

St. Clair County

Infrastructure Assessment & Planning Toolkit

To Protect County Water Resources



LSL Planning, Inc.
Community Planning Consultants

Acknowledgements

St. Clair County Board of Commissioners

St. Clair County Metropolitan Planning Commission

St. Clair County Department of Public Works

Lynda Krupansky, Michigan Coastal Management Program,
DEQ/Environmental Science & Service Division

Kristen O. Jurs, St. Clair County Stormwater Coordinator

Sheri Faust, Environmental Educator, St. Clair County

Public officials, municipal staff and engineering consultants from
St. Clair County's local units of government, including:

- City of Algonac
- Burtchville Township
- Village of Capac
- China Township
- Clay Township
- Clyde Township
- Cottrellville Township
- East China Township
- Fort Gratiot Township
- Ira Township
- Kimball Township
- Marine City
- City of Marysville
- City of Memphis
- City of Port Huron
- Port Huron Township
- City of St. Clair
- St. Clair Township
- City of Yale

Project Team:

St. Clair County Metropolitan Planning Commission Staff

- William Kauffman, AICP, Planning Director
- David Struck, AICP, Senior Planner
- Lori Eschenburg, GIS Specialist

Planning Consultant:

LSL Planning, Inc.

- Jeff Purdy, AICP, Partner
- Allen Serkin, Assistant Planner

Financial assistance for this project was provided, in part, by the Michigan Coastal Management Program, Michigan Department of Environmental Quality (MDEQ), through a grant from the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce.

The statements, findings, conclusions, and recommendations in this report are those of the County of St. Clair and do not necessarily reflect the views of the MDEQ and the NOAA.



Table of Contents

Introduction	1	Green Buildings	54
Land Use and Development Trends.....	2	Native Landscaping	56
Infrastructure Assessment	10	Tree Protection Ordinance.....	58
Land Use and Growth Potential	13	Low Impact Development.....	60
Benefits of Smart Growth.....	15	Best Management Practices (BMPs).....	62
Infrastructure Planning	18	Onsite Stormwater Storage.....	64
Growth Management and Utility Policies.....	22	Transfer/ Pooling of Stormwater Mitigation.....	65
Green Infrastructure Plan	24	Protect Riparian Areas	66
Watershed Plan	26	Private Community Wastewater Systems.....	68
Infill Development	28	Policies to Manage Water Demand.....	70
Brownfield and Greyfield Redevelopment	30	Public Facilities Ordinances	72
Mixed-Use Development	32	Utility Hookup Fees	73
Utility Demand Zoning.....	34	Conditional Land Transfer	74
Cluster Development.....	36	Capital Improvement Plan	76
Planned Unit Development	38	Priority Funding Areas	78
Conditional Rezoning.....	40	Provide Transportation Options.....	79
Subdivision and Condominium Design Standards	42	Funding.....	81
Downzone Critical Environments	44	Appendix	A-1
Transfer and Purchase of Development Rights	46	Summary List of Tools and Applicability	A-2
Site Plan Review of Natural Features.....	48	Model Ordinances	A-3
Performance Zoning	50	References	A-49
Geographic Information Systems (GIS)	52		



Purpose

The St. Clair County Infrastructure Assessment and Planning Toolkit to Protect County Water Resources provides tools for proactive planning to help ensure that the County's communities are better equipped to direct growth to appropriate locations. In planning for growth, the Toolkit focuses on the orderly and efficient provision of water and wastewater systems and private utilities such as electric, gas, and telecommunications. At the same time, it seeks to enhance local capability to protect the sensitive environmental areas, coastal/riparian ecosystems, surface water and groundwater resources that make St. Clair County an attractive place to live, work, and visit. The Toolkit also assesses the fiscal impacts of infrastructure planning decisions, and their intended and unintended consequences. Tools in this document promote regional planning to foster intergovernmental cooperation on infrastructure and public/private cooperation.

Process

The following process was followed in the preparation of this document. Population and housing trends, infrastructure capacities, land use, and the location of significant natural features were analyzed in relation to one another. Then, tools were developed to help communities plan to most efficiently direct and accommodate growth given expected future conditions.

Trend Analysis. The St. Clair County Infrastructure Assessment and Planning Toolkit to Protect County Water Resources is based on sound analysis of existing conditions, historical trends, and future forecasts of population and housing data for the County, its communities, their local zoning districts, and US Census block

groups. These analyses provide the basis for understanding the expected amount and location of development in the County.

Infrastructure Inventory and Analysis. Most new development will require utilities, particularly sewer services, given the County's generally poorly draining soils. The Toolkit assesses the location of existing infrastructure capacity in relation to current and future household growth to help determine where existing utility capacity is sufficient and where it is not expected to adequately accommodate growth.

Land Use and Growth Potential. Most new development will occur on previously undeveloped land. A large amount of undeveloped land exists within or very close to existing utility service areas. This Toolkit assesses the availability of developable land in relation to currently permitted zoning densities and infrastructure capacities.

SWOT Analysis. SWOT analysis is an assessment of Strengths, Weaknesses, Opportunities, and Threats.

Planning Toolkit. The Toolkit was developed based on sound land use, environmental, and utility planning principles. It takes into account the information learned from the above analyses. The tools are meant to help communities accommodate growth efficiently and in a way that protects significant natural resources, especially water resources.



Introduction.

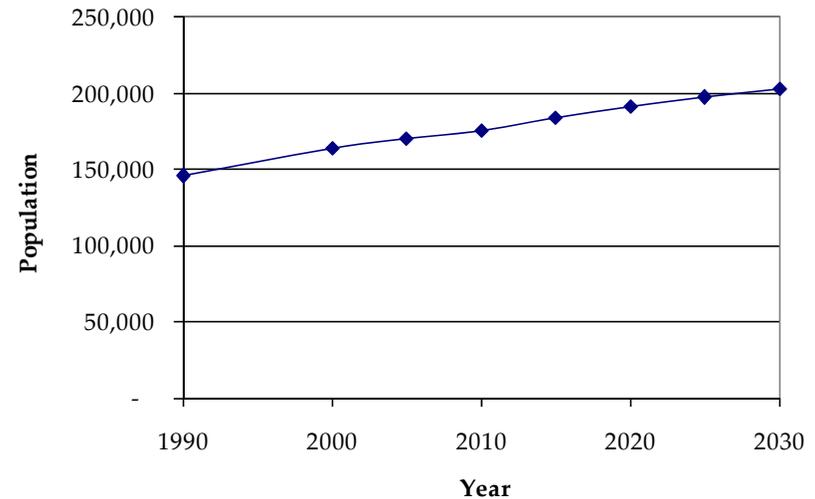
It is important have an understanding of the current, historical, and projected characteristics of the County to get a picture of where we are now and in what direction we are headed. This chapter focuses on demographic, land use and development trends in St. Clair County since 1990 and includes projections through 2030. These trends allow us to estimate the County's future population and the number of housing units that the population will occupy. We can then use these figures to help plan an orderly and efficient development pattern that accommodates future residents and businesses in a way that benefits the County's communities.

In July 2005, St. Clair County had an estimated population of approximately 171,500, making it the 13th most populous of Michigan's 83 counties. Between 1990 and 2005, the population grew 17.1%, making it the 34th fastest growing County during that period. By 2030, the County is expected to have over 203,000 residents.

It is clear that St. Clair County is growing and is expected to continue to grow steadily. It is important for infrastructure planning purposes to also understand where within the County this growth is occurring and where the future growth will most likely take place. A variety of information about households and growth is presented in the next few pages in maps and tables to help answer those questions.

Infrastructure is usually provided by individual communities. The utility service areas typically encompass the more heavily developed areas within those communities. Therefore, analysis of St. Clair County demographic indicators was performed at more

St. Clair County Population, 1990-2030



Source: SEMCOG Regional Forecast

detailed scales to help understand the population characteristics at a finer level. These finer scales include the community-level and the US Census block group-level.

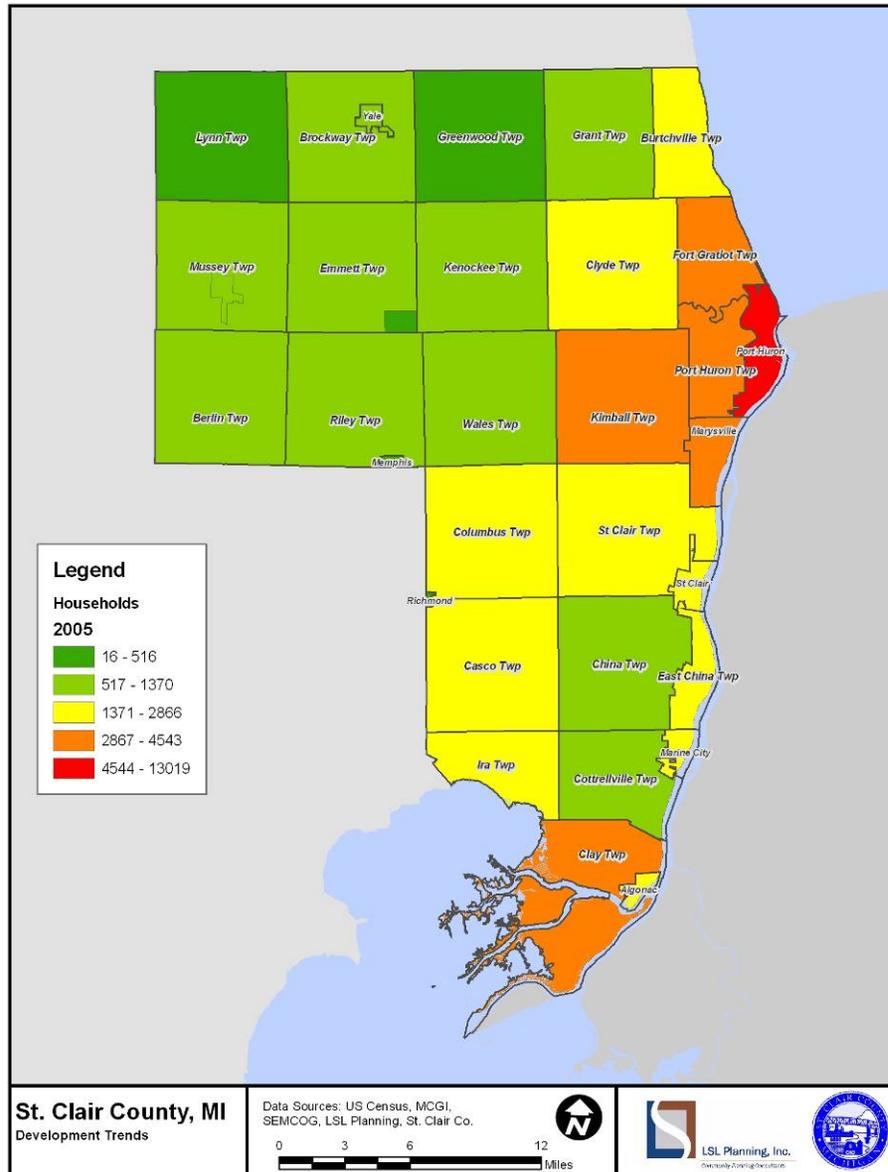
Infrastructure planners often use households as the primary demographic indicator. The US Census Bureau defines a household as one or more persons or families who share a housing unit. Since services are connected to housing units, not individuals, households are an appropriate unit of measure for infrastructure planning and are typically used throughout this document rather than individuals.



