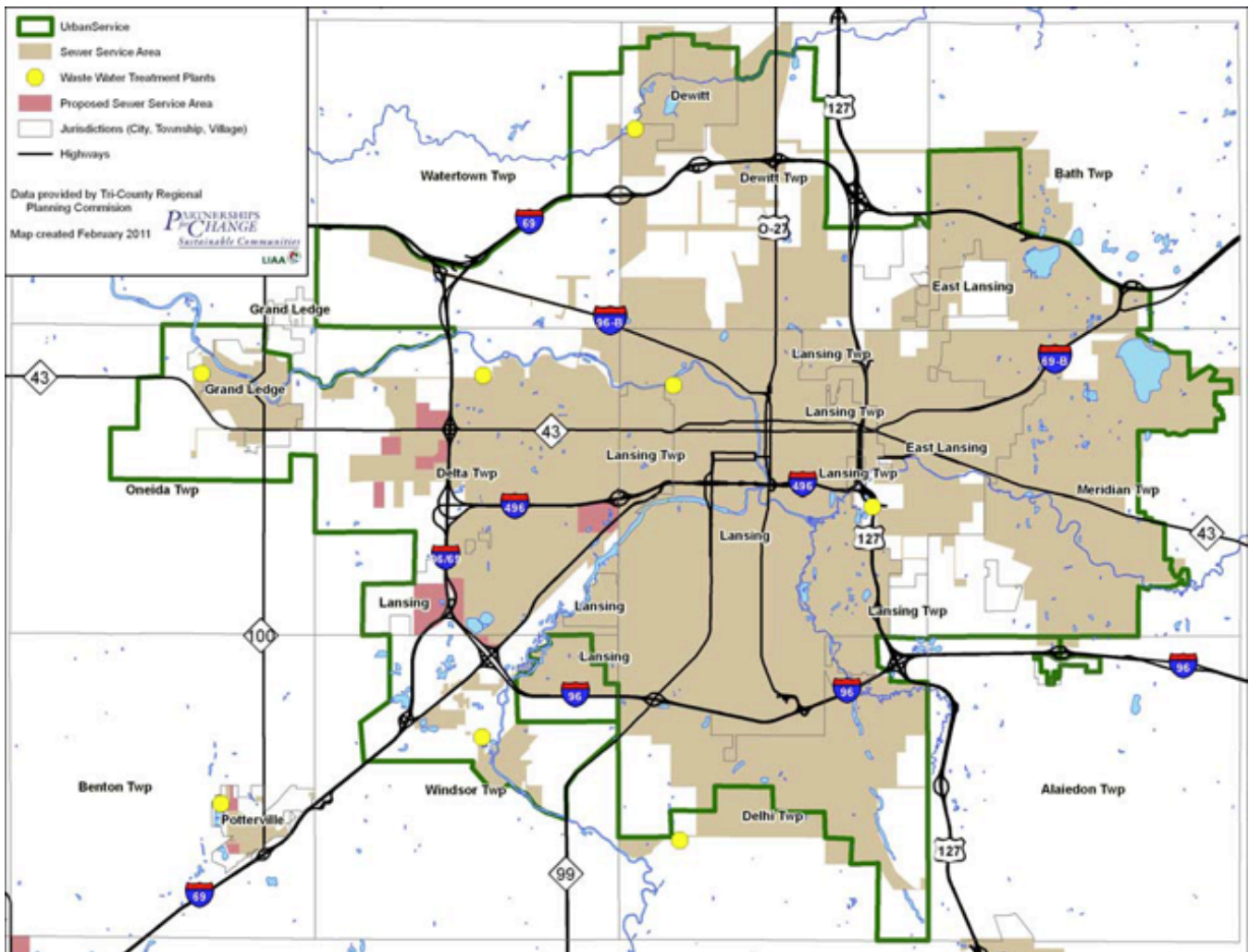


Figure V-2 shows the existing and planned sewer service areas in the metropolitan Greater Lansing region. The figure shows the major urban core along with the suburban areas that have experienced the most consistent growth over the past 20 to 30 years. The proposed URSM boundary (depicted as the solid green line) encompasses the growth areas and provides additional areas for future growth and expansion of public sewer infrastructure.

### EXISTING CONDITIONS – PRIVATE WELL AND SEPTIC SYSTEMS

This section addresses the research question whether deteriorating septic and well systems on private land lead to existing or future public health risks, and when required to connect to public services, or required to upgrade their onsite systems, would low-income homeowners' ability to pay for health care be adversely affected? Figures V-1 and V-2 show areas within the Lansing metropolitan area that are currently served by public water and sewer or likely to be served in the future. Most of the regions outside these areas use private wells for drinking water and septic systems to handle wastewater.

Although not widespread, private well and septic systems occasionally fail throughout the region. Private wells in shallow aquifers are vulnerable to contamination from failed septic tanks and fields, agricultural pesticides, herbicides, and fertilizers; and from past industrial uses. Potential effects of private well and septic systems are shown in Tables V-1 and V-2. Septic systems typically fail due to poor soil conditions. Most municipalities now require relatively expensive engineered septic systems and recommend regular testing of private wells. Landowners

who do not have the money to drill a new well or replace a septic system or regularly have the systems tested, may continue to be exposed to pathogens and contaminants without knowing until someone in the household becomes physically ill. Even then, the household budget may not be able to handle both medical treatment and well and septic maintenance.

The wellhead protection program provides information on both public and private sources of groundwater, as well as known locations of contamination. All wells require testing when completed. Public wells receive regular testing and the health departments recommend periodic testing of private wells. New developments, particularly multi-family residential developments in rural areas having either separate septic systems or large engineered systems, can become a source of contaminated groundwater. Expansion of such developments in the mid-Michigan region outside of the existing water and sewer infrastructure must be designed to ensure that water quality, especially if located near public well fields, will not be adversely affected. Otherwise, these developments must be connected to municipal systems.

### POTENTIAL HEALTH IMPACTS FROM THE EXPANSION OF WATER AND SEWER INFRASTRUCTURE INTO RURAL OR UNDEVELOPED AREAS

Table V-1 provides a summary of issues regarding local decisions to maintain existing public water and sewer infrastructure or allow expansion of services into rural areas that were identified during the scoping sessions and the survey of stakeholders (See Appendix A and Appendix B). Based on the opinions expressed by stakeholders and the literature, primary health concerns include exposure to disease-causing pathogens or organic contaminants from failed or deteriorating sewers, failed or deteriorating private septic systems, and compromised sources of drinking water, whether public or private. Stakeholders were also concerned about costs of sprawl into undeveloped areas, upgrading or expanding existing water and sewer infrastructure, and how these actions might lead to public health concerns. The table identifies the potential health risks for each issue and goals of the URSM policy that local communities can use to address the health concerns and health outcomes communities should anticipate.



PRIORITY AREA 1: EXPANDING PUBLIC WATER AND SEWER INFRASTRUCTURE AND SERVICES

**TABLE V-1.  
SUMMARY OF POTENTIAL HEALTH EFFECTS OF EXPANDING WATER AND SEWER INFRASTRUCTURE INTO RURAL OR UNDEVELOPED AREAS**

Water/Sewer Issue	Health Risk	URSM Policy Goals	Health Outcome	Information and Indicator Resources
<b>Health risks to public from existing/future deterioration of water &amp; sewer infrastructure.</b>	<p>Direct exposure to contaminants at specific locations of system failure.</p> <p>Increased taxes lead to stress and reduced access to health care.</p>	<p>Deteriorating water &amp; sewer can be repaired and maintained using existing revenues.</p> <p>Public revenues can be focused on specific problem areas.</p>	<p>Decreased exposure to surface or ground water contamination leading to reductions in infectious diseases.</p> <p>Decrease in stress and anxiety.</p> <p>Increase in health equity and access to health care.</p> <p>Increase in quality of life.</p>	<p><a href="http://www.nlm.nih.gov/health/publications/stress/index.shtml">http://www.nlm.nih.gov/health/publications/stress/index.shtml</a></p> <p><a href="http://www.nlm.nih.gov/health/publications/depression/index.shtml">http://www.nlm.nih.gov/health/publications/depression/index.shtml</a></p>
<b>Costs of upgrading, maintaining, or expanding water &amp; sewer infrastructure.</b>	<p>Increase in property taxes and household budget trade-offs.</p> <p>Potential community-wide economic and health trade-offs.</p>	<p>Low-income homeowners' ability to pay for health will not be adversely affected.</p> <p>Development can be directed to areas with existing water &amp; sewer.</p> <p>Costs of new water &amp; sewer can be passed along to developers.</p>	<p>Increase in health equity and access to health care.</p> <p>Increase in quality of life.</p> <p>Decrease in stress and anxiety.</p>	<p><a href="http://www.atsdr.cdc.gov/substances/toxsubstance.asp?toxid=3">http://www.atsdr.cdc.gov/substances/toxsubstance.asp?toxid=3</a></p>
<b>Effects of sprawl.</b>	<p>Potential economic and health trade-offs.</p>	<p>Reduction of sprawl into suburban and rural areas.</p> <p>Costs of new water &amp; sewer can be passed along to developers.</p> <p>Reduced short- and long-term costs to residents.</p>	<p>Increase in health equity and access to health care.</p> <p>Increase in quality of life.</p> <p>Decrease in stress and anxiety.</p>	<p><a href="http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1448005/">http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1448005/</a></p>
<b>Health risks to homeowners and public from deteriorating septic and well systems on private land.</b>	<p>Increased taxes lead to stress and reduced access to health care for economically disadvantaged residents.</p> <p>Exposure to contaminants from improperly maintained or failed private wells and septic.</p>	<p>Public revenues can be focused on health issues caused by private system failure.</p>	<p>Decreased exposure to surface or ground water contamination. Decrease in stress and anxiety.</p> <p>Increase in health equity and access to health care.</p> <p>Increase in quality of life.</p>	<p><a href="http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1638204/pdf/envhper00308-0137.pdf">http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1638204/pdf/envhper00308-0137.pdf</a></p> <p><a href="http://water.epa.gov/drink/info/well/health.cfm">http://water.epa.gov/drink/info/well/health.cfm</a></p> <p><a href="http://www.cdc.gov/healthywater/drinking/private/wells/diseases.html">http://www.cdc.gov/healthywater/drinking/private/wells/diseases.html</a></p>

### ASSESSMENT OF FINDINGS

Communities in the region conduct regular maintenance and periodic upgrades of water and sewer systems within their jurisdictions. Deteriorating water and sewer systems are not a region-wide problem, although there have been localized failures of very old sewer lines and occasional ruptures of water mains due to accidents or freezing. The potential for adverse health effects due to system failure is considered minimal in the short term. Longer-term problems are not seen as an issue as long as the existing infrastructure receives regular maintenance. For example, ongoing sewer separation projects have ensured that both stormwater and wastewater systems received upgrades as part of the projects.

All public water comes from deep aquifers, which are considered very high quality and sufficient quantity, with no immediate threat to public health. All municipal water treatment facilities in the region are considered under capacity, suggesting that future development could be accommodated. The quality and quantity are expected to remain so for the immediate future.

The U.S. Environmental Protection Agency has established procedures for assessing the exposure pathways and health risk of contaminated sources of drinking water and will not be repeated in this report (Ortolano, 1997; USEPA, 1986). In order to ensure that tap water is safe to drink, EPA prescribes regulations which limit the amount of certain contaminants in water provided by public water systems.

FDA regulations establish limits for contaminants in bottled water, which must provide the same protection for public health.

The Michigan Department of Environmental Quality and county health departments maintain data on all areas of known contaminated groundwater that may potentially affect public water sources. The state's wellhead protection program identifies public wells that are vulnerable to contamination. The Lansing Board of Water and Light (2014) provides an annual review of sources of drinking water in the mid-Michigan region (both tap water and bottled water), which includes rivers, lakes, streams, ponds, reservoirs, springs, and wells. The BWL tracks potential contaminants from stormwater runoff, sewage treatment plant discharges, and sanitary sewer overflows, including viruses and bacteria; organic compounds like pesticides, herbicides, and fertilizers; various industrial chemicals, and so on. Potential impacts in the longer term may include very local overuse and contamination, particularly intrusion of salt-water and hydrocarbons, which can cause adverse health effects and are very difficult and costly to remediate. There are no known incurrences of either in the region.

Some people may be more vulnerable to contaminants in drinking water than is the general population. Immune-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or

other immune system disorders, some elderly, and infants can be particularly at risk of infections (BWL, 2014). These people should seek advice about drinking water from their healthcare providers.

Maintenance of existing public water and sewer infrastructure can place a financial burden on households least able to afford increasing costs of continuing maintenance through their property taxes. For example, the costs of sprawl may adversely affect underserved or at-risk populations disproportionately, leading to adverse health effects. Adding in potential expenses of extending and maintaining new infrastructure are likely to add to the tax burden. This may lead to trade-offs in how the household budget is apportioned, and expenditures for health care may be a casualty. The strain on the household budget may lead to increased feelings of stress, depression, and anxiety. If there is no money in the budget for a visit to a health clinic, these problems may become more acute.

The next three figures help illustrate situations in which specific at-risk or underrepresented populations may be affected by the decision to establish a service boundary and what might happen if the decision is to limit expansion and continue maintenance of existing infrastructure. The figures also show potential effects if infrastructure is expanded beyond the service boundary.

5. The Regional Growth Plan provides an in-depth analysis of the economic and fiscal impacts of sprawl. This report has been summarized in Appendix C.
6. The illustrations were compiled using the Mid-Michigan Health Impact Assessment Toolkit (<http://hiatoolkit.weebly.com/index.html>).

FIGURE V-3.