Current Number of Households

According to estimates by the Southeast Michigan Council of Governments (SEMCOG), there were approximately 66,500 households in St. Clair County in 2005. This is approximately 4,500 additional households since 2000 when the County Master Plan was adopted.

These households are not evenly distributed throughout the County. They are mostly located in the communities that border the St. Clair River, the lakefronts, and I-94. Port Huron, the largest city in the County, has the largest number of households by a large margin (see Table below). The other cities and townships with the greatest number of households are those immediately surrounding Port Huron – including the City of Marysville, the Townships of Fort Gratiot, Port Huron, and Kimball – as well as Clay Township (See map on left). These six communities are home to nearly half (49.9%) of all households in the County.



Communities with Most Households, 2005

Community	Households
Port Huron	13,019
Fort Gratiot Twp	4,543
Marysville	4,267
Clay Twp	4,157
Port Huron Twp	3,602
Kimball Twp	3,596
County Total	66,437

Source: SEMCOG Regional Forecast



Current Household Density

The cost of providing services is greatly affected by the relative concentration or dispersion and the density of population being served. It is more cost effective to provide infrastructure to higher concentrations of households, as it requires less linear feet of infrastructure (roads and utilities) to serve the same population.

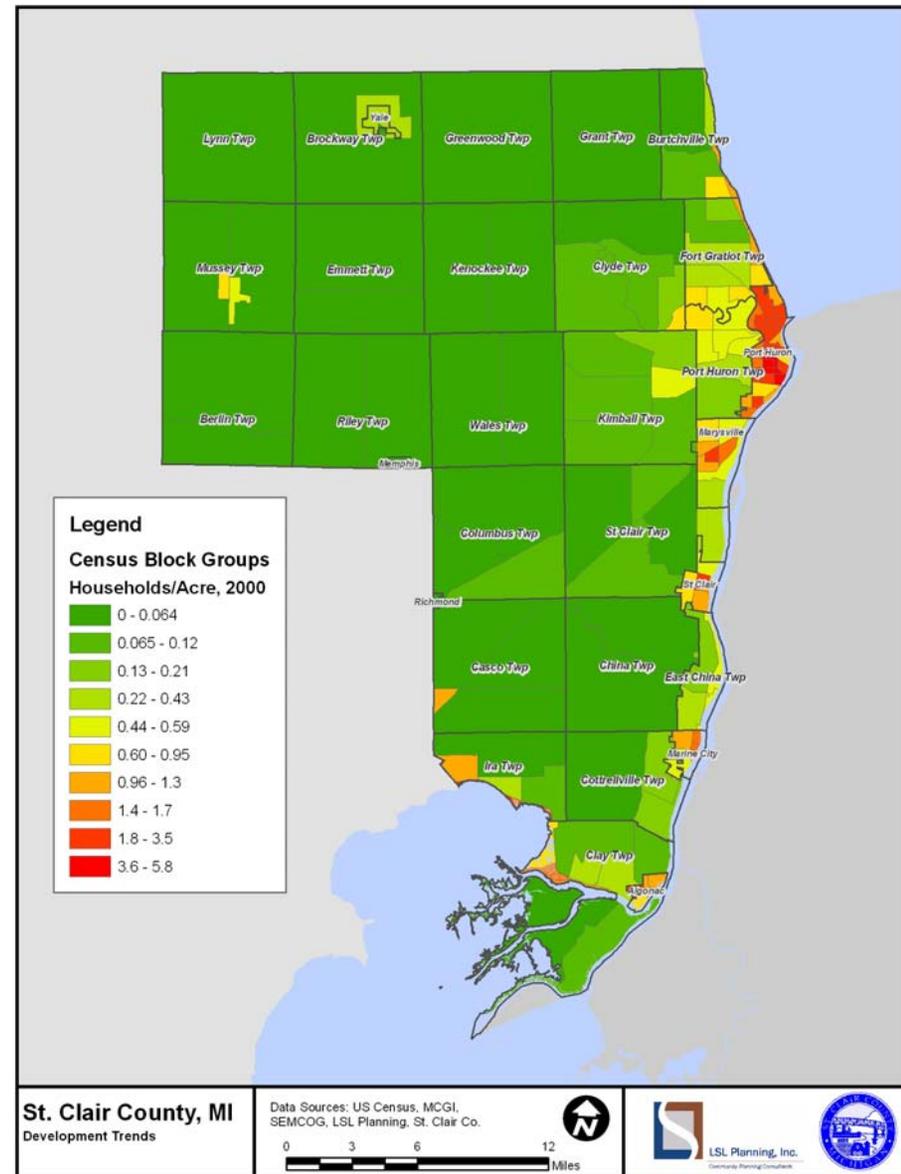
These concentrations typically vary across the landscape and within and across community boundaries. To determine the highest concentrations of households, a smaller geography was used than the community. Census block groups were used to calculate household densities within the County. Household density is defined as the number of households per acre.

According to the 2000 census, the highest concentrations of households were located in census block groups along the lakefront and riverfront portions of communities on the eastern edge of the County, especially in the cities of Port Huron, Marysville, St. Clair, Marine City, and Algonac, and the Townships of Clay and Ira, as seen in the Household Density map to the right and the table below.

Communities with Highest Household Density, 2000

Community	Units per Acre
Marine City	5.12
Port Huron	4.94
Algonac	3.45
Marysville	2.98
St. Clair	2.98
Ira Twp	1.66
Clay Twp	1.48

Source: US Census Bureau



New Households

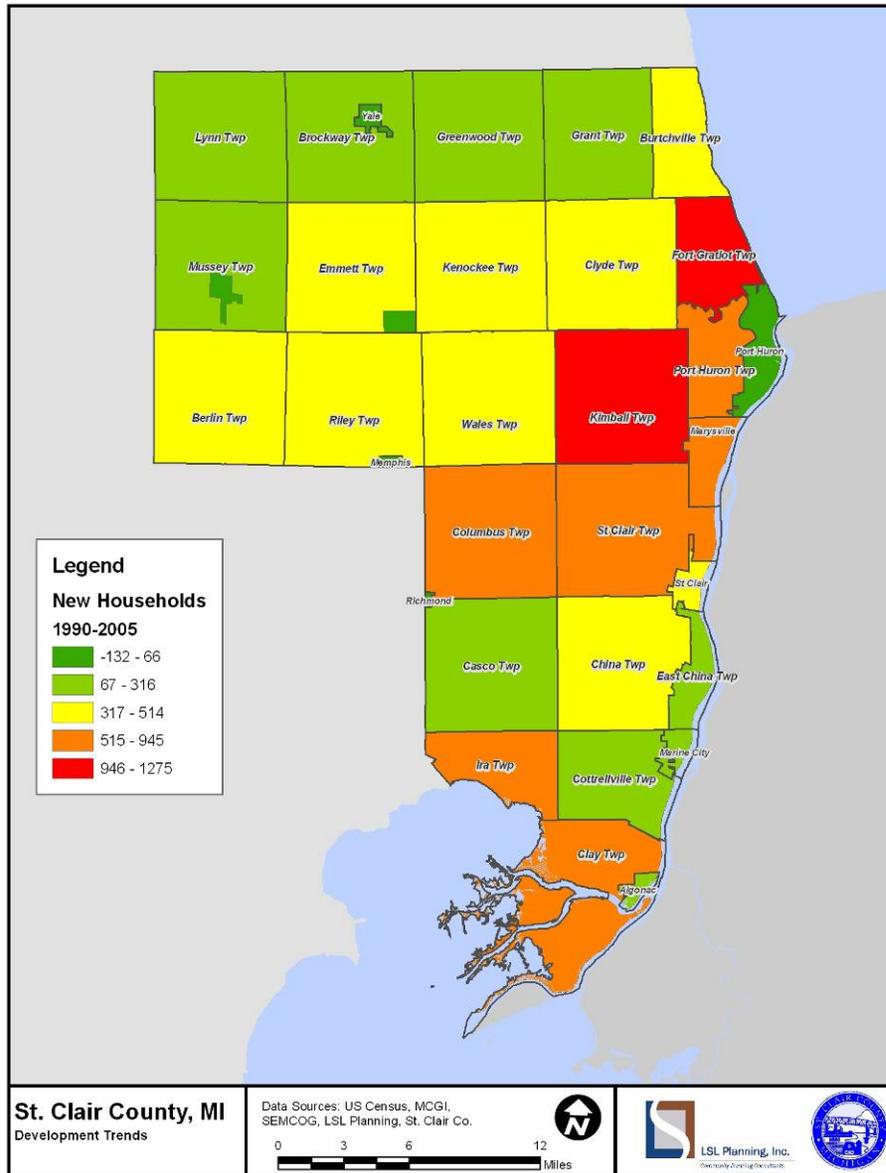
As households move into and within the County, demand for utilities in a community increase. Those areas that have seen the greatest increase in households have felt the greatest increase in demand for water, sewer, and other infrastructure. Between 1990 and 2005, St. Clair County gained approximately 13,500 households representing a growth rate of greater than 25%. This household growth rate exceeds the County’s population growth rate over the same period (approximately 17%) because the average size of households is getting smaller as adults are living longer, having fewer children, and marrying and having children later in life.

The communities where most new households located between 1990 and 2005 are the Townships of Fort Gratiot, Kimball, St. Clair, Port Huron, Clay, Ira, and Columbus, and the City of Marysville. These communities represent over 54% of the County’s new households during that period. During the same period, two communities experienced a net loss of households: the City of Port Huron lost 132 households (1%) and the Village of Emmet lost 3 households (-3%).

Communities with Most New Households, 1990-2005

Community	New Households
Fort Gratiot Twp	1,275
Kimball Twp	1,153
St. Clair Twp	945
Marysville	908
Port Huron Twp	853
Clay Twp	791
Ira Twp	723
Columbus Twp	691

Source: SEMCOG Regional Forecast



New Residences

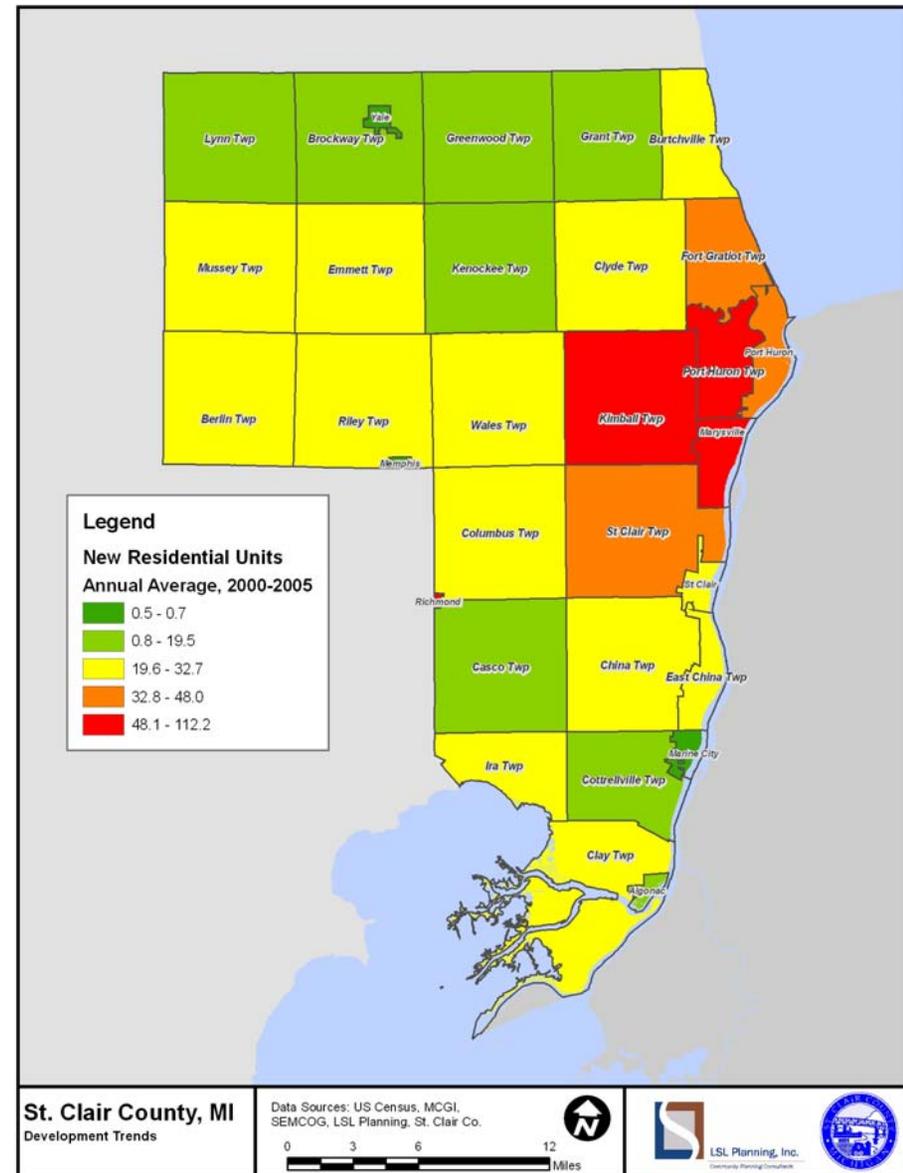
New homes place the highest demand on utility infrastructure on average. New residences located in areas that require utility hookups will demand sufficient infrastructure capacity prior to occupation. For this reason, assuming new housing units eventually become occupied, building permit statistics are a good predictor of the number of future households. Additionally, building permit data are readily available from their issuing authorities and are an important indicator of utility demand for periods between censuses.

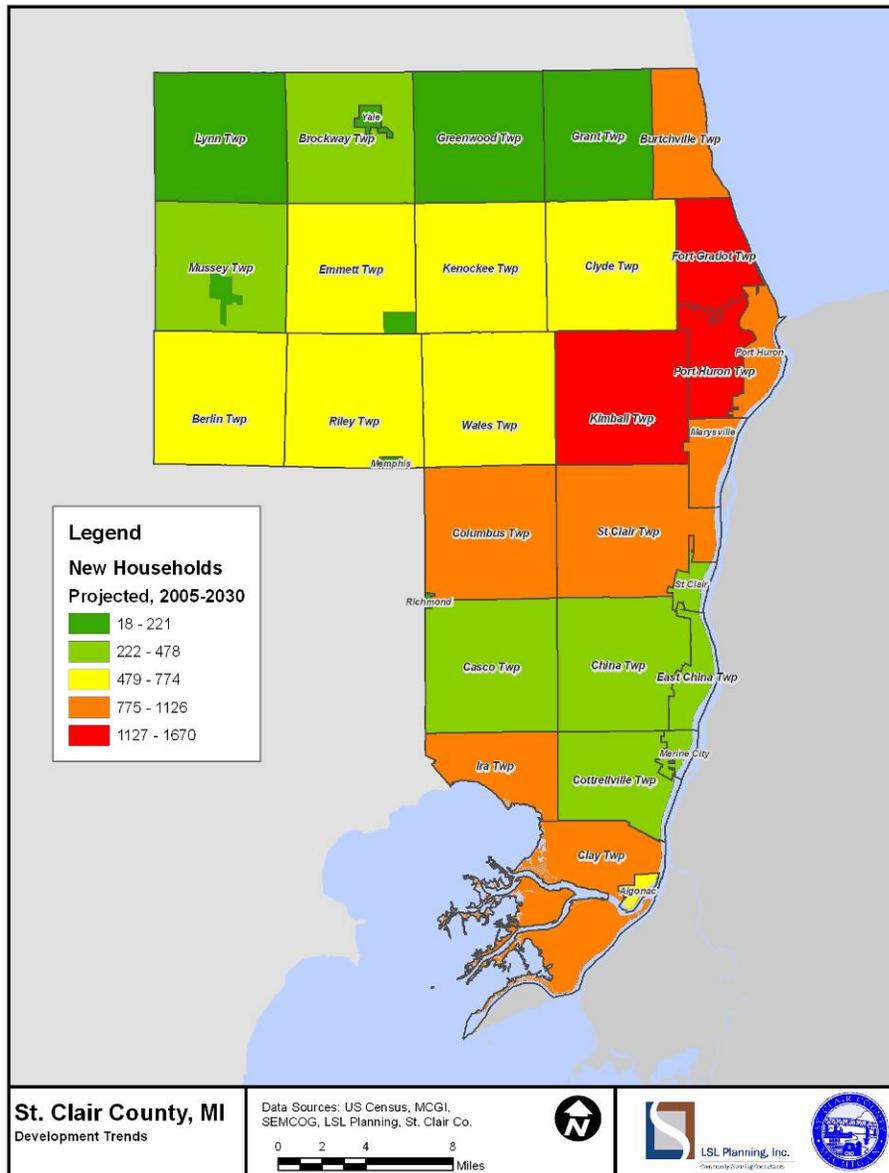
Building permit data from SEMCOG show that the County averaged over 900 annual residential building permits issued between 2000 and 2005. The communities with the highest average annual number of building permits issued during that period are those that are expected to add the most new households. Those communities are the Townships of Port Huron, Kimball, St. Clair, and Fort Gratiot and the City of Marysville.

Communities with Highest Average Building Permits Issued, 2000-2005

Community	Avg. New Permits
Port Huron Twp	112.2
Kimball Twp	66.0
Marysville	63.7
St. Clair Twp	48.0
Fort Gratiot Twp	45.2
Port Huron	39.5

Source: SEMCOG Building Permit Database





Projected Households

SEMCOG has created 25-year projections for a variety of demographic indicators including households. When the current County Master Plan was adopted in 2000, St. Clair County was projected to have 75,800 households by the year 2020. Updated projections since that time now project the number of households in 2020 to be around 79,000.

According to the updated 25-year forecasts, the communities with the greatest number of additional households projected from 2005 to 2030 are the Townships of Fort Gratiot, Port Huron, and Kimball. Significant numbers of new households are also projected to locate in the Cities of Marysville and Port Huron and the Townships of Clay, Burtchville, St. Clair, Columbus, and Ira. These are the communities that are projected to experience the greatest residential development activity and will likely see the most significant increase in demand for infrastructure.

Communities with Most New Households, 2005-2030

Community	New Households
Fort Gratiot Twp	1,670
Port Huron Twp	1,531
Kimball Twp	1,487
Marysville	1,126
Clay Twp	1,081
Burtchville Twp	985
Port Huron	920
St. Clair Twp	901
Columbus Twp	867
Ira Twp	853

Source: SEMCOG Regional Forecast

New Employment

Another use that is going to place demand on utilities and infrastructure is industry. Depending on their size and nature, many businesses, such as those that employ certain industrial processes, demand significant infrastructure capacity. Additionally, employment is a key factor in household mobility choices. Households are most likely to locate in areas with healthy job growth.