# PROPOSED SERVICE BOUNDARY (GREEN LINE) IN PROXIMITY TO AREAS WITH A LARGE ELDERLY POPULATION

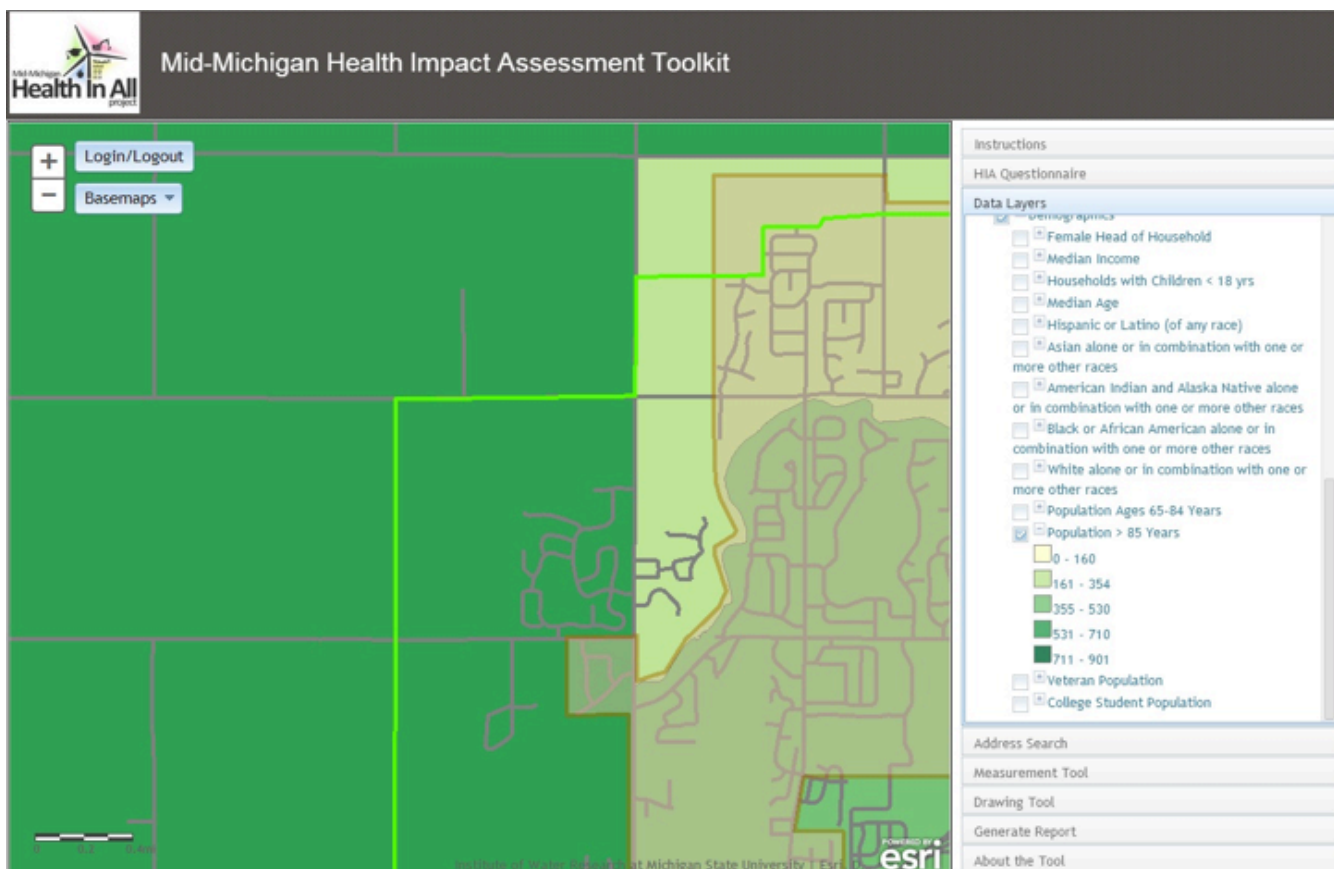


Figure V-3 shows a proposed service boundary in proximity to areas with a large population of elderly people. In this illustration, the area east of the services boundary shows a residential development that is currently served by public water and sewer. The proposed service boundary (green line) would allow expansion of the developed area westward. As shown in the figure, a high proportion of the population to the west of the developed area and service boundary consists of persons 85 years old and older, presumably retired and living on fixed incomes. Expansion of the water and sewer system into the undeveloped area may result in higher property taxes on those residents least able to afford an increase in taxes, potential leading to less disposable income to pay for health services. A community could use this information to adjust the service boundary to avoid or mitigate adverse economic effects on the elderly residents.

FIGURE V-4.

# PROPOSED SERVICE BOUNDARY (GREEN LINE) IN PROXIMITY TO AREAS WITH A LARGE LOW-INCOME POPULATION

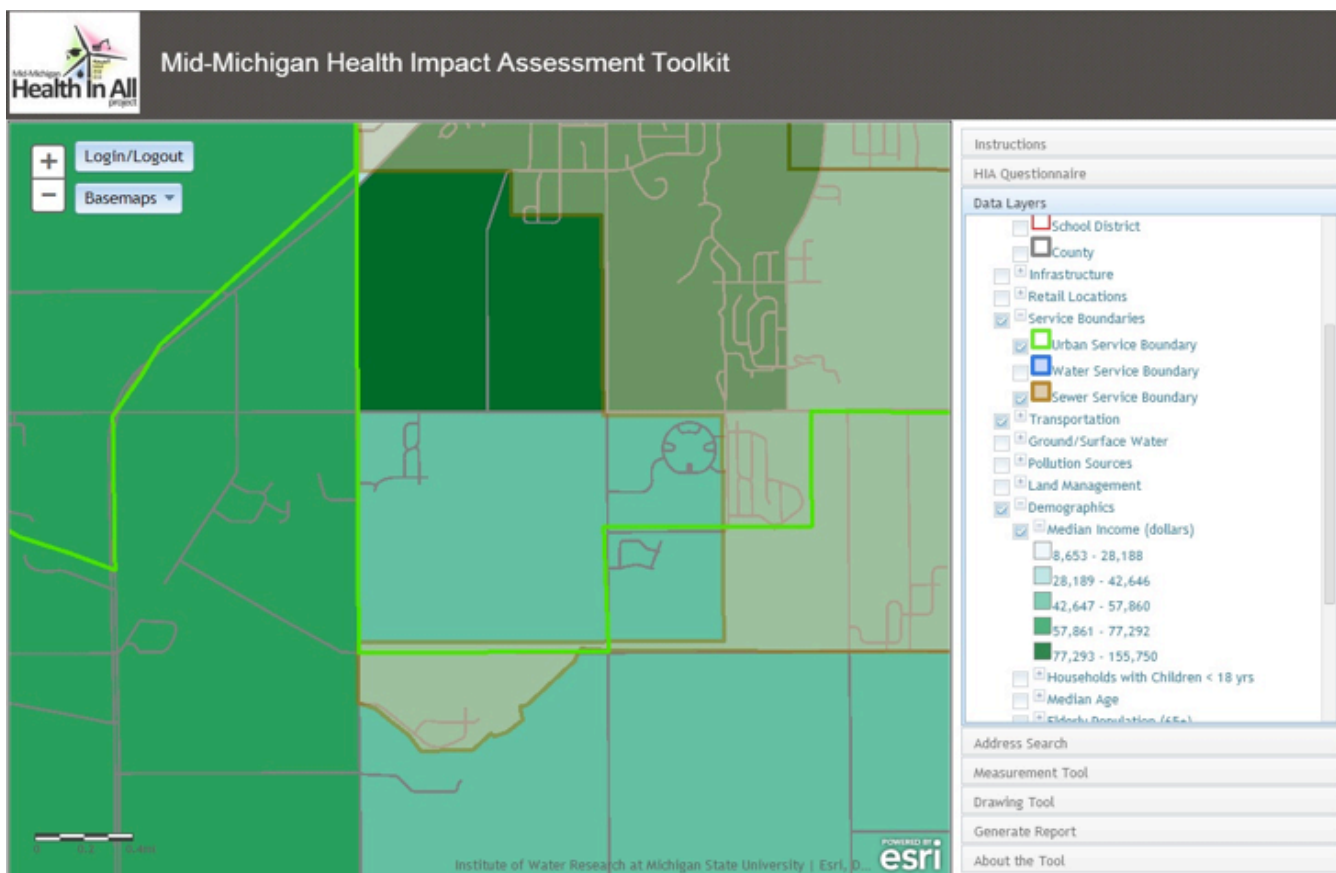


Figure V-4 shows the proximity of the proposed service boundary to lower-income groups. In this illustration, the area north of the services boundary (green line) shows a residential development that is currently served by public water and sewer. The proposed service boundary would allow expansion of the developed area southward. As shown in the figure, a high proportion of the population to the south of the developed area and service boundary consists of persons within several low-income groups with median incomes of \$42,000 or less (blue-green color). Expansion of the water and sewer system into the undeveloped area may result in higher property taxes on those residents least able to afford an increase in taxes, potentially leading to less disposable income to pay for health services or maintain a higher quality of life. A community could use this information to adjust the service boundary to avoid or mitigate adverse economic effects on the low-income residents.

FIGURE V-5.

# PROPOSED SERVICE BOUNDARY (GREEN LINE) IN PROXIMITY TO AREAS WITH A LARGE MINORITY POPULATION

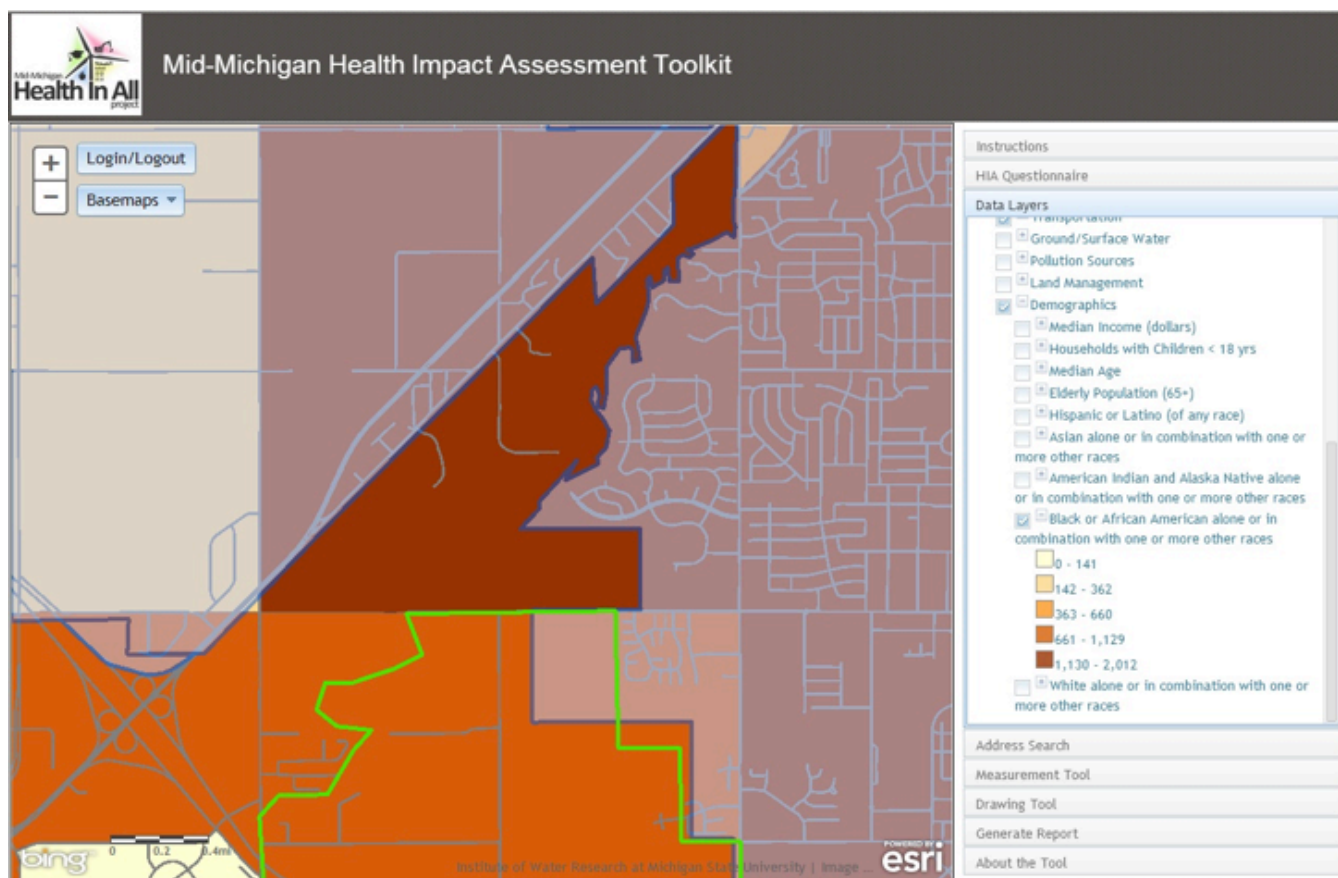


Figure V-5 shows the proximity of the proposed service boundary to certain minority groups. In this illustration, the area north of the services boundary (green line) shows a residential development that is currently served by public water and sewer. The proposed service boundary would allow expansion of the developed area westward. As shown in the figure, a high proportion of the population to the south and west of the developed area and service boundary consists of a high proportion of minority populations (orange and brown-orange colors). Expansion of the water and sewer system into the undeveloped area may result in increased costs and other impacts disproportionately on those minority residents. Higher property taxes may result in less disposable income to pay for health services or maintain a higher quality of life. A community could use this information to adjust the service boundary to avoid or mitigate adverse economic, social, or health effects on the minority residents. On the other hand, the community may use the service boundary to direct more equitable economic benefits to the minority populations that had been under served in the past.