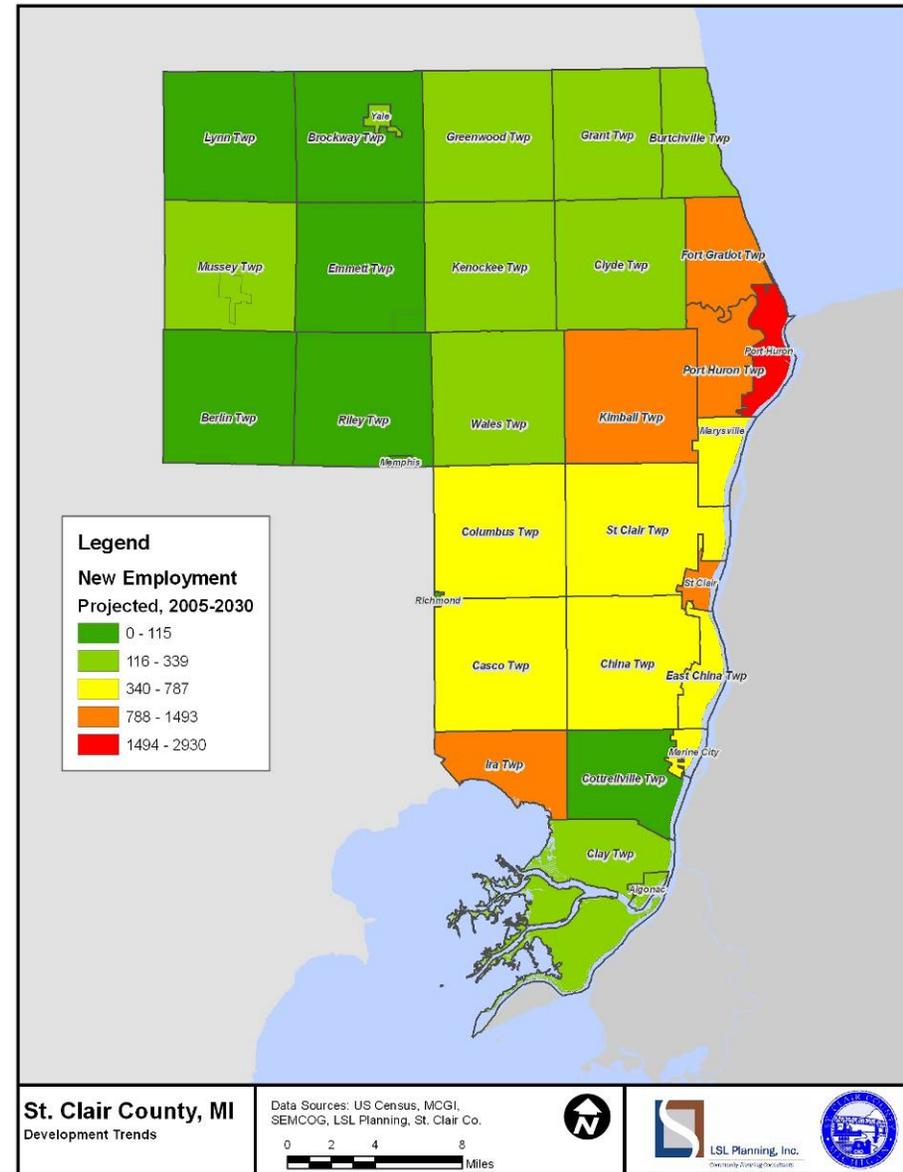
Currently St. Clair County has over 66,000 jobs. More than 60% of those are located in and around the City of Port Huron. St. Clair County is forecast to add nearly 15,000 new jobs between 2005 and 2030. Approximately 44% of those new jobs are forecast to locate in the Port Huron area. Those communities with the most job growth are the Cities of Port Huron and St. Clair, and the Townships of Kimball, Fort Gratiot, Port Huron, and Ira.

There are a number of new industrial facilities locating in St. Clair County. The largest new facility is the Chrysler axle plant that will be built in Marysville, which will employ 900 people when it reaches full volume in 2010.

Communities with Most New Jobs, 2005-2030

Community	New Employment
Port Huron	2,930
Kimball Twp	1,493
Fort Gratiot Twp	1,250
St. Clair	1,092
Port Huron Twp	956
Ira Twp	862

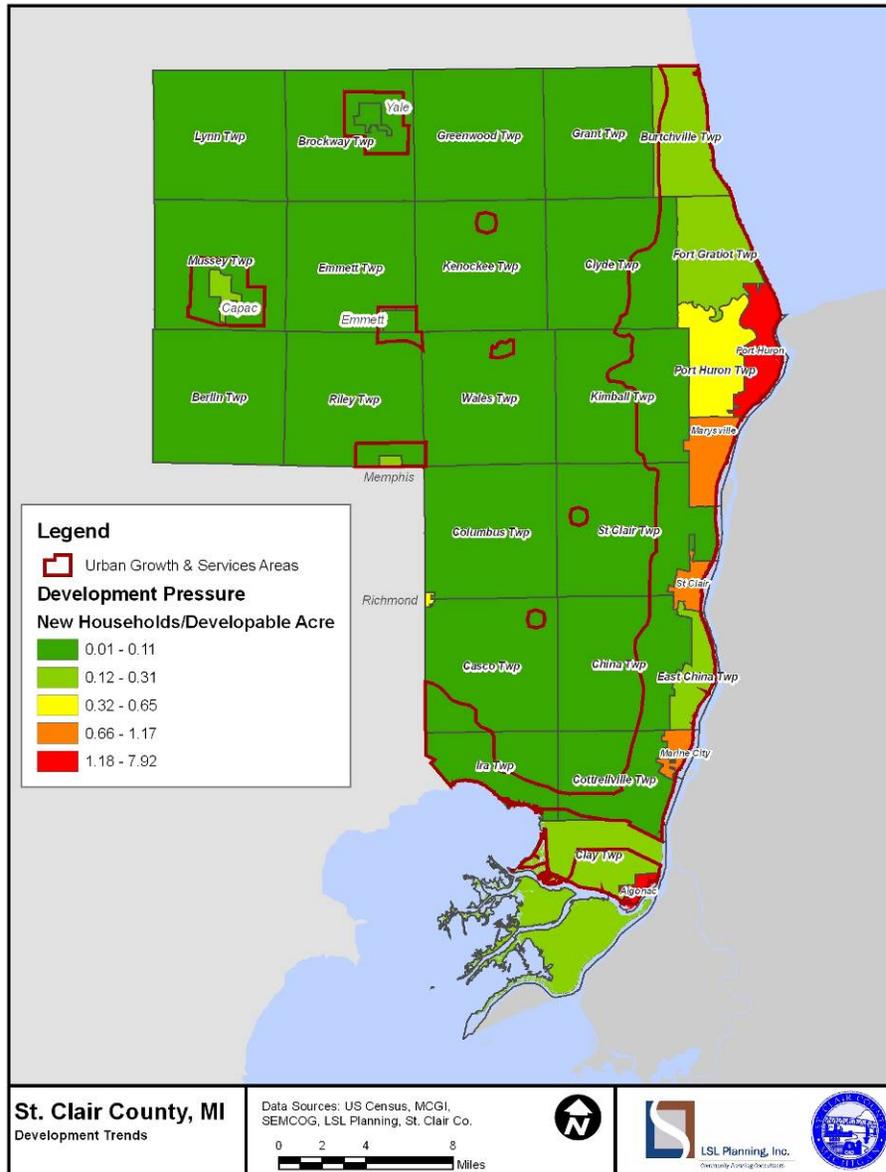
Source: SEMCOG Regional Forecast



Development Pressure

Development pressure was analyzed to determine areas with the greatest projected growth relative to the amount of vacant land available for development. These are areas that need to consider policies to accommodate infill development and redevelopment. To identify those areas where development pressure would be highest, the projected number of new households from 2005 to 2030 was compared to the amount of developable acres in each community. Communities facing the highest development pressure are those with the highest number of new households and the smallest area to accommodate them.

Smart Growth Principles, described in later sections, recommend directing new growth to existing urbanized areas, as opposed to allowing development to sprawl into rural areas. This maximizes the use of existing infrastructure and facilitates improvements to infrastructure in urban areas. A goal of this study is to help these communities take advantage of this opportunity for infill development/redevelopment and minimize sprawl into rural areas. There are a number of recommendations in this Toolkit to help encourage redevelopment of urbanized areas.



Utility Demand and Capacity

The ratio of demand to capacity indicates the pressure being put on a utility system. A high ratio is a sign that demand is near capacity and an indicator of a system that may need capacity improvements. A low ratio is a sign that development may be accommodated.

For the purposes of this study, average daily demand and capacity figures have been reported. This data was provided by the system operators. Peak demand and capacity data was only provided for Port Huron, although these figures would have been useful in painting a more complete picture of infrastructure conditions; however it does illustrate relative demand and capacities.

In general, demand for water is low relative to capacity in most systems. Only Clay Township, whose water is supplied by the City of Algonac, has a demand greater than 50% of capacity. Many other communities have significant unused water capacity, including Yale, Clyde Township, Burtchville Township, East China Township, and Memphis. These communities are using less than 25% of their available water capacity.

Demand for sanitary sewer varies widely across the communities in St. Clair County. Demand to capacity is higher than for water for most communities. Several communities are experiencing average sewer demands greater than 75% of their capacities and peak demands at capacity. These communities include the City of St. Clair, the Village of Capac, St. Clair Township, Port Huron Township, and Algonac. At the same time, several communities have excess sewer capacity, including Yale and Marine City.

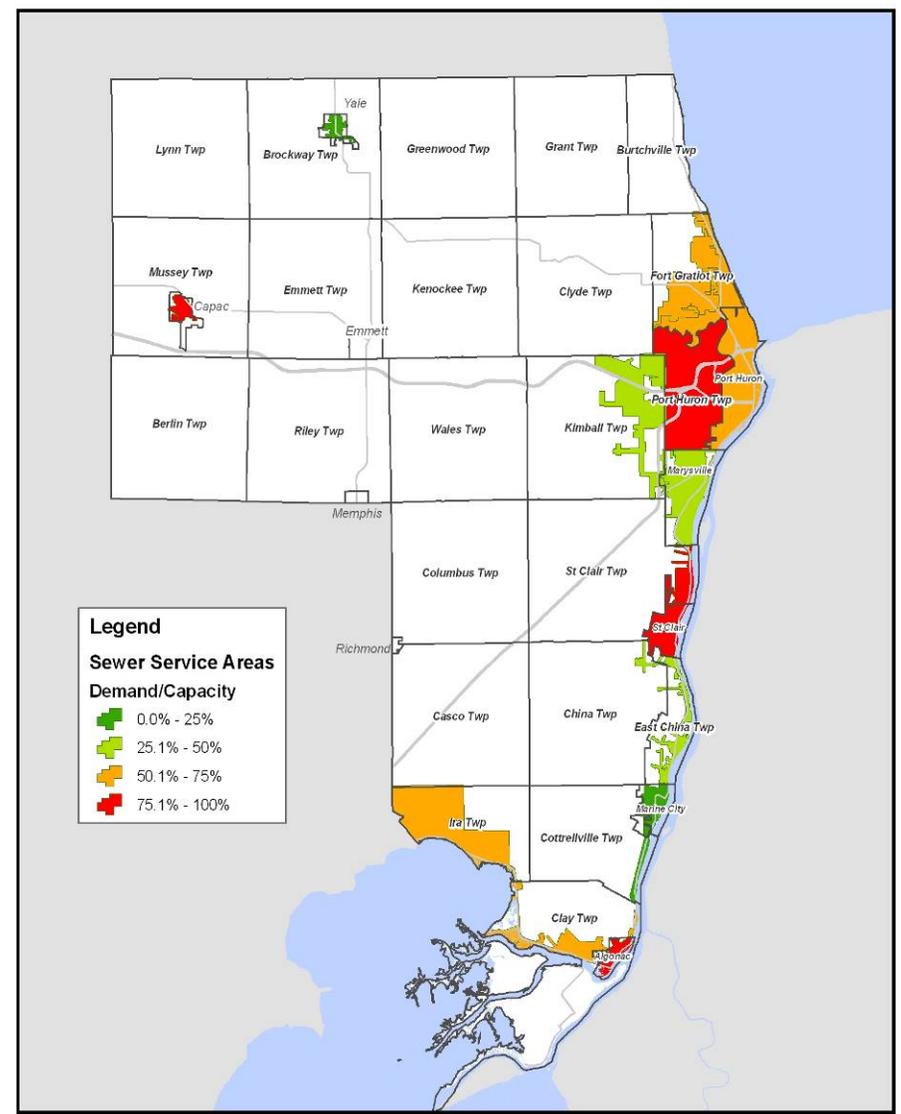
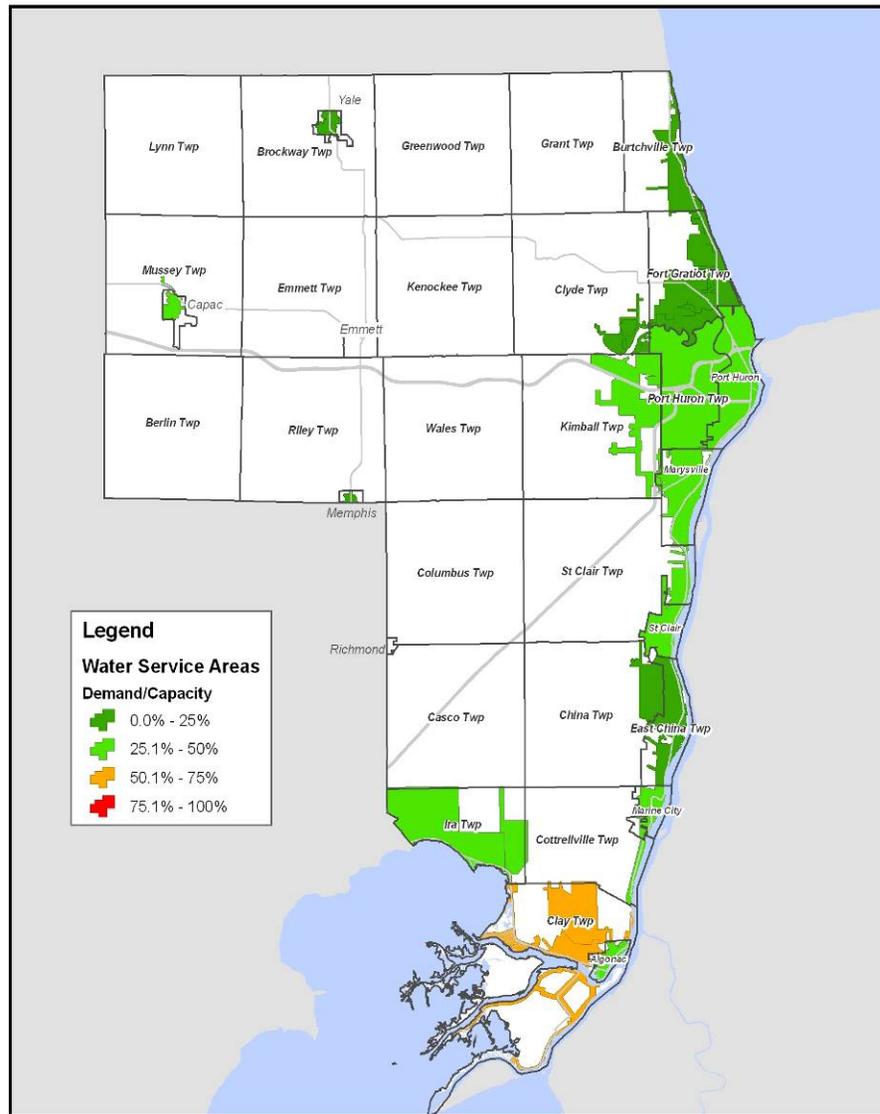
St. Clair County Water/Wastewater Capacity and Demand 2005

Community	Water (mg/d)		Wastewater (mg/d)	
	Capacity	Demand	Capacity	Demand
Algonac City	2.75	1.3	-	-
Algonac	1.0	0.46	-	-
Clay Twp	1.75	0.84	-	-
St. Clair County	-	-	2.7	1.9
Algonac	-	-	0.82	0.63
Clay Twp	-	-	0.94	0.63
Ira Twp	-	-	0.94	0.63
Burtchville	1.0	0.22	none	none
Capac	0.4	0.2	0.24	0.21
East China	2.7	0.6	3.35	0.85
China Twp	0.27	0.06	0.34	0.08
East China Twp	2.43	0.54	3.01	0.77
Ira	2.25	0.7	-	-
Marine City	2.0	0.80	7.0	0.80
Cottrellville	0.05	0.02	0.175	0.02
Marine City	1.95	0.78	6.825	0.78
Marysville	7.5	2.2	6.1	2.22
Memphis	0.39	0.09	none	none
Port Huron	30.0	7.7	20.0	11.3
Clyde Twp	.69	0.2	none	none
Ft. Gratiot Twp	5.7	1.5	3.8	1.28
Kimball Twp	2.01	0.4	1.4	.34
Port Huron Cty	15.9	4.1	10.8	5.74
Port Huron Twp	5.7	1.5	4.0	2.1
St. Clair	3.0	1.4	1.6	1.4
St. Clair Cty	2.42	1.15	1.28	1.12
St. Clair Twp	0.58	0.25	0.32	0.28
Yale	1.65	0.23	1.8	0.35

Source: Local units of government and utility authorities

Peak demand for Port Huron system in red. Average demand provided for all other communities





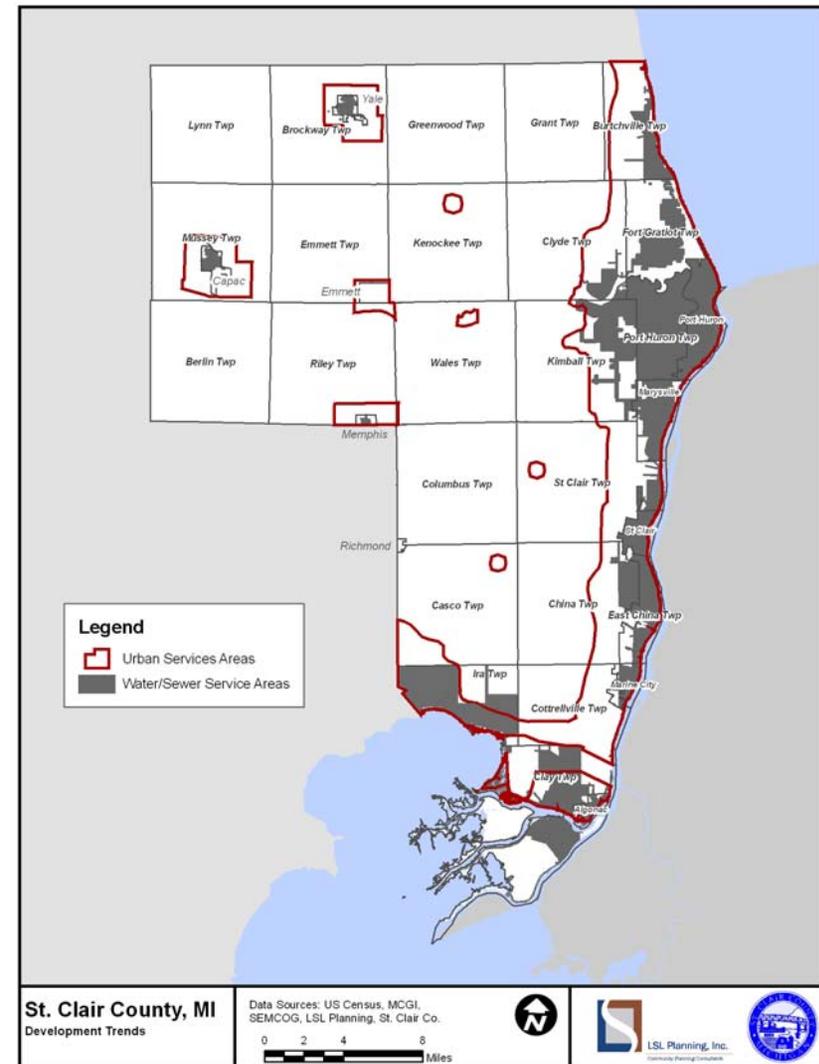
Infrastructure Assessment

There are two general utility service areas referred to in this document. The existing utility service area is comprised of those areas currently served by water or sewer services and those areas close to existing services where utility services are assumed be easily extended. This area contains approximately 50,900 acres of County lands.

Poor soils cover a large portion of St. Clair County. These soils drain poorly and make septic wastewater treatment problematic. As a result, new development will generally require extension of water and sewer services.

The Urban and General Services (UGS) District is the area to which the 2000 St. Clair County Master Plan directs future phased utility expansion and those types of development that require or most benefit from public utilities. This area contains approximately 114,000 acres in the County.

Much of the existing service area and a large portion of the UGS District have been developed. Nevertheless, undeveloped or underdeveloped lands exist in these areas and future development and redevelopment should be concentrated on these lands over the next 20 years of the County's growth.