# PRIORITY AREA 2:

## Maintaining Surface Water Quality

Public infrastructure – roads, commercial centers, drinking water systems, sewer systems, energy plants, and recreational trails – are critical to the economic success of communities and the State of Michigan. The condition of the water infrastructure has a direct effect on water quality and quantity. During the stakeholder involvement process, URSM Committee members and stakeholder groups expressed concern regarding urban sprawl and identified the protection of surface water and ground water resources as an important goal in land development in the mid-Michigan region. Stakeholders specifically identified goals of watershed protection and enhanced tourism and recreation opportunities that could be addressed by a growth management or URSM policy (See Appendix A and Appendix B). From the standpoint of health, project participants were concerned about improving and protecting water quality, minimizing public exposure to pathogens and contaminants in local lakes and streams, and reducing health hazards from toxins in fish.

### RESEARCH QUESTIONS

Research questions were developed through interactions with the URSM Committee and stakeholder groups and an online community survey developed by the HIA Team and administered as part of the stakeholder engagement program. There are two research questions related to land use practices and surface water quality considered in the assessment of potential effects on health. These research questions are as follows:

- (5) Locally, are there any land uses that are resulting in adverse impacts to surface water quality and public health concerns?
- (6) Would a locally adopted Urban Service Boundary or Urban Service Management Area result in any change in the water quality in urban or rural areas?

### INFORMATION REQUIREMENTS AND SOURCES TO ADDRESS THE RESEARCH QUESTIONS

The Michigan Department of Environmental Quality (MDEQ) tracks surface water resources statewide using samples obtained at specific locations and noting trends that apply to similar locations (MDEQ, 2014). The draft 2014 assessment of inland

lakes, reservoirs, and rivers and streams provides an annual summary of surface water quality by designated use (e.g., fish consumption, partial and total body contact, drinking water intake, and supporting other indigenous aquatic life and wildlife) that may have potential health impacts to people using the resources. This information was used to address the HIA research questions whether local land uses contribute to impacts to surface water quality and potential public health concerns, and whether the adoption of a growth management or URSM policy result in any change in water quality in urban or rural areas.

The environmental health divisions in Clinton, Eaton, and Ingham counties, in coordination with MDEQ, maintain records of impaired surface waters and areas containing contaminated soils and potential sources of pollutants.

### EXISTING CONDITIONS

Surface water resources in the mid-Michigan region are not used as sources of public water and are rarely used for private drinking water supplies. Lakes and streams in the region are generally considered safe for total body contact and recreational use. Contaminants found in surface waters

include pesticides and fertilizers used in agricultural and residential areas, coliform bacteria, and some heavy metals. The potential health effects of these chemicals on human populations are listed on Table V-2.

Surface water quality in the region is relatively good for most human uses. Land uses in areas not served by public water and sewer systems include agriculture; rural residential, which generally include detached single-family units on large lots, multiple-family subdivisions, apartments, and mobile-home parks; and recreation. Although agricultural development can potentially adversely affect surface water quality, most farms with livestock conform to the Michigan Right to Farm Act, P.A. 93 of 1981, which authorizes the Michigan Commission of Agriculture and Rural Development to develop and adopt Generally Accepted Agricultural and Management Practices (GAAMPs) for farms and farm operations in Michigan. These farm management practices are scientifically based and updated annually to utilize current technology, promoting sound environmental stewardship on Michigan farms. Of particular importance is the control of manure spread on farm fields during

the winter and in close proximity to surface drainage. Runoff carrying high levels of phosphorus from farm fields can also degrade the quality of surface waters, often leading to degradation of lakes and public water supplies in the Great Lakes Basin. Unfortunately, there are no similar rules controlling non-point source runoff from non-agricultural uses.

The 2014 MDEQ statewide surface water resources report includes the following summary of surface water quality by designated use (e.g., fish consumption, partial and total body contact, drinking water intake, and supporting other indigenous aquatic life and wildlife) that may have potential health impacts to people using the resources (MDEQ, 2014).

Health advisories promulgated by MDEQ are recommended for people consuming fish caught in local lakes and streams. Agricultural and industrial chemicals most often found in fish include mercury, hexachlorobenzene, PCB, chlordane, DDT, heptachlor epoxide, and dieldrin, which are breakdown products of heptachlor and aldrin. Other contaminants such as lindane, terphenyl, PBB, heptachlor, and aldrin have not been found in mid-

Michigan surface waters and should not be considered a health issue at this time. Although advisories can only suggest that people not consume fish taken from potentially contaminated waters, an HIA can be a valuable tool in helping to inform the public and local authorities of health concerns and develop policies and actions to control contaminants from various non-point sources.

Potential health effects from frequently detected agricultural pesticides include liver and kidney damage, neurological problems, and cancer (NRDC, 1993). Water chemistry and fish tissue monitoring indicates that about 90% of the assessed acres do not support the fish consumption designated use because atmospheric deposition continues to be a major source of PCBs and mercury to Michigan's inland waters; however, localized sources are still contributing to mercury and PCB fish contamination problems in some inland lakes, impoundments, and rivers. And, more than 98% of the assessed river miles do not support fish consumption or total body contact recreation primarily due to PCBs and mercury contamination (MDEQ, 2014).

In addition, monitoring for *E. coli* found that approximately 95% and 87% of the assessed inland lake and reservoir shoreline miles support the partial body contact and total body contact designated uses, respectively. Despite this, people using lakes and streams in the mid-Michigan region are encouraged to heed beach-closing advisories before engaging in partial body contact and total body contact designated uses.

As indicated in Priority Area 1, some people may be more vulnerable to contaminants in surface water than the general population. Immune-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk of infections (BWL, 2014). These people should seek advice about contact with surface water resources from their healthcare providers.



### ASSESSMENT OF HEALTH IMPACTS AND INFORMATION RESOURCES

Table V-2 provides a summary of issues regarding local decisions to expand water and sewer infrastructure that may affect water quality that were identified during the scoping sessions and the survey of stakeholders (See Appendix A and Appendix B). The table identifies the potential health risks for each issue and goals of the URSM policy that local communities can use to address the health concerns and health outcomes communities should anticipate. The potential health outcomes for reducing or eliminating public exposure to the contaminants monitored by MDEQ include the following:

- REDUCTION IN ADVERSE REACTIONS TO TOXINS.
- INCREASE IN HEALTH EQUITY.
- INCREASE IN QUALITY OF LIFE.
- REDUCTION IN INFECTIOUS DISEASES.

The potential health effects on human receptors of contaminants found in surface water resources in mid-Michigan are well documented (see, for example: US EPA, 2014; Agency for Toxic Substances and Disease Registry, 2014; National Institutes of Health, 2014). Although many of these contaminants are found in runoff from farming operations, not all runoff containing potential contaminants is sourced in agricultural lands. Nonpoint-source runoff from lawns, streets, and parking lots contribute substantial amounts of contaminants to receiving surface waters, and stormwater and sewage that may be bypassed at water treatment plants are also significant sources of pollutants that have an adverse effect on health. The primary goal of the URSM Policy is to ensure that existing and future land uses in local communities will not adversely affect surface water quality and public health and to improve overall water quality.

The answer to the HIA research question that asks whether adoption of a growth management or URSM policy would result in any change in water quality in urban or rural areas is less clear. Given the overall quality of both ground and surface water resources in the mid-Michigan region, the continued ability to meet standards for drinking water and total body contact, and lack of known threats to this status, there is no immediate need to expand public water and sewer into rural and undeveloped areas. Moreover, continued maintenance of existing infrastructure appears to be effective in protecting public health. If water quality monitoring or future urbanization pressure reveals potential problems, a URSM policy can help guide where and when services need to be better maintained, upgraded, or expanded to meet existing demand and not create future demand in rural areas.

**TABLE V-2.  
POTENTIAL HEALTH EFFECTS OF CHRONIC EXPOSURE TO MONITORED CONTAMINANTS IN SURFACE WATERS IN  
MID-MICHIGAN FROM URBAN AND RURAL SOURCES**

Contaminant	Health Risk	URSM Policy Goals	Health Outcome	Information and Indicator Resources
<b>Aldrin/dieldrin</b>	Damage to nervous system; headaches.	Improved water quality in urban and rural areas.	Decreased exposure to surface or ground water contamination leading to reductions in infectious diseases.  Decrease in stress and anxiety.  Increase in health equity and access to health care.  Increase in quality of life.	<a href="http://www.atsdr.cdc.gov/phs/phs.asp?id=315&amp;tid=56">http://www.atsdr.cdc.gov/phs/phs.asp?id=315&amp;tid=56</a>
<b>Mercury</b>	Kidney damage.	Improved water quality in urban and rural areas.	Same outcome.	<a href="http://water.epa.gov/drink/contaminants/basicinformation/mercury.cfm">http://water.epa.gov/drink/contaminants/basicinformation/mercury.cfm</a>
<b>Hexachlorobenzene</b>	Kidney damage; reproductive problems; cancer.	Improved water quality in urban and rural areas.	Same outcome.	<a href="http://water.epa.gov/drink/contaminants/basicinformation/hexachlorobenzene.cfm">http://water.epa.gov/drink/contaminants/basicinformation/hexachlorobenzene.cfm</a>
<b>PCB</b>	Kidney damage; reproductive problems; cancer; skin changes; thymus gland problems; immune and nervous system problems.	Improved water quality in urban and rural areas.	Same outcome.	<a href="http://water.epa.gov/drink/contaminants/basicinformation/polychlorinated-biphenyls.cfm">http://water.epa.gov/drink/contaminants/basicinformation/polychlorinated-biphenyls.cfm</a>
<b>Chlordane</b>	Increased risk of cancer; nervous system problems	Improved water quality in urban and rural areas.	Same outcome.	<a href="http://water.epa.gov/drink/contaminants/basicinformation/chlordane.cfm">http://water.epa.gov/drink/contaminants/basicinformation/chlordane.cfm</a>
<b>DDT</b>	Variety of nervous related symptoms	Improved water quality in urban and rural areas.  Permitted land uses in rural areas will not affect water quality and public health.	Same outcome.	<a href="http://npic.orst.edu/factsheets/ddttech.pdf">http://npic.orst.edu/factsheets/ddttech.pdf</a>
<b>Heptachlor epoxide</b>	Liver damage and cancer	Improved water quality in urban and rural areas.	Same outcome.	<a href="http://water.epa.gov/drink/contaminants/basicinformation/heptachlor-epoxide.cfm">http://water.epa.gov/drink/contaminants/basicinformation/heptachlor-epoxide.cfm</a>
<b>Arsenic in contaminated wells and runoff</b>	Human carcinogen	Permitted land uses in rural areas will not affect water quality and public health.	Same outcome.	<a href="http://www.atsdr.cdc.gov/substances/toxsubstance.asp?toxid=3">http://www.atsdr.cdc.gov/substances/toxsubstance.asp?toxid=3</a>  <a href="http://water.epa.gov/drink/info/well/health.cfm">http://water.epa.gov/drink/info/well/health.cfm</a>  <a href="http://www.cdc.gov/healthywater/drinking/private/wells/diseases.html">http://www.cdc.gov/healthywater/drinking/private/wells/diseases.html</a>
<b>Nitrates in contaminated wells</b>	Blue Baby Syndrome leading to death	Permitted land uses in rural areas will not affect water quality and public health.	Same outcome.	<a href="http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1638204/pdf/envhperoo308-0137.pdf">http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1638204/pdf/envhperoo308-0137.pdf</a>
<b>Bacteria and viruses</b>	Variety of contagious diseases	Permitted land uses in rural areas will not affect water quality and public health.	Same outcome.	<a href="http://water.epa.gov/drink/contaminants/basicinformation/pathogens.cfm">http://water.epa.gov/drink/contaminants/basicinformation/pathogens.cfm</a>

# PRIORITY AREA 3:

## Preservation of Agriculture and Open Space

Uncontrolled growth into agricultural land and other rural areas can lead to serious environmental problems, which may lead to negative effects on human and community health (NACCHO, 2014; Michigan Land Use Leadership Council, 2003; Dannenberg, et al., 2003; Duany, Plater-Zybeck, and Speck, 2000). Once agricultural land is developed, it is highly unlikely that it will ever be farmed again (Skole, et al., 2002; Pijanowski, et al., 1995). Although it is physically possible to convert rural residential uses to agriculture, the costs in property values, energy, materials, and labor would make this prohibitively expensive. While this is done in urban areas through community gardens, there are no known examples of large-scale farmland restoration.

Meanwhile, as rising transportation costs become a growing concern for the state and nation, communities will need to rely more heavily on local food sources. As local farms decrease, so does the opportunity to access local food sources (Land Policy Institute, 2003; Michigan Land Use Leadership Council, 2003). For these reasons, the Frankenmuth Growth Management Strategy, a USB policy developed by the City of Frankenmuth and Frankenmuth Township, discusses the preservation of agriculture as a key feature of the policy and emphasizes that it is necessary to help protect the economic value of agricultural production. As stated in the Strategy, “this is money that circulates in the local economy.” (TCRPC, 2011.)

These so-called undeveloped or under-served areas are most likely to be affected by urbanization and decisions to expand water and sewer services. Scoping identified five primary areas of concern to local communities and stakeholders throughout the mid-Michigan region (See Appendix A). These include:

- PRESERVING FARMLAND AND OPEN SPACE,
- REDUCING CONFLICTS BETWEEN INCOMPATIBLE LAND USES,
- PROMOTING ACCESS TO HEALTHY, LOCALLY GROWN FOOD,
- ENSURING ACCESS TO CLEAN WATER AND AIR, AND
- DECREASING SPRAWL.

### RESEARCH QUESTIONS

Research questions address the role a growth management or URSM policy can have a positive effect on the preservation of farmlands, open spaces, priority conservation areas, and rural values in undeveloped areas and lead to improved health outcomes in the region. These questions were developed through interactions with the URSM Committee and stakeholder groups and an online community survey developed by the HIA Team and administered as part of the stakeholder engagement program. Research questions regarding the establishment of a URSM policy and its potential health effects on agriculture and open space include the following:

(7) In our region, do you know of any conflicting land uses that result in adverse public health impacts? If so, would the provision of public water and sewer infrastructure into areas without service decrease land use conflicts and mitigate public health issues?