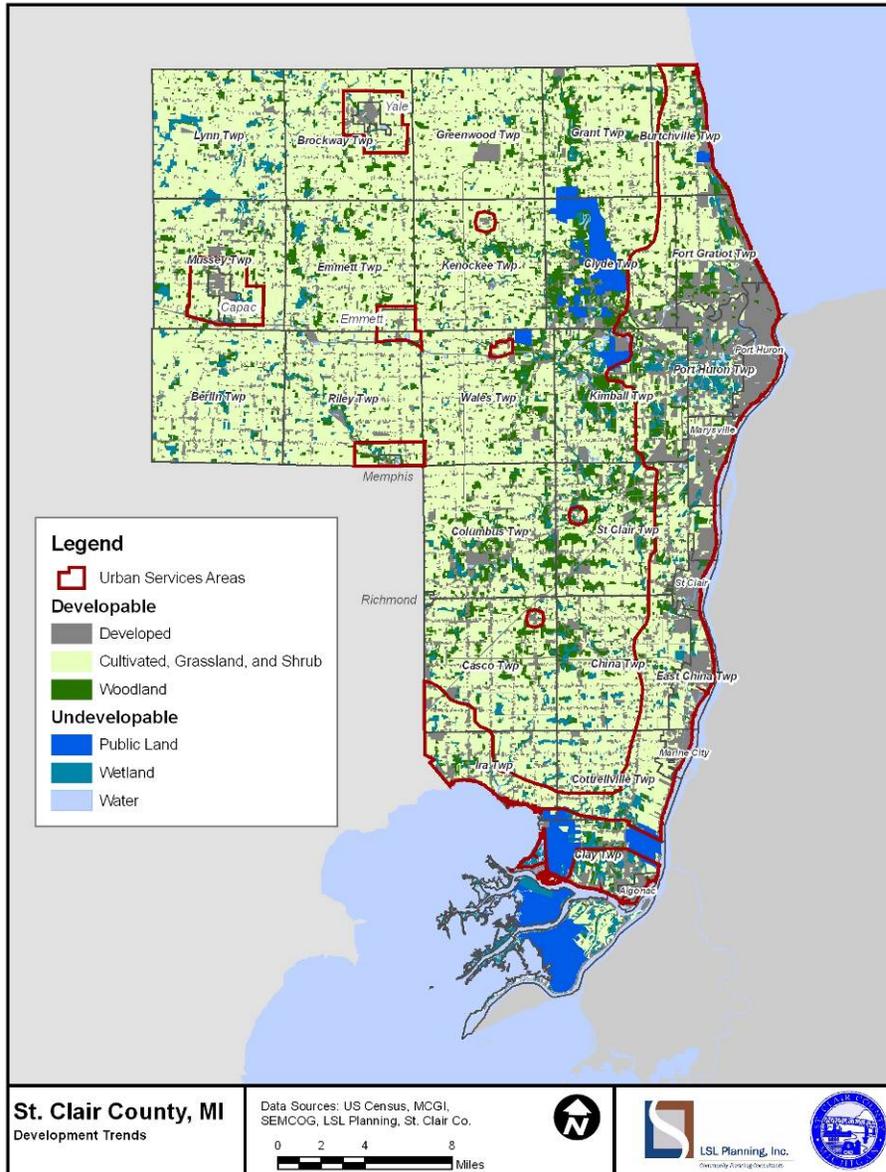


Development Potential

County land use data for 2000 indicates significant developable acreage existed within the existing utility service area and the UGS District. Developable lands include woodlands, agricultural lands, grasslands, and shrub lands that are not wetlands or in public ownership.

There are approximately 30,000 acres of developed land in the existing utility service area. This represents 58% of the service area. Another 8,000 acres are undevelopable water bodies or wetlands, representing 15% of the service area. The remaining 14,000 acres or 27% of the service area are developable.

Within the UGS District, where future growth will be directed, there are approximately 40,000 (35%) developed acres of land, while approximately 60,000 (52%) acres are still developable and 14,000 (12%) acres are undevelopable natural areas.



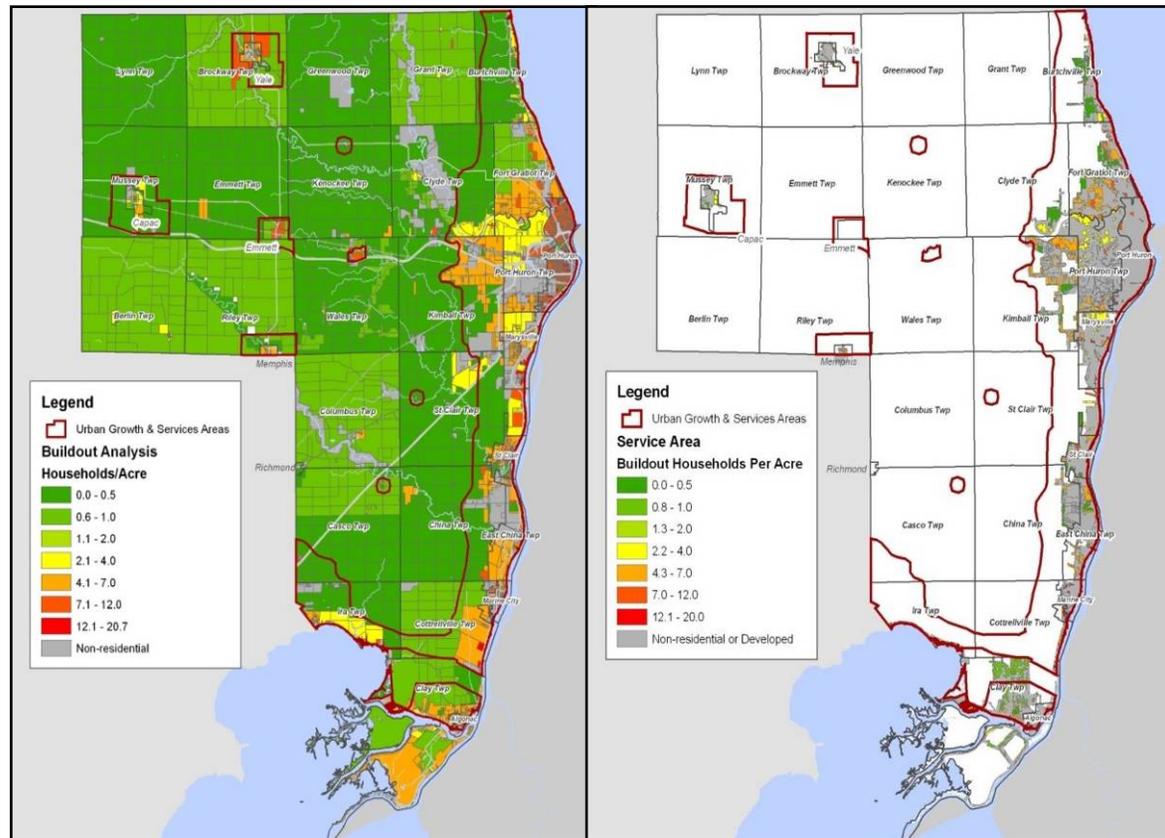
Buildout Analysis

The St. Clair Metropolitan Planning Commission developed a buildout analysis that determines the maximum population that can be accommodated if the entire County was developed at the current maximum permitted zoning densities. This analysis estimates that local government regulations allow approximately 440,000 housing units housing 1.16 million people. This figure far exceeds the projected growth in the County over the next 25 years which estimates a total of approximately 73,000 housing units.

Comparison of the buildout analysis with the developable acres in the existing service area indicates that the approximately 14,000 developable acres are zoned to accommodate approximately 38,000 additional households. In addition, the 60,000 developable acres located in the Urban and General Services (UGS) district defined in the County's 2000 Master Plan is zoned to accommodate 96,000 households (or 58,000 additional households in the 46,000 acres beyond the existing service area).

Projected new households 2000-2030	19,000 HH.
Developable land in current service area	14,000 Ac.
Additional households in current service area	38,000 HH.
Developable land in Urban & General Services district	60,000 Ac.
Additional households in UGS district	96,000 HH.

Based on these estimates, there appears to be more than enough developable land in the current service area that is sufficiently zoned to accommodate the additional 19,000 households that are forecasted to locate in the County by 2030. Therefore, significant expansion of current water and sewer systems is not expected to be necessary in the short term.



Smart Growth

According to the US Environmental Protection Agency (EPA), Smart Growth is “a range of development and conservation strategies that help protect our natural environment and make our communities more attractive, economically stronger, and more socially diverse.” The principles of Smart Growth include:

- Create range of housing opportunities and choices.
- Create walkable neighborhoods.
- Encourage community and stakeholder collaboration.



- Foster distinctive, attractive communities with a strong sense of place.
- Make development decisions predictable, fair and cost effective.
- Mix land uses.
- Preserve open space, farmland, natural beauty and critical environmental areas.
- Provide a variety of transportation choices.
- Strengthen and direct development towards existing communities.
- Take advantage of compact building design.

Environmental Benefits of Smart Growth

Communities that embrace Smart Growth will also better protect their natural resources by encouraging more intensive development of less sensitive lands. A smart growth development pattern requires less land to accommodate the same number of households, leaving more land available for conservation purposes. To help protect natural resources, communities can incorporate Smart Growth principles into development decisions to:

Reduce stormwater runoff to protect surface water quality and drinking water supplies. Preserving natural areas, encouraging cluster and infill development and encouraging mixed-use development can reduce the impervious surfaces that impact the quality of surface waters, a key source of drinking water to many communities in St. Clair County.

Benefits of Smart Growth

Preserve open spaces and natural features. Explicit conservation efforts, in combination with policies to promote compact and infill development patterns, work to protect open spaces and important natural areas that serve as habitat for all types of wildlife, including those that are endangered or threatened. Protected open spaces also help preserve groundwater recharge and floodwater retention areas. They also help absorb greenhouse gasses that contribute to global warming and can provide shade that help maintain stable microclimates.

Protect natural resources like fisheries and woodlands. Many natural resources like fisheries, woodlands, and agriculturally productive lands are important to the economy as well as to the natural function of local ecosystems. They also contribute to the quality of life of County residents and visitors.

Reduce resource consumption in construction of unnecessary infrastructure. Compact, infill, and mixed-use development patterns require less infrastructure which reduces natural resource consumption as well as installation costs.

Reduce air and water pollution by reducing fuel consumption and vehicle miles driven. Development patterns that maximize infill, density, and mixed-uses support transit, pedestrians, and bicyclists. This creates a better opportunity to reduce automobile traffic and fuel consumption, which contribute to air and water pollution and can impair the health of people and ecosystems.

Encourage cleanup and redevelopment of contaminated “brownfield” sites. Development policies that promote development of unused and underused infill parcels have the benefit of encouraging reuse of contaminated, former industrial sites. These brownfields are typically served by utilities, resulting

in an underutilization of existing infrastructure. Existing infrastructure capacity and brownfield cleanup programs make these sites more attractive for development.

Community & Quality of Life Benefits of Smart Growth

Communities that incorporate Smart Growth principles into their development decisions see improved quality of life for their residents, business owners, employees, and visitors. In addition to the financial and environmental benefits discussed above, Smart Growth can also help in the following areas:

Revitalize older urban cores. Older downtown areas and other urban cores are typically served by utilities but often contain underutilized properties. Communities that encourage Smart Growth through their land use and utility policies can help spark economic and social revitalization in these areas by providing incentives to construct infill and redevelopment projects in downtowns and other areas with existing infrastructure.



Create new communities with a strong sense of character. New developments that adhere to the principles of Smart Growth have better success creating communities that are attractive, pedestrian-friendly, and vibrant than conventional developments.

Preserve farmland and rural character. Smart Growth principles encourage redevelopment of existing sites and new development on unused infill sites. Developments should be compact with higher densities. These features combine to reduce development pressure on land beyond the urban fringe, especially farmland and very low-density rural residential areas. Preserving these areas helps maintain their rural character and helps keep productive agricultural lands as active farms.

Preserve natural features and open spaces. High quality natural features and open spaces make communities attractive. Studies show that homes near parks and greenways are valued at a premium and that communities with high quality natural areas have an advantage in attracting and retaining employers, employees, homeowners, and tourists.

Improve health through reduced pollution and improved opportunities for walking and biking. By protecting natural and open spaces, promoting brownfield cleanup, and reducing automobile dependence, communities that develop according to the principles of Smart Growth can help improve the health of their residents by improving air and water quality, reducing the presence of toxic chemicals, and promoting physical activity.



Cost to Provide Infrastructure

Incorporating Smart Growth principles into local development decisions helps communities make better use of public and private expenditures. Use of public infrastructure is maximized by encouraging public and private investment in already developed areas and limiting the costly expansion of services. This can be achieved by promoting compact and multi-use development on infill properties and those near existing services.

The cost and efficiency for providing infrastructure can vary greatly depending on a community's development pattern. Utility costs associated with sprawl vary depending upon the pattern of development. Studies show that development patterns based on Smart Growth strategies can provide significant cost savings to governments, developers, and homeowners.

In terms of minimum lot size requirements, doubling lot sizes can increase infrastructure costs by up to 40%. Communities should therefore keep in mind the infrastructure and fiscal implications of requiring larger lot sizes and weigh these against density and community character concerns.

The location of a development relative to existing urbanized areas and other developments can also increase infrastructure costs. The distance of a new development from existing urbanized areas with utilities can increase infrastructure costs by 2 - 15%. Also, where development tracts are dispersed into a checkerboard pattern with vacant land between (often referred to a "leapfrog-development") this can increase infrastructure costs by 2 - 8%.

Essentially residential development on small lots, close to existing urbanized areas is the most cost effective in terms of providing community infrastructure. Development on large lots, far from

service centers is the least efficient means of providing infrastructure and community services.

According to a study by SEMCOG titled Fiscal Impacts of Alternative Land Development Patterns in Michigan, a more compact development pattern can provide a 12% savings in expenditures for roads, a 15% savings in expenditures for public water, an 18% savings for sanitary sewer. In addition to roads and utilities, infill development and compact development near existing urbanized areas can result in a 5% savings in costs associated with public buildings, such as schools, by better utilizing existing facilities in urbanized areas and reducing the need to build new facilities in rural areas.

In addition to infrastructure savings, more compact development can have a 12% savings in the land area, which has the added benefits of reducing environmental impacts of sprawl and preserving farmland. All of this has a combined effect of reducing housing costs overall by 6%.

While many communities require the developer to pay the up-front cost of extending and installing infrastructure to serve their developments, at least a portion of this cost gets passed on to the homebuyer in higher housing prices. Just as important, though, the municipality will be responsible for the costs associated with long term maintenance and eventual replacement of this infrastructure. Therefore, inefficient development patterns now will lead to increased public costs in the future.

Much of St. Clair County has poor ground water due to brine or methane gas contamination, which makes individual residential wells problematic. This creates demand to extend municipal water to serve residents. However, the cost to provide municipal



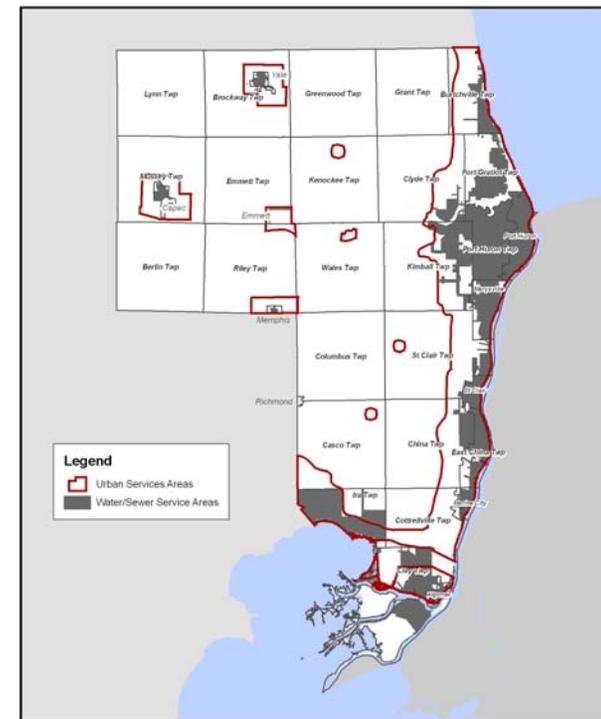
water to residences, particularly in low density areas, can be high. The cost to maintain water systems can also be high. For example, Cotterville Township is extending 4.5 miles of water main to serve 103 residences at a cost of \$1.7 million. This will be funded through a special assessment district with an assessment of \$3,600 per lot plus \$30 per linear foot of waterline. Ira Township is spending \$5 million to replace five miles of watermain along M-29.

Not only is the cost of extending watermains high, but the cost of constructing, maintaining and improving water treatment plants is also high. China and East China Townships completed a new water treatment plant at a cost of \$7.5 million. Marine City was required by the MDEQ to make improvements to its water treatment plan to prevent backwash sediments from being discharged back into the St. Clair River. The improvements, which included a new generator, holding tank, filter upgrades and valve replacements, cost \$2.5 million.

The soils in St. Clair County tend to be high in clay content and have high water tables, which will not permit development of septic systems. This creates the necessity for municipal sanitary sewer, which can also be costly to construct and maintain. The City of Marysville plans to spend approximately \$60 million over the next 15 years to repair and replace storm and sanitary sewer lines to help elevate flooding problems. This will include replacing sanitary sewer interceptors, installing relive sewers and new sanitary sewers, rehabilitating existing sanitary sewers, disconnecting foundation drains from sanitary sewers and constructing a new 7.5 million gallon storage tank to contain sanitary sewer overflows during rain events.

Utility Service Areas

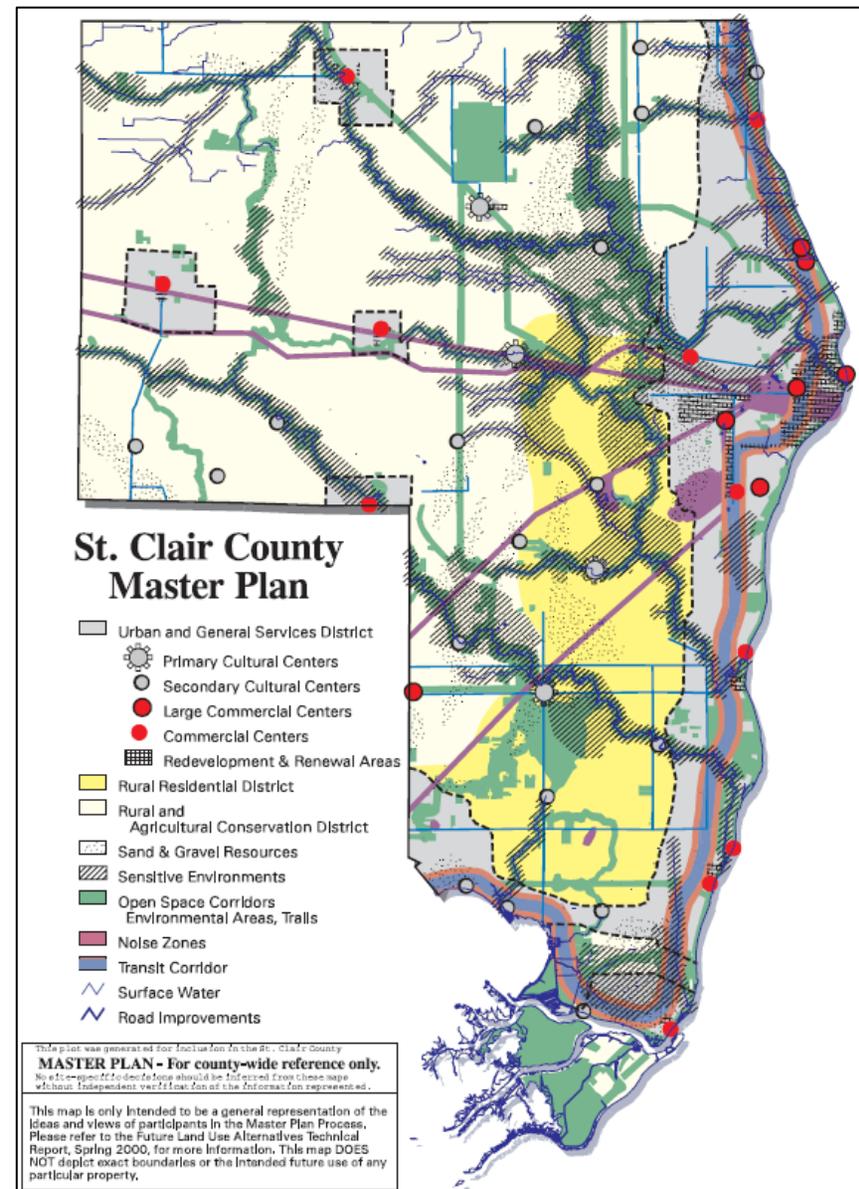
With the high cost of providing utility services, development should be focused in areas where utilities are available. This will maximize efficient use of existing infrastructure and investment in maintaining existing utility systems. Because there is currently land available within close proximity to areas currently served by utilities, communities should focus land use policies towards encouraging infill development. This will ensure the most efficient provision of public services and help to limit urban sprawl. There are a number of tools that are available to communities to help manage growth and infrastructure that follows in the next section of this study.