(8) Would expansion of new infrastructure into areas without service reduce the public's access to local foods, recreation, and open space?

(9) Are there any land uses in the region that adversely impact air quality?

### INFORMATION REQUIREMENTS AND SOURCES TO ADDRESS THE RESEARCH QUESTIONS

In Michigan, the research and analysis of information resources necessary to address the loss of farmland and open space is extensive and has a positive role in informing local land-use planning (See, for example, Michigan Land Use Leadership Council, 2003, Michigan's Land, Michigan's Future and Land Policy Institute, 2009, Chasing the Past or Investing in Our Future) and is well-covered in the Tri-County Regional Growth Plan. It will not be repeated in this HIA. Information resources needed to address potential health effects related to this issue include county farmland preservation programs, and the

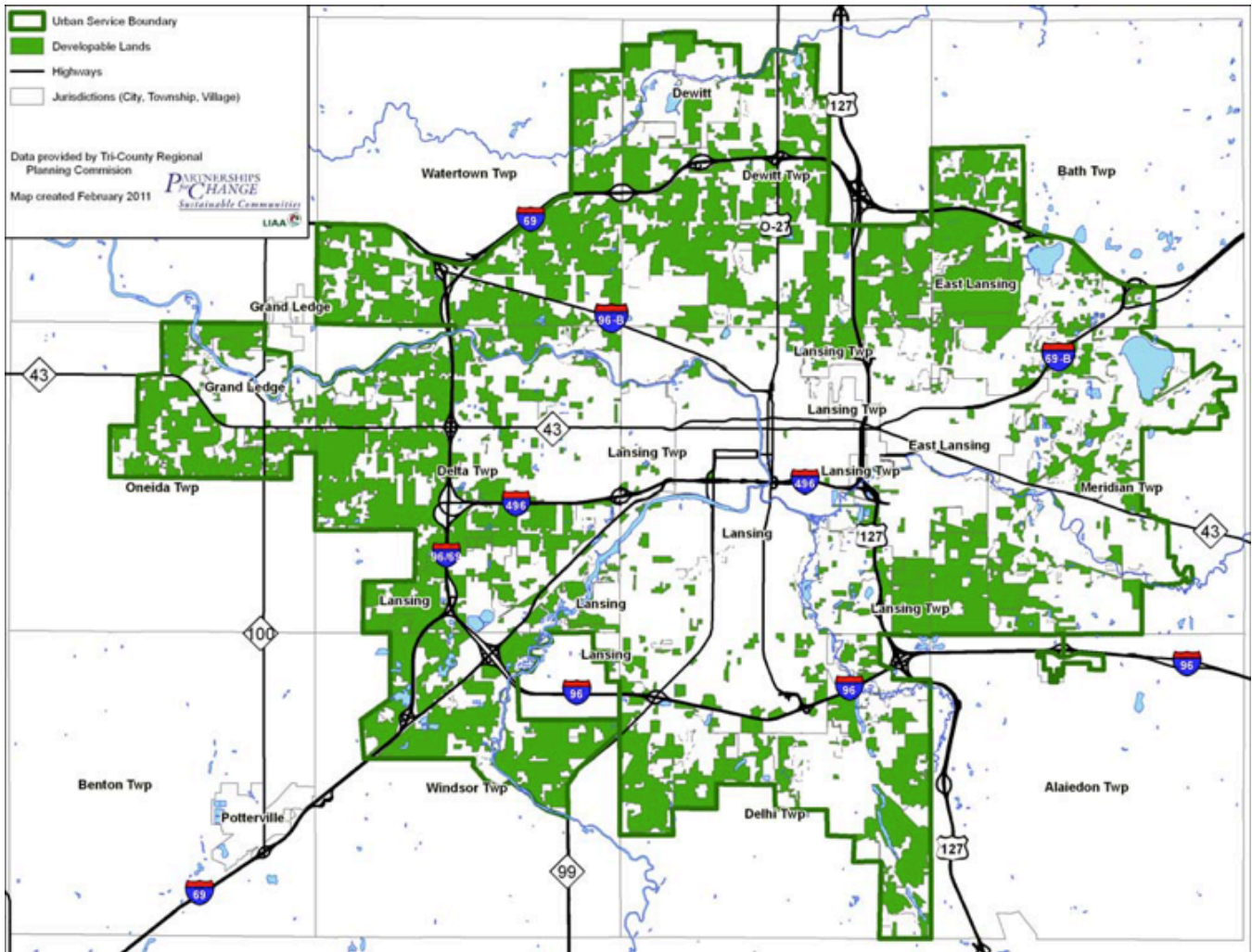
Michigan Department of Agriculture and Rural Development's data on farmland status, farm conversions, and farming practices in the region.

### EXISTING CONDITIONS

A detailed description of existing conditions, growth trends, and the driving forces in land-use change in the mid-Michigan region is provided in Skole et al. (2002), as well as in an extensive body of research conducted over the past several decades. Driving forces in land-use change in the mid-Michigan region are reported in Chapter 2 of the Tri-County Regional Growth Plan, which is summarized above in Section IV of the HIA, entitled Baseline Conditions in the Mid-Michigan Region. The Growth Plan provides a detailed description of land use patterns, demographics, and socioeconomic conditions that are characteristic of the region, as well as growth trends through 2045. The undeveloped urban and rural areas, along with the proposed USB are shown in Figure V-6.

FIGURE V-6.

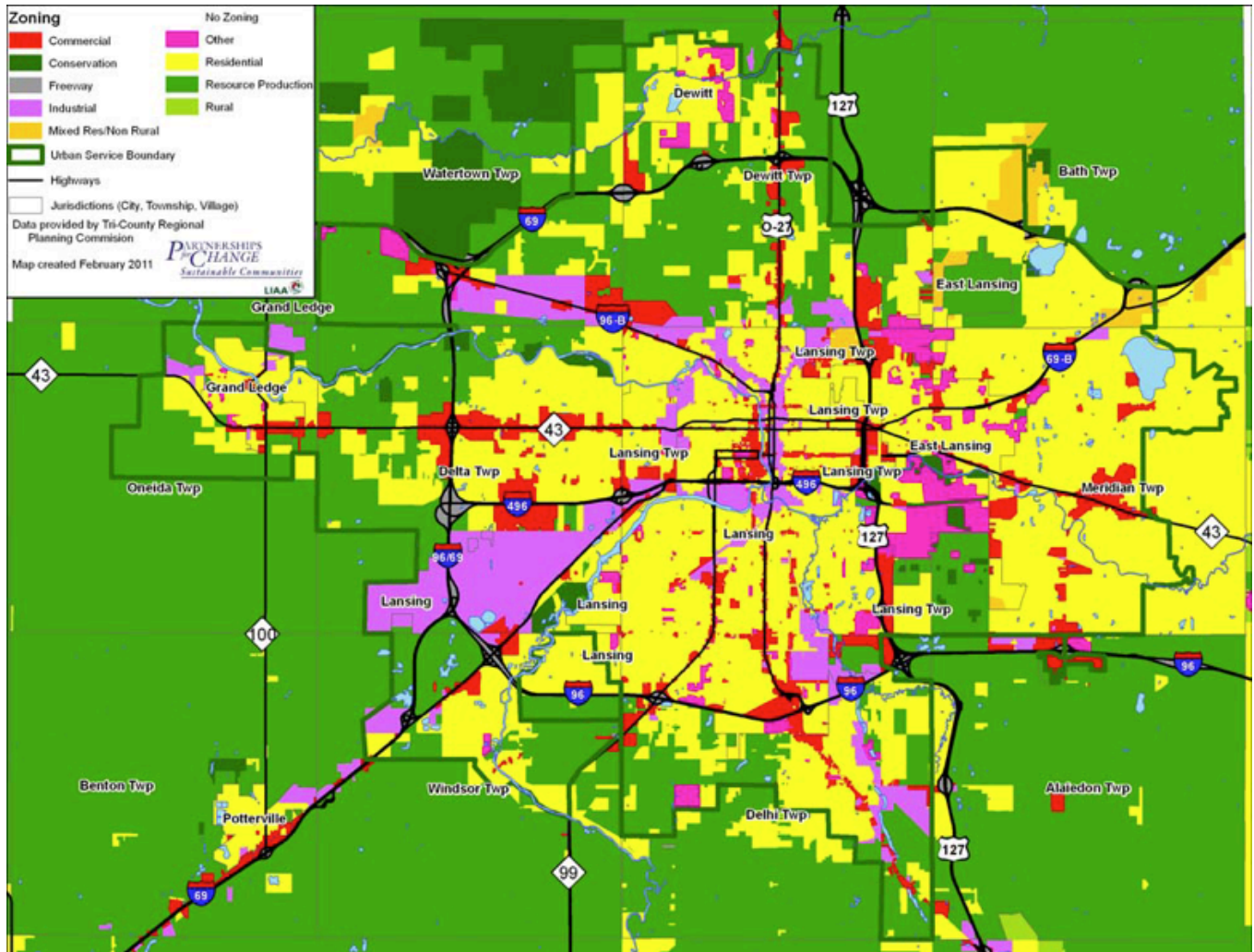
# DEVELOPABLE LANDS WITHIN THE PROPOSED URBAN SERVICE BOUNDARY



In this figure, the areas in green are considered developable due to their proximity to commercial and residential areas, areas that have experienced significant growth over the past 10-20 years, or areas that have been designated for managed growth by local governments. Some locations may even have water and sewer infrastructure in place or planned by communities, despite the fact that many individual land parcels are still being actively farmed. Other areas may be parks, preserved open spaces and riparian areas, and land that are currently not in production. The Growth Plan also indicates municipal and township areas within the mid-Michigan region that are zoned for development, shown in Figure V-7.

FIGURE V-7.

# COMPILED ZONING DISTRICTS WITHIN THE PROPOSED URBAN SERVICE BOUNDARY



### ASSESSMENT OF POTENTIAL HEALTH EFFECTS OF LAND-USE CHANGE

Table V-3 provides a summary of issues regarding local decisions to expand water and sewer infrastructure that may affect farmland, access to locally grown food; ecologically important natural areas, and access to open space and recreational opportunities that were identified during the scoping sessions and the survey of stakeholders (See Appendix A and Appendix B). The table identifies the potential health risks for each issue and goals of the URSM policy that local communities can use to address the health concerns and health outcomes communities should anticipate.

### LOSS OF FARMLAND AND OPEN SPACE AND CONFLICTING LAND USES

Incompatible land uses and sprawl occur in rural areas that surround urban or suburban core communities because growth policies allow this to happen. Policies that allow or encourage sprawl may lead to adverse health effects on residents within communities and in adjacent communities particularly when zoning districts place incompatible land uses next to or in close proximity to each other without adequate setbacks or buffer zones. This practice has had a disproportionate affect on the poor, minorities, or elderly populations in inner city and older

urban neighborhoods, placing people in close proximity to air and water pollution, noise, heavy vehicle traffic, and crime. Due to increasing crime and environmental deterioration, people have sought to leave the cities for the suburbs, resulting in conversion of agricultural areas and open space into residential areas.

Land-use planning, marketing, and building practices that convert productive farmland and natural areas into poorly planned residential developments, particularly in rural areas, often fail to include adequate roads, water and sewer, and telecommunications (Duany, Plater-Zybeck, and Speck, 2000). The authors go on to say that typical subdivisions do not provide the “small town” feel sought by people leaving the cities, add to automobile traffic, and increase demand for more and larger road systems to meet travel requirements. As a result, expanded suburban development may result in reduced interpersonal interactions and reduced opportunities for active lifestyles. Moreover, people moving into the suburbs and rural areas demand the same services they had in the cities. Local governments want the growth and provide the services, and then must increase taxes to pay for the services (Land Policy Institute, 2009).

As more people move into the

suburbs and rural areas, conflicts tend to arise with existing land uses, primarily agriculture and open space/natural areas. New residents often complain about odors and noises caused by farming operations. While the Michigan Right-to-Farm Act, P.A. 93 of 1981, protects most agricultural operations, conflicts still occur (Michigan Land Use Leadership Council, 2003).

Of equal importance is the effect of residential development on land values under the philosophy of highest and best use. As land values (and taxes) increase, many farmers cannot make enough to pay taxes on open land and wind up selling acreage or the entire farm to developers. The Michigan Farmland and Open Space Preservation Program was designed to preserve farmland and open space through agreements that restrict development, and provide tax incentives for program participation (Part 361, Farmland and Open Space Preservation, of the Natural Resources and Environmental Protection Act, Public Act 451 of 1994, as amended.). Nevertheless, farmland near the fringes of the urban areas, and presumably in areas being considered for expansion of water and sewer systems, remain at risk to development pressures.

Ongoing discussions among committee members, the HIA team, and local

PRIORITY AREA 3: PRESERVATION OF AGRICULTURE AND OPEN SPACE

TABLE V-3.  
ENVIRONMENTAL AND HEALTH-RELATED CONCERNS DUE TO LOSS OF FARMLAND  
AND OPEN SPACE

Land-Use Issue	Health Risk	URSM Policy Goals	Health Outcome	Information and Indicator Resources
Conflicts between incompatible land uses.	Stress, anxiety, depression.	Potential land use conflicts are minimized.	Reduction in stress-related health issues.  Increase in health equity.  Increase in quality of life.	<a href="http://www.nlm.nih.gov/health/publications/stress/index.shtml">http://www.nlm.nih.gov/health/publications/stress/index.shtml</a>  <a href="http://www.nlm.nih.gov/health/publications/depression/index.shtml">http://www.nlm.nih.gov/health/publications/depression/index.shtml</a>
Loss of or decreased access to open, green space and ecologically important areas. Reduced opportunities for physical fitness.	Decrease in recreation options and increased stress.  Increased risk of overweight and obesity.	Reduced loss of open space, recreational opportunities, and working farmland will improve mental health and physical fitness.	Increase in quality of life.  Reduction in rates of obesity.	<a href="http://thehill.com/blogs/congress-blog/economy-budget/196546-healthy-incentives-are-farm-bill-bright-spot">http://thehill.com/blogs/congress-blog/economy-budget/196546-healthy-incentives-are-farm-bill-bright-spot</a>  <a href="http://www.jhsph.edu/research/centers-and-institutes/johns-hopkins-center-for-a-livable-future/_pdf/projects/fsp/farm_bill/farmbill_lessons.pdf">http://www.jhsph.edu/research/centers-and-institutes/johns-hopkins-center-for-a-livable-future/_pdf/projects/fsp/farm_bill/farmbill_lessons.pdf</a>  <a href="http://sjvblueprinttoolkit.weebly.com/principle-12---environmental-resource-management.html">http://sjvblueprinttoolkit.weebly.com/principle-12---environmental-resource-management.html</a>
Loss of productive agricultural areas.  Loss of, or decreased access to healthy, locally grown food.	Increased cancers, obesity. Stress, anxiety, depression.  Decrease in locally grown foods; higher cost of non-local foods and decrease in access to healthy foods.	Increased preservation of productive farmland and agricultural lifestyles.  Access to healthy local food options maintained or increased.	Increase in quality of life.  Reduction in incidence of infectious diseases.	Cohen, 1987; Cunningham and Saigo, 1997.  <a href="http://thehill.com/blogs/congress-blog/economy-budget/196546-healthy-incentives-are-farm-bill-bright-spot">http://thehill.com/blogs/congress-blog/economy-budget/196546-healthy-incentives-are-farm-bill-bright-spot</a>  <a href="http://www.jhsph.edu/research/centers-and-institutes/johns-hopkins-center-for-a-livable-future/_pdf/projects/fsp/farm_bill/farmbill_lessons.pdf">http://www.jhsph.edu/research/centers-and-institutes/johns-hopkins-center-for-a-livable-future/_pdf/projects/fsp/farm_bill/farmbill_lessons.pdf</a>  <a href="http://sjvblueprinttoolkit.weebly.com/principle-12---environmental-resource-management.html">http://sjvblueprinttoolkit.weebly.com/principle-12---environmental-resource-management.html</a>
Noise	Chronic noise leading to sleeplessness; endocrine and cardiovascular effects.	Potential land use conflicts are minimized.	Reduction in stress-related health issues.  Increase in quality of life.	<a href="http://ehp.niehs.nih.gov/wp-content/uploads/122/1/ehp.122-A20.pdf">http://ehp.niehs.nih.gov/wp-content/uploads/122/1/ehp.122-A20.pdf</a>  <a href="http://www.nlm.nih.gov/health/publications/stress/index.shtml">http://www.nlm.nih.gov/health/publications/stress/index.shtml</a>  <a href="http://www.nlm.nih.gov/health/publications/depression/index.shtml">http://www.nlm.nih.gov/health/publications/depression/index.shtml</a>
Industrial farm animals' odors.	Industrial farm animals' odors; increase in stress hormone; increase in blood pressure.	Potential land use conflicts are minimized.	Reduction in stress-related health issues.  Increase in quality of life.	<a href="http://www.hsi.org/assets/pdfs/hsi-fa-white-papers/hsi_report_impact_of_odors_f.pdf">http://www.hsi.org/assets/pdfs/hsi-fa-white-papers/hsi_report_impact_of_odors_f.pdf</a>  <a href="http://www.nlm.nih.gov/health/publications/stress/index.shtml">http://www.nlm.nih.gov/health/publications/stress/index.shtml</a>  <a href="http://www.nlm.nih.gov/health/publications/depression/index.shtml">http://www.nlm.nih.gov/health/publications/depression/index.shtml</a>



stakeholders, with support of the health-related literature, made it very clear that the preservation of open space, natural areas, and rural recreational opportunities, as well as maintaining agricultural values, has a positive effect on wellbeing and human health. Moreover, stakeholders strongly suggested that local communities consider growth policies that contribute to a healthier environment in the following ways:

- RELIEVE STRESS;
- PROVIDE FOR RECREATIONAL EXPERIENCES NOT OTHERWISE AVAILABLE TO CITY RESIDENTS;
- HELP MAKE A COMMUNITY MORE WALKABLE AND THUS HEALTHIER, REDUCING OBESITY;
- CLEAN STORMWATER RUNOFF;
- CLEAN THE AIR WE BREATHE;
- PROVIDE EDUCATION EXPERIENCES NOT AVAILABLE IN CITY PARKS OR BACKYARDS;
- INCREASE PROPERTY VALUES (CAN BE MEASURED ACCORDING TO DISTANCE FROM A GREENBELT OR NATURAL AREAS);
- PROVIDE HIGHER QUALITY OR LOWER-COST FOOD;
- CONTRIBUTE TO THE POSITIVE IDENTITY OF A COMMUNITY OR SENSE OF PLACE (CAN BE MEASURED BY USING THE SUSTAINABILITY AUDIT TOOL DEVELOPED BY THE LAND POLICY INSTITUTE AT MSU [[HTTP://WWW.MIDMICHIGANSUSTAINABILITY.ORG/TOOLS.ASPX](http://www.midmichigansustainability.org/tools.aspx)]).

#### ASSESSMENT OF POTENTIAL HEALTH EFFECTS RELATED TO PUBLIC ACCESS TO LOCAL FOODS

Agricultural land uses, especially family-owned farms, are at risk from urban sprawl, in most cases low-density residential development. Residential development includes both single-family homes along country roads and rural subdivisions. Multi-family residential development that is often located in rural areas includes mobile home parks. In many cases, homes are built on what is considered prime farmland – productive soils, relatively flat contours, with good access to water. Loss of productive farmland reduces regional food resources, and public access to locally grown foods, and may adversely affect the production of specialty crops in favor of commodity crops. In addition, homes are built adjacent to rivers, streams, and wetlands or in wooded areas, restricting public access to recreational uses and reducing or fragmenting natural habitats.

As shown in Table V-3, there is a strong correlation between land-use practices and unhealthy diets, obesity, and cancers (Cohen, 1987; Cunningham and Saigo, 1997; USDA, 2009). Potential health effects include a reduction of access to high-quality, healthy, locally grown foods (e.g., fruits, vegetables, whole grains, complex carbohydrates, and dietary fiber) that are available via a relatively short supply chain with greater reliance on less-healthy foods shipped

in from distant sources. Varieties of nutritious fruits and vegetables are accessible to more affluent consumers and potentially unavailable to retailers serving economically disadvantaged consumers. In addition, longer supply lines that require long-distance transport result in costs being passed along to customers. Less affluent consumers must pay a greater proportion of their household budgets to absorb this cost. As households must pay more for healthy diets, or, if local grocery retailers cannot stock healthy foods, there is the potential for less affluent and high-risk consumers to revert to an unhealthy diet with higher proportions of highly processed foods; high concentrations of sugar, salt, and fat; and meats containing nitrites.

This assumes that regional growers are producing diverse crops rather than commodity crops. This is an economic decision by farmers. Without a greater demand for locally grown specialty and food crops, farmers may be forced to grow commodity crops to offset increasing local taxes.

### ASSESSMENT OF POTENTIAL HEALTH EFFECTS RELATED TO PUBLIC ACCESS TO RECREATION AND OPEN SPACE

Much has been written about the importance of nature to the human psyche and sense of wellbeing (see, for example, Roszak, Gomes, and Kanner, 1995) and the adverse effects on human populations following the loss of natural communities and open space. Metzner (1995) and Glendinning (1995) suggest that the loss of access to nature leads to a loss in perspective and humility in the complexities of the natural world in favor of the technologies used to control nature. Thus, sprawl is seen as progress and not loss. As Schnaiberg and Gould (1994) argue, a decision to preserve the integrity and function of natural systems for human enjoyment versus preservation of these systems on their own merit can each have a positive effect on human health.

The American Public Health Association recognizes the value of access to nature as an important contributor to public health for people of all ages and all socioeconomic classes (APHA, 2013). Access to nature includes both natural areas, including state and federal parks and preserves in the rural countryside, and more urban settings like city parks, gardens, greenways, and even natural landscaping around public and private buildings. According to APHA, access to nature has been related to lower levels of mortality and illness, higher levels of physical activity outdoors, restoration from stress, a greater sense of wellbeing, and greater social capital. Natural elements that promote wellbeing include trees, diverse vegetation, local biodiversity, water features, parks, natural playscapes, community gardens and school gardens. APHA goes on to

say that the integration of nature into towns and cities has secondary benefits that contribute to better health and more sustainable societies. Trees and vegetation capture carbon dioxide and mitigate global warming. Trees and vegetation also help to buffer noises, offer shade, reduce the effect of heat islands, and trap particulates and other airborne pollutants. Parks and other natural areas filter groundwater, reduce stormwater runoff, and prevent combined sewer overflows, improving the functioning of both public and private water systems.

Conversion of agricultural and other undeveloped lands and open space to urbanization often includes the loss of natural areas and public access to recreational opportunities, as well as a reduction in physical fitness (Saelens, et al., 2003). A practice that has become familiar throughout Michigan is the

conversion of cropland and farm woodlots into subdivisions that are sold as “regular” lots and “premium” lots, respectively. Woodlands are no longer available for recreation and no longer provide natural habitat for either game or non-game wildlife. If the residential development occurs in close proximity to streams, lakes, or wetlands, increased runoff into these water bodies decreases water quality, degrades aquatic habitats, and diminishes the recreation values of these areas. The loss of hunting and fishing, boating, hiking, and bird watching, to name a few recreational and leisurely pastimes, will adversely affect all income categories.

#### ASSESSMENT OF POTENTIAL HEALTH EFFECTS RELATED REGIONAL WATER AND AIR QUALITY

The question whether there are land uses in the region that adversely affect regional water and air quality was asked of stakeholders. Ground water and surface water quality issues were addressed above in Priority Area 1 and Priority Area 2, respectively. Survey responses regarding air quality suggested that while air quality is not currently considered a concern, air quality may become a more important issue in the future and may be the focus of a subsequent HIA effort.

The Tri-County Region is an attainment zone under the Clean Air

Act and is in compliance with the State Implementation Plan. The only primary pollutant monitored in the region is ozone. Local air quality issues may arise during construction, with an increase in particulates and vehicle emissions, dust generated by farming operations, and the increasing use of wood-burning furnaces in the winter. Radon has also been identified as a potential indoor air health issue in the region. These sources can result in very localized adverse health conditions among disadvantaged populations. However, air quality from a regional standpoint is considered a non-issue.

# PRIORITY AREA 4:

## Encouraging Policy Development and Implementation and a Regional Vision

The State of Michigan recognizes that many water quality issues regarding safe drinking water and wastewater management are not local, but rather regional concerns. For example, many mid-Michigan communities operate multi-jurisdictional water and wastewater authorities as members of the Lansing Board of Water and Light public utility or the East Lansing-Meridian Township Water & Sewer Authority.

Michigan also has many municipalities that manage stormwater and wastewater under a single management focus. However, large precipitation events that overpower stormwater and wastewater systems can adversely affect most communities in the region. Raw sewage is discharged into surface water bodies after extreme wet weather events. According to Michigan Department of Environmental Quality (MDEQ, 2014), in 2011, more than 5 billion gallons of untreated combined sewer effluent and 1.8 billion gallons of untreated sanitary sewer overflows were discharged to waters of the state. Untreated discharges and overflows introduce nutrients and pathogens, threatening public health, impairing aquatic life, contributing to nuisance algal blooms and impeding recreational uses.

Statewide, municipalities are being required to separate storm and sewer drains by the Department of Environmental Quality's Water Quality and Water Use Initiative (MDEQ, 2014). While Michigan communities have made great progress addressing point-source pollution, they still face the more difficult challenge of addressing nonpoint source pollution from stormwater runoff. The state encourages communities to form regional stormwater utilities. So far, there are only a few municipalities that have undertaken the politically difficult job of forming a stormwater utility.

Expanding water and sewer infrastructure into rural or other areas may indicate the need for more intergovernmental cooperation due to the increased costs to individual governmental units. Sustainable funding mechanisms will be needed to recover the costs of stormwater infrastructure regulatory compliance, planning, maintenance, capital improvements, and repair and replacement.

**THE PRINCIPAL ISSUE REGARDING EXPANSION OF WATER AND SEWER INFRASTRUCTURE INTO RURAL OR OTHER AREAS WITHOUT SERVICE INCLUDES THREE REVENUE EXPENDITURE SCENARIOS:**

- Scenario 1: No URSM Policy. This scenario diverts budget revenues needed to maintain and upgrade existing water and sewer infrastructure to build new facilities in areas without service.
- Scenario 2: No URSM Policy. This scenario allows expansion of water and sewer infrastructure into areas without service and maintains existing infrastructure. The costs of this plan are borne by all taxpayers in the community.
- Scenario 3: Adopting a URSM Policy. This scenario allows the use existing budget revenues to maintain and upgrade existing water and sewer infrastructure. There are two alternative policies to consider under this scenario. The first alternative

places a moratorium on expansion by establishing a service management boundary. The second alternative allows expansion, but with the requirement that developers pay to build the system and connect with existing services and land owners pay for future maintenance and upgrades with higher property taxes.

Expansion of public services would address a public health issue only if: (a) there are limited sources of potable drinking water, (b) there is known or potentially likely contamination of ground or surface water resources that would be used by homeowners and businesses, which would primarily be agriculture, or

(c) local soils are not adequate for sewage disposal. According to the Lansing Board of Water and Light (e.g., 2013 Annual Water Quality Report and Regional Well-head Protection Program) none of these factors are present or widespread in the region. Based on the 2014 survey

of communities in the mid-Michigan region conducted by the HIA Task Team, developers are generally required by most local governments to provide and pay for adequate potable and wastewater disposal services as part of the land-development permit process.

In addition to concerns over access to high-quality and safe water and sewer infrastructure throughout the region, stakeholders also expressed concern that health issues might result from future urban sprawl or unmanaged growth due to local policies that encourage development of rural areas. Stakeholders also expressed concern that public health might be adversely affected due to a lack of local and regional intergovernmental cooperation that has resulted in inefficient use of tax revenues, occasional redundant public services, and pitting one jurisdiction against another in attracting new business.

### RESEARCH QUESTIONS

Research questions were developed through interactions with the URSM Committee and stakeholder groups and an online community survey developed by the HIA Task Team and administered as part of the stakeholder engagement program. Research questions regarding the potential health effects of urban sprawl by discouraging the expansion of water and sewer infrastructure through the establishment of a URSM Policy include the following:

- (10) Do local existing public infrastructure policies encourage or discourage sprawl-type development?
- (11) Are there new regional or local opportunities for shared water and sewer service that could incentivize downtown infill or clustered growth?
- (12) Are there specific impediments to the sharing of water and sewer services that lead to competition between jurisdictions?
- (13) Does the community participate in shared services with neighboring communities (an Authority, PA 425, other)?

### INFORMATION REQUIREMENTS AND SOURCES TO ADDRESS THE RESEARCH QUESTIONS

Research and analysis of information resources needed to address potential health effects related to this issue include:

- Michigan DEQ Water Resources Division. <http://www.michigan.gov/deq/0,4561,7-135-3313---,00.html>
- Tri-County Regional Planning Commission. (2011). Tri-County Urban Service Management Study.
- Michigan Land Use Leadership Council. (2003). Michigan's Land, Michigan's Future (Michigan's Future Report).
- Land Policy Institute (LPI). (2009). Chasing the Past or Investing in Our Future. Michigan State University.
- Urban Policy Choices for Michigan Leaders. D.W. Thornton and C.S. Weissert, ed. Institute for Public Policy and Social Research, Michigan State University. East Lansing, Michigan.

In addition, local communities with planning and zoning responsibilities must rely on accurate information to define and draw management

areas, and they must be able to assess potential impacts of adopting a URSM policy. TCRPC maintains data resources that include the following list, and this database, along with mapping and impact assessment tools are integrated in the HIA Toolkit to be used by communities:

- Existing and planned sewer and water infrastructure.
- Public Act 51 and National Functional Classification (NFC) road designations.
- Public transportation routes and stations.
- Parcels.
- Ortho photo and/or existing land use analysis.
- Zoning districts.
- Future land use districts.
- Natural and working lands features including wetlands, protected areas, large tracts of forestland, and agriculture.
- Prime and unique farmland soils.
- Data from health, police and fire departments.
- Public Act 425 areas.

#### ASSESSMENT OF POTENTIAL HEALTH EFFECTS OF POLICY IMPLEMENTATION

The distinction between assessing the potential health effects of adopting and implementing a service boundary or management area for public water and sewer infrastructure and assessing impacts from the actual construction of water and sewer projects is discussed in Section II of the HIA report. In general, health effects of a policy tend to be manifested as emotional or mental stress and anxiety, as opposed to the health effects of exposure to physical factors, for example, noise, air and water pollution, loss of natural features, accidents, and so on. Even though the literature focuses more on the health effects of projects than on policies, both actions can lead to measurable adverse health effects. The examples provided in Figures V-3, V-4, and V-5, which show how a policy establishing a growth management or urban services management area and the actual location of a water and sewer expansion project, may have an adverse effect on at-risk or underserved populations. Such examples illustrate the importance of considering the health effects in both policy development and implementation.

The potential effects of adopting or not adopting a policy on health is strongly correlated to whether or not someone supports the policy and whether someone is directly or indirectly affected by its implementation. If someone does not support a policy, or is not comfortable discussing the policy in a public forum, feelings of stress or anxiety may result. People who experience acute stress and anxiety in a public forum, such as a meeting or a hearing, may suffer from a variety of health-related symptoms, which may include digestive problems, headaches, sleeplessness, depressed mood, anger and irritability (National Institutes of Mental Health 2014). Those who suffer chronic stress from policy decisions may experience frequent and severe viral infections, such as the flu or common cold, resistance to vaccines; heart disease, high blood pressure, diabetes, depression, anxiety disorder, and other illnesses (National Institutes of Mental Health 2014). If someone becomes depressed as the result of policy implementation perceived as unfair, they may experience persistent sadness, anxiety, feelings of emptiness, hopelessness, pessimism, guilt, irritability, restlessness, fatigue, difficulty concentrating, insomnia,

thoughts of suicide or suicide attempts, aches or pains, headaches, cramps, or digestive problems (National Institutes of Mental Health 2014).

Table V-4 provides a summary of issues regarding local decisions to adopt and implement policies that limit the expansion of water and sewer infrastructure, as well as policies that encourage growth within the existing services area, and seek opportunities for shared services with other local governments in the mid-Michigan region. The URSM Committee identified several of these issues during the scoping sessions and the survey of stakeholders that could have an effect on public health and well-being (See Appendix A and Appendix B). The table identifies potential health risks for each issue and goals of the URSM policy which local communities can use to address anticipated health concerns and health outcomes.

**TABLE V-4.  
HEALTH-RELATED CONCERNS DUE TO LOCAL AND REGIONAL POLICY DECISIONS**

Policy Issue	Health Risk	URSM Policy Goals	Health Outcome	Information and Indicator Resources
<b>Local policies on water and sewer infrastructure encourage unmanaged growth and sprawl.</b>	Household budget trade-offs leading to reduced access to health care. Acute and chronic stress, anxiety, depression. Increased blood pressure.  More impervious land/ stormwater runoff leading to gastrointestinal illnesses (see Table V-2 regarding water quality and Table V-3 regarding land-use conflicts).	Existing policies that encourage sprawl are eliminated.	Reduction in stress-related health issues.  Increase in health equity.  Increase in quality of life.	<a href="http://www.nimh.nih.gov/health/publications/stress/index.shtml">http://www.nimh.nih.gov/health/publications/stress/index.shtml</a>  <a href="http://www.nimh.nih.gov/health/publications/depression/index.shtml">http://www.nimh.nih.gov/health/publications/depression/index.shtml</a>  <a href="http://www.sciencedirect.com/science/article/pii/S1353829207000160">http://www.sciencedirect.com/science/article/pii/S1353829207000160</a> or <a href="http://ajph.aphapublications.org/doi/full/10.2105/AJPH.93.9.1446">http://ajph.aphapublications.org/doi/full/10.2105/AJPH.93.9.1446</a>
<b>Municipality budget constraints.</b>	Road and sidewalk maintenance deficient; increased transportation-related injuries or death; strain on maintaining existing water/sewer.	Existing policies that encourage sprawl are eliminated.	Reduction in traffic related traumas, accidents.  Reduction in stress-related health issues.  Increase in health equity.  Increase in quality of life.	<a href="http://news.jrn.msu.edu/bathdewittconnection/category/dewitt-township/">http://news.jrn.msu.edu/bathdewittconnection/category/dewitt-township/</a>
<b>Local policies on water and sewer infrastructure result in feelings of stress and anxiety.</b>	Digestive symptoms, headaches, sleeplessness, depressed mood, anger and irritability, frequent and severe viral infections, such as the flu or common cold, resistance to vaccines; heart disease, high blood pressure, diabetes, depression, anxiety disorder, and other illnesses.	Reduced negative impacts on physical and mental public health.  Open discussions on water and sewer can reduce public anxiety.	Increase in quality of life.  Reduction in incidence of infectious diseases.	<a href="http://www.nimh.nih.gov/health/publications/depression/index.shtml">http://www.nimh.nih.gov/health/publications/depression/index.shtml</a>



**TABLE V-4.  
HEALTH-RELATED CONCERNS DUE TO LOCAL AND REGIONAL POLICY DECISIONS (CONT.)**

Policy Issue	Health Risk	URSM Policy Goals	Health Outcome	Information and Indicator Resources
A local or regional policy on water and sewer infrastructure discourages use of non-motorized transportation.	Obesity; coronary heart disease; Type 2 diabetes; cancers (endometrial, breast, and colon); hypertension (high blood pressure); dyslipidemia (for example, high total cholesterol or high levels of triglycerides); stroke; liver and gallbladder disease; sleep apnea and breathing problems; osteoarthritis; gynecological problems.	Healthier lifestyles are encouraged.	Reduction in stress-related health issues.  Increase in quality of life.	<a href="http://ehp.niehs.nih.gov/wp-content/uploads/122/1/ehp.122-A20.pdf">http://ehp.niehs.nih.gov/wp-content/uploads/122/1/ehp.122-A20.pdf</a>  <a href="http://www.nlm.nih.gov/health/publications/stress/index.shtml">http://www.nlm.nih.gov/health/publications/stress/index.shtml</a>  <a href="http://www.nlm.nih.gov/health/publications/depression/index.shtml">http://www.nlm.nih.gov/health/publications/depression/index.shtml</a>  <a href="http://www.cdc.gov/healthyweight/effects/index.html?s_cid=tw_ob245">http://www.cdc.gov/healthyweight/effects/index.html?s_cid=tw_ob245</a>
Local or regional policies on W&S infrastructure dis-incentivizes downtown infill development or clustered growth.	Municipal budget constraints leading to health-related issues, e.g., accidents, trauma; mental illness, stress and anxiety; obesity.	Increased economic redevelopment opportunities and incentives. Increased revenues for local government services.	Reduction in stress-related health issues.  Increase in quality of life.	<a href="http://www.hsi.org/assets/pdfs/hsi-fa-white-papers/hsi_report_impact_of_odors_f.pdf">http://www.hsi.org/assets/pdfs/hsi-fa-white-papers/hsi_report_impact_of_odors_f.pdf</a>  <a href="http://www.nlm.nih.gov/health/publications/stress/index.shtml">http://www.nlm.nih.gov/health/publications/stress/index.shtml</a>  <a href="http://www.nlm.nih.gov/health/publications/depression/index.shtml">http://www.nlm.nih.gov/health/publications/depression/index.shtml</a>
Local or regional policies on W&S infrastructure discourage shared services.	Municipal budget constraints leading to health-related issues listed above.	Increased and enhanced intergovernmental cooperation.  Increased revenues for local government services.	Reduction in stress-related health issues.  Increase in quality of life.	

### ASSESSMENT OF POTENTIAL HEALTH EFFECTS OF POLICIES THAT ENCOURAGE SPRAWL AT THE EXPENSE OF URBAN CENTERS

As previously indicated in the HIA report, nearly all jurisdictions in the region provide public water and sewer (see service maps in Figures V-1 and V-2). However, as urban and suburban expansion, and in particular residential use, increases into the surrounding rural areas, demand for public water and sewer service also increases. Growth along the urban fringes can put a strain on local government resources. Land-use conflicts occur, especially if the city or village and the surrounding townships represent separate jurisdictions. Thus, local jurisdictions in the mid-Michigan region face overall increased costs of public services and the inequitable and unsustainable land use patterns that result from sprawl (TCRPC, 2006).

Policies that allow or encourage sprawl affect both suburban and urban areas and have had a disproportionate effect on the health of poor, minorities, and elderly populations in inner city and older urban neighborhoods, placing people in close proximity to air and water pollution, noise, heavy vehicle traffic, and crime. As shown in Table V-5, Hamlin (2002) lists a number of issues and policies related to the decline of inner cities in Michigan, which have been shown to adversely affect physical and mental health (Mid-Michigan County Health Departments, 2012).

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traffic, and crime. As shown in Table V-5, Hamlin (2002) lists a number of issues and policies related to the decline of inner cities in Michigan, which have been shown to adversely affect physical and mental health (Mid-Michigan County Health Departments, 2012).

Local jurisdictions in Michigan rely on property tax revenues, state-tax revenue sharing, and municipal bonds to pay for and maintain public water and sewer systems (Taylor and Weissert, 2002). Due to increasing costs to provide public services and declining revenues from the state, local governments, especially older inner cities, are finding it increasingly difficult to provide the public services their citizens expect. Many communities try to offset declining revenues by encouraging growth in undeveloped or rural areas, often with the incentive of expanding public water

8. A summary of the economic costs of sprawl is provided in Appendix C, reproduced from the Regional Growth Plan.

**TABLE V-5.  
POTENTIAL HEALTH DETERMINANTS OF INNER CITY REDEVELOPMENT ISSUES AND POLICIES**

Causes in the Decline of Michigan Cities	Health Determinants
<b>Physical Development Issues</b>	
<ul style="list-style-type: none"> <li>• “Middle-class” demand for detached single-family home-ownership on large suburban lots</li> <li>• Deterioration of inner-city infrastructure</li> <li>• Chaotic subdivision of inner-city land (e.g., irrational lot lines, small and odd-shaped lots) that discourages parcel assemblage</li> <li>• Aging, obsolescence of commercial buildings</li> <li>• Decline of inner-city housing stock</li> <li>• Parking problems and congestion</li> <li>• Mixing of incompatible land uses resulting in blight and reduced property values</li> <li>• Industry’s need for horizontally spacious and updated industrial plants</li> </ul>	<p>Uneven (unfair?) distribution of state-supported revenue sharing; suburban areas out-compete for new businesses and job opportunities; additional disproportionate physical hazards to residents and workforce; residents exposed to health effects of incompatible land uses; loss of affordable housing and supporting commercial/retail businesses through new industrial development (i.e., suburbs enforcing NIMBY reactions)</p>
<b>Economic Issues</b>	
<ul style="list-style-type: none"> <li>• Bank redlining</li> <li>• Low labor-force skills</li> <li>• Investor perception of higher inner-city risk</li> </ul>	<p>Substandard, unhealthy, and unaffordable housing; low wages or living wages; lack of employment opportunities and training opportunities; unequal economic opportunity</p>
<b>Public Finance Issues</b>	
<ul style="list-style-type: none"> <li>• Reduced tax base and tax revenues from investment decline</li> <li>• Reduced quality of inner-city services and fiscal stress because of declining revenue sources</li> <li>• Perception of lower suburban taxes</li> <li>• Infrastructure that is expensive to repair or replace, yet discourages economic development when left unattended through deferred maintenance</li> </ul>	<p>Exposure to hazardous and toxic effluents and pathogens from failed water &amp; sewer or older private wells; routine maintenance budget diverted to other programs; suburban areas out-compete for new businesses and job opportunities</p>
<b>Social Issues</b>	
<ul style="list-style-type: none"> <li>• Perception of decline of inner-city schools</li> <li>• Increased inner-city crime</li> <li>• Mass in-migration to inner cities from foreign immigrants or poor rural Americans</li> <li>• White flight to suburbs</li> </ul>	<p>At-risk populations “left behind” in areas they can marginally afford; public services spread to residents least able to pay for them (elderly, poor, immigrants, etc.); stress and conflict due to location and policy decisions and resultant health issues; low graduation rates in sub-standard schools; concentrated poverty, disease, and disillusionment; unequal social opportunity</p>

and sewer systems into these areas to support such growth. The potential trade-off is that established water and sewer infrastructure could be neglected in the process. Appendix C provides a summary of the fiscal and economic costs of sprawl in the mid-Michigan region that was included in the Growth Plan.

In the 2003 Michigan's Future report, the Michigan Land Use Leadership Council asserted that the conversion of agricultural land, forestland, and open space to urban uses could decrease both the visual appeal and the land-based economy of communities. These qualities are often associated with "rural character." At the same time, this pattern of development may result in a decline in urban population as people move out to suburban and rural residences. The loss of population can decrease the tax base and property values in city and village centers, leaving existing infrastructure without adequate funding for proper maintenance. The outcome can be a diminished "rural character" and suffering urban centers. Meanwhile, the infrastructure needed to support new growth along the urban fringe adds costs that can put a strain on local government resources.

The paving, maintenance, expansion, or construction of roads is an example of infrastructure costs that increase as low-density suburban and rural development continues. As the road network expands, available funds must be spread further, reducing available maintenance funds on a per-mile basis. Likewise, the costs of extending water and sewer services into lower-density areas can be excessive. One Michigan community recently estimated that one linear foot of a fully installed municipal sewer, water, and paved roadway infrastructure costs about \$200. A one-mile extension of services into the countryside would therefore cost approximately \$1,056,000. The taxes that pay for these services would either need to be raised or stretched too thin to maintain the expanding infrastructure. (TCRPC, 2011.)

In connection with the impact that unmanaged growth can have on the costs of infrastructure are the negative impacts that it could have on the natural resources of the community. For instance, if intense suburban development occurs in rural areas without access to public water and sewer services, groundwater degradation can occur. The expansion of the road network can also affect

water quality by creating more impervious surfaces, increasing runoff, and inhibiting natural filtration processes. As a result, sediments, fertilizers and other contaminants can flow directly into the area's valued streams and lakes. Pollutants entering the area's waterways would affect all anglers, boaters, swimmers, and wildlife. (TCRPC, 2011.)

#### ASSESSMENT OF POTENTIAL HEALTH EFFECTS OF INTERGOVERNMENTAL COOPERATION

Establishing a regional growth management policy may allow local communities to develop and share a common vision of a more sustainable future. Thinking regionally in mid-Michigan and looking for ways communities can collaborate may ultimately result in more shared services, less competition and conflict between municipalities in attracting and retaining businesses, a more equitable balance between costs and revenues, and an overall healthier environment.

Sub-state regions around the country are beginning to rethink the planning process to ensure long-term sustainability. A good example of this is the San Joaquin Valley of

California (See: The San Joaquin Valley Blueprint and Implementation Toolkit. <http://sjvblueprinttoolkit.weebly.com/index.html>). In the next 40 years, the Valley will almost triple in population from 3.9 million to more than 9.5 million. The San Joaquin Valley Blueprint planning process is creating a long-range regional vision based on this population growth. Blueprints are regional in scope and integrate land use, transportation and resource planning. The planning process is based on what are referred to as the “Three Es” of sustainable communities: prosperous economy, quality environment, and social equity (American Library Association, 2014). The toolkit is the result of intergovernmental collaboration and signed agreements – closely paralleling the process used by TCRPC in the Regional Growth Plan.

Locally, the Sustainable Design Portfolio for the Grand River-Michigan Avenue Corridor, which is part of the Mid-Michigan Program for Greater Sustainability (MMPGS) Project (<http://www.midmichigansustainability.org/projects.aspx>), has incorporated sustainable principles and best practices for each of the planning categories listed below.

This approach can serve as a model for the mid-Michigan region because each category addresses, in part, goals for meeting health outcomes, healthy lifestyles, and quality of life.

- HOUSING OPPORTUNITIES
- WALKABLE/BIKEABLE COMMUNITIES
- COMMUNITY AND STAKEHOLDER COLLABORATION
- DISTINCTIVE, ATTRACTIVE COMMUNITIES
- DEVELOPMENT DECISIONS
- MIXED LAND USES
- PRESERVE OPEN SPACE
- TRANSPORTATION CHOICES
- DEVELOPMENT OF EXISTING COMMUNITIES
- COMPACT BUILDING DESIGN
- ECONOMIC VITALITY
- ENVIRONMENTAL RESOURCE MANAGEMENT
- WATER NEEDS

The best practices developed for the Design Portfolio are also being made available to local communities, developers, and the public on the HIA Toolkit website. Communities

can measure progress toward meeting sustainability and livability goals by using a Sustainability Audit Tool developed by MSU’s Land Policy Institute (<http://www.midmichigansustainability.org/tools.aspx>).

The Lansing River Trail/Ingham County pathway system and the Capital Area Park system are good examples of regional cooperation that have a continuing positive effect on recreation and health. The regional trail system has over 72 miles of trails with another 17.5 miles planned by 2020. The park system includes more than 150 parks, most of which are universally accessible. The regional Green Infrastructure project ([www.greenmidmichigan.org](http://www.greenmidmichigan.org)) is another example of regional cooperation that will have a significant positive effect on health.

Another example of intergovernmental cooperation has been demonstrated in Jackson County, Michigan. Jackson County has established a model regional agreement for intergovernmental cooperation that may have relevance to the mid-Michigan region. In 2005, the Jackson County Planning Commission, with

the support of the Region 2 Planning Commission, Consumers Energy Company, and MSU Extension, developed a coordinated approach to a countywide master plan. This approach was unique in that all cities, villages, and townships in Jackson County officially agreed to participate in the planning process. The countywide master plan provided both a shared vision and a planning strategy for the county that has served as a model for master plans of individual municipalities and established a common protocol for sharing services, costs, and revenues. The comprehensive countywide master plan has received recognition from the U.S. Department of Housing and Urban Development and the Michigan Environmental Council as a best practice and model for Michigan.

Figure V-6, provided in the previous section, shows developable lands within the Greater Lansing growth area, and Figure V-7 is a compilation of zoning districts. Together, these two figures illustrate where development could be managed through an intergovernmental cooperative agreement similar to what has been achieved in Jackson County. The

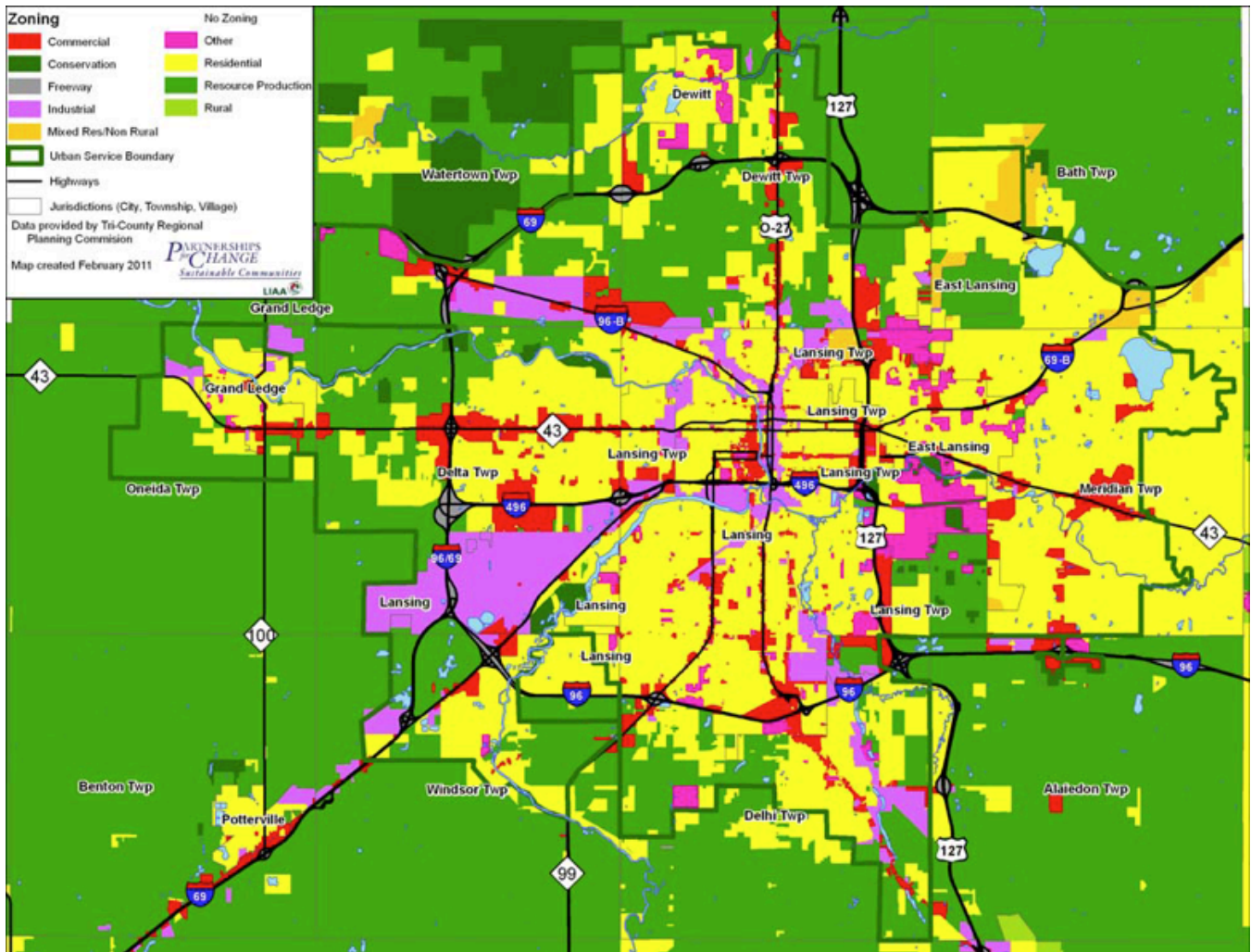
Michigan Townships Association and the Michigan Municipal League have long promoted the idea of intergovernmental cooperation as a means of reducing the costs of services provided by local units of government, particularly services with high fixed costs, like equipment and facilities and when shared services between jurisdictions can reduce or eliminate redundant services and costs through economies of scale. The Intergovernmental Conditional Transfer of Property by Contract Act, PA 425 of 1984, otherwise known as PA 425, and the Urban Cooperation Act, PA 7 of 1967, enable tax revenue sharing. The 425 agreements allow communities to share tax revenues from new developments, which can reduce pressure to develop undeveloped parcels in rural townships through annexation by municipalities. Actual implementation is difficult, however, potentially due to fears of hostile annexation of lands in townships and the loss of local power to govern.

Connecting growth policy to potential health outcomes was not considered in the Michigan's Future report. Addressing the impacts to the

built and natural environments and assessing potential health effects, while planned and regulated at the local jurisdictional level, might be better addressed at the regional level through intergovernmental cooperation. In many, if not most cases, the adverse effects of land use decisions are not confined within a community's boundaries.

There are additional examples of intergovernmental cooperation in Michigan that have had a positive effect on community and individual health and wellbeing including renaissance and enterprise zones and brownfield redevelopment projects that have converted contaminated or functionally obsolete properties into revenue generating productive uses. These projects have been successful in redeveloping and reinvesting in urban areas, providing jobs, stimulating commercial and retail growth, and relieving some of the stress of urbanizing productive farmland and open space (Thornton and Weissert, 2002). Moreover, redevelopment of formerly used industrial sites has taken advantage of existing water and sewer infrastructure.

FIGURE V-7.  
COMPILED ZONING DISTRICTS



## Summary of Key Findings of the Impact Assessment

This section is a summarization of the preceding Impact Assessment sections. The analysis of potential key impacts of adopting or not adopting the proposed URSM policy revealed eight promising findings, which includes issues that can and should be addressed at the local level, and questions that should be asked in development decisions that could affect the five elements established by the URSM Committee in proposing the policy. These elements are:

1. TO KEEP URBANIZED AREAS VIABLE.
2. TO PROTECT FARMLAND, OPEN SPACE, AND RURAL QUALITY OF LIFE.
3. TO PRESERVE PRIORITY CONSERVATION AREAS.
4. TO UTILIZE EXISTING INFRASTRUCTURE.
5. TO COST-SAVE THROUGH COOPERATION AND EFFICIENCY.

The scoping strategy of the HIA is to address the potential health effects of establishing a URSM policy that would address each of the five elements listed above. The

analysis of potential key health effects of adopting or not adopting the proposed URSM policy revealed seven key findings, which are listed below and summarized in the enclosed table. These findings are graphically depicted in the pathway diagrams (shown in Section III of this report), which track health determinants and impacts of establishing growth management areas or boundaries with respect to expanding water and sewer infrastructure in undeveloped or rural areas.

The HIA Team augmented the HIA assessment process with a series of post-project interviews conducted with local elected officials and planners to determine the practical effects of adopting a URSM policy and whether health considerations were included in local decision making. Interviews were conducted with communities that either: (a) had adopted a URSM policy; (b) had established a growth or SB/SMA area without formally adopting a policy; or (c) had considered, but not adopted a growth-management or SB/SMA policy.

### KEY FINDINGS OF THE HIA ARE AS FOLLOWS:

- Costs to expand water and sewer infrastructure place a burden on community resources that would otherwise be available to maintain existing systems, in addition to providing other public services for disadvantaged populations. Maintaining existing water and sewer facilities reduces adverse health effects due to the potential failure of outdated systems.
- Additional property taxes to support expansion of water and sewer infrastructure may adversely affect household budgets at the expense of health care affordability. Communities should continue a “pay-as-you-go” policy in which new developments in rural areas pay for new water and sewer facilities, decreasing the tax burden on developed areas. Nevertheless, low-income residents in rural areas may be disproportionately affected when new developments are built nearby.



- Urban development or land-use change in rural areas resulting from expansion of water and sewer infrastructure may result in loss of productive farmland, recreational opportunities, sensitive natural areas, and sense of wellbeing. These effects may lead to increasing stress and anxiety to residents and family-owned agricultural businesses in rural areas and eliminate a rural lifestyle choice.
- Urban development or land-use change in rural areas resulting from expansion of water and sewer infrastructure may reduce the availability of healthy locally grown food, which could lead people to substitute unhealthy food options or spend more money to travel to retail outlets that offer healthy food choices. Adverse health effects may include increasing obesity rates, stress, decreased access to health care, risk of accidents, and so on.
- Land-use conflicts and declines in capital improvement budgets create stress, anxiety, mistrust, and

uncertainty and place additional financial burdens on populations least able to adapt to changing growth and development policies in a community. Disadvantaged populations can become economically marginalized and may be forced to relocate.

- Communities with a mix of urban and rural land uses may have to prioritize between new greenfield development versus redevelopment or infill opportunities, new subdivisions versus preservation of farmland and open space, and so on.
- Annexation of township land by municipalities may result in conflict between jurisdictions, changes in development priorities and revenue generation, and dramatically increased tax rates for businesses and homeowners. Small businesses and vulnerable populations are often at the greatest risk in annexation proposals.

Table V-6 is a summary of the findings regarding the potential health effects of a region-wide policy establishing an urban and rural services boundary

as described in detail in the Impact Assessment sections of the full URSM HIA. The summary table also indicates the relative availability of supporting research and additional sources of information. The quality/strength of evidence used in the summary table follows the format and content guidelines provided in the Human Impact Partners 2010 HIA Report Guide (HIA-Report-Guide-Dec-2010-1.pdf). The description of the quality/strength of evidence found in the literature is qualitative and is discussed in more detail in the HIA. The tables provided in the individual sections of the impact assessment show the applicable health-related references, which were not repeated in the summary table. The summary table also refers to the substantial body of literature on the environmental and socioeconomic effects of land-use change that were not referenced in the HIA.

**TABLE V-6.  
SUMMARY OF HIA FINDINGS—POLICY: ADOPT AN URBAN SERVICE/GROWTH MANAGEMENT AREA OR BOUNDARY**

Determinant	Impact/Health Outcome	Direction	Magnitude/Severity on People	Impact Likelihood	Distribution (Populations Most Affected)	Quality of Evidence
<b>Maintain existing water &amp; sewer and discourage expansion of services into rural areas.</b>	Exposure to waste, sewage & infectious diseases; stress.	Decrease.	High impact on moderate number.	Possible.	Residents in areas with deteriorating water & sewer system.	Many strong studies available.
<b>Preservation of farmland &amp; open space.</b>	Access to healthy, locally grown food.	Increase.	High impact on many.	Likely.	General population.	Good studies generally consistent with principles of public health.
	Rural lifestyle and sense of place.	Increase.	High impact on moderate number.	Likely.	Rural residents and general population.	Good studies available.
	Land-use conflict.	Decrease.	High impact on many.	Likely.	General population.	Many strong studies available.
	Healthy lifestyle.	Increase.	High impact on many.	Possible.	Rural residents and general population.	Good studies available.
	Access to recreation.	Increase.	Moderate-high impact on many.	Likely.	General population.	Good studies available.
	Open space & natural areas.	Increase.	High impact on moderate number.	Likely.	General population.	Good studies available.
<b>Access to clean surface &amp; ground water.</b>	Exposure to contaminants & infectious diseases.	Decrease.	High impact on many.	Possible.	General population.	Many strong studies available.
	Overall water quality.	Increase.	High impact on many.	Likely.	General population.	Many strong studies available.
<b>Property values &amp; taxes.</b>	Property values.	Increase.	High impact on high number.	Likely.	All residents.	Good studies available.
	Health care access.	Increase.	High impact on moderate number.	Possible.	Low-income residents.	Many strong studies.
<b>Local government investment in built areas &amp; local business development.</b>	Sense of place & wellbeing.	Increase.	High impact on many.	Possible.	Rural residents and general population.	Good studies and generally consistent with principles of public health.
	Building densities in urban areas.	Increase.	High impact on moderate number.	Possible.	Low-income residents.	Many strong studies available.
<b>Intergovernmental cooperation.</b>	Shared services.	Increase.	High impact on many.	Possible.	All residents.	Good studies available.
	Annexation.	Decrease.	High impact on high number.	Possible.	Low-income residents; small businesses.	Many strong studies available.
<b>Affordable housing &amp; lifestyles.</b>	Social, economic & age discrimination.	Decrease.	High impact on moderate number.	Possible.	Low-income and elderly residents.	Many strong studies available.



The proposed URSM policy and local implementation of restrictions on where and when water and sewer infrastructure should be extended beyond a growth management boundary can have a significant effect on environmental quality and human health. Changing where and how we build our communities can

help mitigate adverse impacts of decentralized growth, improving how development affects the environment and human health.

Conclusions and recommendations are based on participation in URSM Committee meetings, stakeholder events, and final recommendations provided to the committee and

TCRPC. These recommendations are tracked through the analysis process and submittal to the authors of the plan. Final recommendations, as they appear in the 2011 URSM report, are tracked as they are implemented at the community level.

# RECOMMENDATIONS

Based on this analysis, recommendations to address the potential health effects include the following:

## 1: ESTABLISH BOUNDARIES

Responsible, environmentally sound, and socially and economically equitable growth should be a continuing goal of every community in the mid-Michigan region.

Communities in the mid-Michigan region are encouraged to establish service boundaries or service management areas. The URSM policy provides guidelines and support to communities that desire to manage growth within their jurisdictions.

The stated goals of the URSM Policy are to:

1. Keep urbanized areas viable;
2. Protect farmland, open space, and rural quality of life;
3. Preserve priority conservation areas;
4. Utilize existing infrastructure; and
5. Cost-save through cooperation and efficiency.

The mission and objectives of the URSM Committee have been established to help mid-Michigan communities realize these goals. The URSM policy statement represents a reasonable approach for supporting local communities tackling issues of public water and sewer infrastructure extensions by offering recommendations and training on the efficacy of related, intergovernmental policies and plans.

## 2: USE EXISTING INFRASTRUCTURE

Where we build involves locating development in a region or land area that can accommodate growth with existing infrastructure (e.g., water and sewer, roads, etc.) with minimal effect on non-compatible uses.

Communities in the mid-Michigan region are encouraged to locate development within areas that can accommodate growth with existing infrastructure (e.g., water and sewer, roads, etc.) with minimal effect on non-compatible uses. It includes safeguarding sensitive areas such as riparian buffers, wetlands, and critical habitat from development pressures; directing new development to infill, brownfield, and greyfield sites to take advantage of existing infrastructure and preserve green space; and putting homes, workplaces, and services close to each other in convenient, accessible locations.

Results from the interviews suggest that, overall, communities in the mid-Michigan region recognize the value of protecting and promoting natural values in the planning process through zoning practices. It was the consensus that, despite economic conditions in the region over the last 10-15 years, communities have been successful in establishing, promoting, and maintaining growth management areas, while protecting rural lands from urbanization. Most of the recent

uptick in growth has occurred in areas already served by water and sewer infrastructure, paved roads, bike lanes, paths and trails, and public transportation.

The region as a whole has embraced a Green Infrastructure program and is in the process of using green corridors, riparian areas, parks, agricultural areas, and open spaces, to link communities via a regional trail system, protect natural habitat, and mitigate gray infrastructure. Coordinated county and local park systems and programs have contributed to this network effort. One community, Meridian Township, has adopted both a wetland protection ordinance and a nationally recognized land preservation program.

## 3: ENCOURAGE HEALTHY PRACTICES

Communities in the mid-Michigan region are encouraged to consider practices and technologies in which the built environment can protect and enhance health and the quality of life for all residents. In addition to providing safe and cost-effective public services like water and sewer, communities can encourage walkability and bikeability; public open spaces; safe routes to schools and public places; and buildings that are low-impact, energy efficient, and make maximum use of sustainable materials in all new developments within their jurisdictions.

#### 4: MINIMIZE ENVIRONMENTAL IMPACTS

Communities in the mid-Michigan region that are currently growing or likely to grow in the future should consider adopting a policy of directing potential growth into areas within their jurisdictions that can accommodate growth while minimizing adverse impacts to sensitive natural areas and open space, productive agricultural lands, and recreation areas.

Whereas the URSM policy may provide a useful template for a local growth management policy, by no means should the “official” URSM policy be the only mechanism by which a local policy is incorporated in local decision making. Many communities in the region have established growth boundaries or growth management areas that are based on local or historical patterns of growth or physical barriers, such as interstate corridors or riparian areas, and these communities have been very successful in directing growth into or away from such areas.

The three mid-Michigan counties and many individual communities have established farmland preservation programs, which have been successful in saving productive farmland and limiting growth in close proximity of farms in the program. This has had a positive effect on locally grown foods and preserving farming lifestyles as well as access to open spaces and recreational opportunities.

#### 5: ADOPT A HEALTH IN ALL POLICY

Communities are encouraged to adopt a Health In All Policy, generally defined as a collaborative approach across all levels and all sectors involved in decision making as a means of ensuring that the health effects of a land-use decision are considered equally with economic, fiscal, and engineering considerations of a proposed development.

Based on results from the interviews, other than the legal requirements to protect and enhance public safety, relatively few mid-Michigan communities regularly consider health issues in local land-use decisionmaking. And, none of the interviewees were aware of a Health In All Policy or efforts on behalf of the county health department toward adopting a Health In All Policy at the county level. On the other hand, communities would like to learn more about this policy as long as there remains no legal requirement to adopt such a policy and officially implement it.

Interviewees would welcome presentations from TCRPC and training opportunities in the URSM policy; a local Health In All Policy; the practice of HIA; and tools, techniques, and information resources available in addressing health considerations in their communities.

The findings and recommendations in the HIA can be tracked or monitored

as communities adopt growth management policies, incorporate recommendations in master plans, zoning ordinances, and permit requirements. Long-term monitoring can determine whether: (1) community goals were reasonable and realistic in the first place; (2) community goals should be changed; and (3) resultant policies, practices, etc., can and should be changed or modified as conditions change in communities. The implementation of a future HIA process should also be incorporated with significant changes in policies or conditions. A suggested monitoring plan is provided in Appendix E.

## Future Goals

The HIA, and its findings and recommendations, is being provided to all communities in the mid-Michigan region via the HIA Toolkit, accessible to the public via the Mid-Michigan Program for Greater Sustainability (MMPGS) Portal at [www.midmichigansustainability.org](http://www.midmichigansustainability.org) and the Tri-County Regional Planning Commission website at [www.mitrpc.org](http://www.mitrpc.org). Comments and suggestions on the draft HIA can be communicated to the HIA Team via the HIA Toolkit ([hiatoolkit.weebly.com](http://hiatoolkit.weebly.com)). Names and contact information for the HIA Team are provided.

The HIA has identified communities in the mid-Michigan region that have adopted a service manage policy. These communities have indicated their willingness to provide guidance to neighboring communities. In addition, the URSM Committee will continue

to assist local communities that have adopted the policy or are considering adopting the policy in the future.

TCRPC will also assist communities in developing a long-term monitoring program to determine whether: (1) community goals were reasonable/realistic in the first place; (2) community goals should be changed; and (3) resultant policies, practices, etc., can and should be changed or modified as conditions change in communities. The implementation of a future HIA process should also be incorporated with significant changes in policies or conditions. In addition, TCRPC, in collaboration with the county health departments, will determine whether the indicators or criteria used to measure change (i.e., individual behavior, health determinants, programmatic and regulatory compliance, institutional

change, etc.) have adequately measured change, and develop and include action triggers/red flags that can immediately report problems and offer mitigation of adverse or unforeseen impacts. And, as appropriate, local health agencies and non-governmental organizations, particularly the Greater Lansing Power of We Consortium and the Land Use and Health Resource Team, will continue providing public information and feedback to include ongoing results, lessons learned, and other applicable feedback to URSM participants, including local planners, decision makers, and represented stakeholder participants.

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# Appendices

APPENDIX A. URSM PRIORITY AREAS IDENTIFIED THROUGH STAKEHOLDER MEETINGS AND LINKS TO DETERMINANTS OF HEALTH

APPENDIX B. SURVEY OF HEALTH-RELATED PUBLIC ISSUES AND PRIORITIES REGARDING LOCAL ADOPTION OF A URSM POLICY

APPENDIX C. SUMMARY OF FISCAL AND REAL COSTS OF SPRAWL (REGIONAL GROWTH PLAN)

APPENDIX D. URSM POLICY MONITORING PARTICIPANTS AND STAKEHOLDERS

APPENDIX E. A PLAN FOR MONITORING THE HEALTH EFFECTS OF ADOPTING A REGIONAL URSM POLICY