Urban and General Services Boundary

In order to further encourage the clustering of development in and around existing utility service areas, revisions to the UGS Boundary should be considered in the next County Master Plan update. The build-out analysis shows that there is capacity for an additional 96,000 households within the current UGS Boundary. This is far in excess of the 19,000 new households that SEMCOG projects to be developed over the next 25 years. Therefore the geographic extent of the UGS Boundary can be reduced to concentrate development towards developed areas. Revisions to the UGS Boundary should consider the following factors:

- Areas currently served by utilities should remain in the UGS boundary, except in instances where significant environmental conditions make significant development in these areas inappropriate.
- Areas that currently have higher density development, but no public utilities should be included where it will be necessary to extend utilities to serve existing development in the near future.
- Sensitive environments that could be adversely affected by development should be excluded from the UGS Boundary, such as forest preservation areas, areas with large wetland systems and areas along major riparian corridors.
- The UGS Boundary should reinforce the creation of concentrated nodes of development or hamlets where utility systems can be more efficiently developed.
- The UGS Boundary should focus development towards existing urban centers to encourage infill development.



Tools



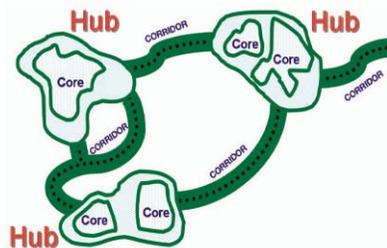
Overview

Green infrastructure is our system of natural resources that provide the critical ecological services necessary to maintain a healthy environment for humans and wildlife. The various components of the natural environment function, change, and interact as part of a delicate ecosystem that must maintain a balance of biodiversity to remain healthy. Because hydrology is a critical component of the ecosystem, the impact of stormwater runoff needs to be considered. For development to be sustainable, communities must ensure that it occurs in a manner that has the least impact on the overall system.



A green infrastructure plan is a functional part of a community master plan that designates and prioritizes open space for conservation. It also helps to reflect the desired development pattern. A green infrastructure plan identifies important natural areas that have important conservation value, such as:

- Woodlands
- Wetlands
- Floodplains
- Water features
- Animal and plant habitats
- Greenway corridors
- Headwater tributaries
- Glacial beach ridges and swales
- Prime agricultural land and rural character
- Public access to water resources



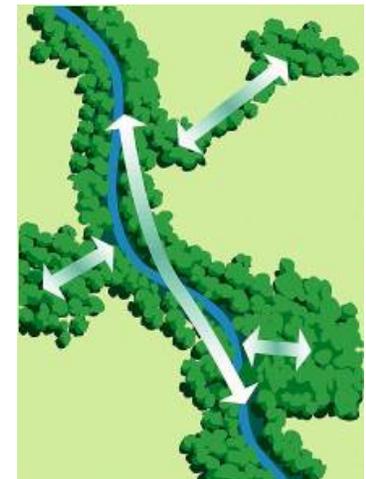
The plan helps coordinate conservation efforts so that the most critical natural areas are preserved first. The plan also helps determine areas best suited for the establishment of an interconnected open space network or greenway.

Benefit

Green infrastructure helps sustain life on the planet. It provides important natural benefits like maintaining air and water quality and protecting people and property from flood hazards. This is especially important in St. Clair County where poorly draining soils make much of the County flood prone and where most drinking water comes from lakes, rivers, streams, and wells. Green infrastructure also provides recreational resources that help us live healthy lives. A system of linked natural areas creates places for bike paths, trails, river trails, beaches, and other outdoor recreation that help us remain active. The greenway system along natural drainage courses can also be integrated into the community's stormwater management system.

Relevant Locations

A green infrastructure plan is appropriate in most communities, but especially those experiencing high growth pressure or containing significant natural resources. Urban, suburban, and rural areas, with and without utilities, can take advantage of preparing a green infrastructure plan.



Recommended Implementation Guidelines

Get public opinion of the desired characteristics of a greenways system.

Public participation is critical to develop popular and political support necessary for implementing a green infrastructure plan.

Identify critical environmental areas.

A natural features inventory should specify the location of important environmental features. The inventory should include rivers, streams, lakes, wetlands, woodlands, floodplains, dunes, beaches, endangered and threatened species habitat, wildlife corridors, and aquifer and groundwater recharge areas.

Identify existing protected open spaces.

Permanently protected open space should also be identified. These areas may include lands owned by federal, state, and local governments and non-profit conservation organizations, such as land trusts. Areas to catalog may include parks, forests, monuments, recreation areas, game lands, animal preserves, lakeshores, historic sites, and battlefields.

Identify areas least suitable for development.

Land that has major development constraints can be targeted as future protected open space. Areas with steep slopes, poorly draining and unstable soils, and poor access should be identified to help plan future land acquisition priorities.

Map green infrastructure.

Mapping the location of these areas will make it easier to identify potential corridors and connections for making sure the greenspace network is interconnected.

Consider a regional approach.

Each community's open space network should connect to the network of neighboring communities to create a connected regional network. This will help ensure ecological health as well as expand recreational opportunities for all residents.

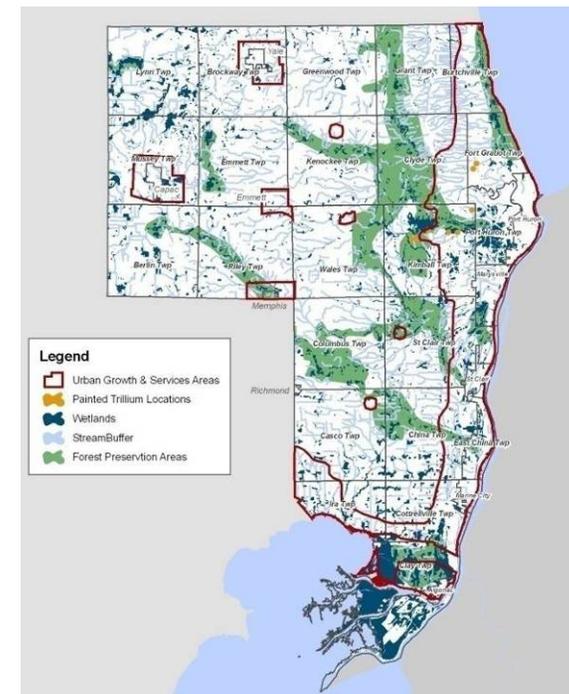
Resources

Saginaw Bay Greenways Collaborative:

<http://www.greeninfrastructure.net/pdf/Vision%20of%20Green.pdf>

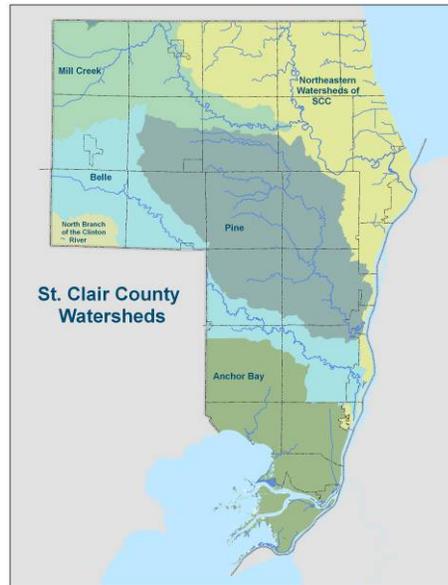
Northwest Lower Michigan Conservation Resource Alliance:

<http://www.greeninfrastructure.net/pdf/cra%2008.30.05.pdf>



Overview

A watershed is the geographic land area in which all surface waters drain to a common outlet. Watersheds often consist of smaller sub-basins within a larger watershed. In Michigan, all interior watersheds drain into the Great Lakes. There are six primary watersheds in St. Clair County: Mill Creek, Belle, Pine, Anchor, Bay, North Branch of the Clinton River, and the Northeastern Watersheds of St. Clair County (Lower Black and Lake Huron). The effects of stormwater runoff can be seen in the immediate area, such as an inland lake or river, as well as Lake Huron. Water quality is directly related to the character of the landscape and the type of land use activities along the waterways. In Michigan, planning and zoning decisions are made at the local level. The inherent problem in this kind of land management is that the quality of our water resources is directly linked to land use activities, and watersheds do not follow political boundaries. The consequences of poor land use decisions in one community will most likely affect an adjacent community. To best manage water quality, planning decisions should consider all land uses within a 'watershed'. Watershed plans exist for Anchor Bay and the Northeastern Watersheds and can be used as a model for other watershed planning efforts.



Benefit

Watershed-based planning helps improve water quality, which can reduce the treatment required for community water supply systems, improve fisheries, and protect the natural services provided by healthy environments. Considering development impacts on an overall watershed will also help manage stormwater runoff.

Relevant Locations

All communities in the County and those in neighboring counties located in common watersheds.

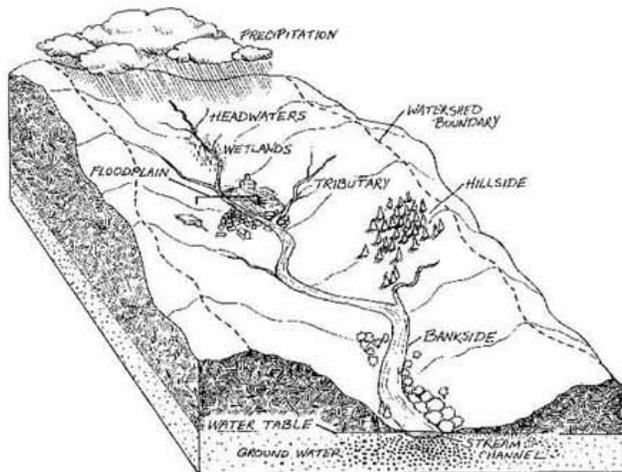
Recommended Implementation Guidelines

Minimize impervious surface on a watershed level instead of a site level.

Reducing impervious surfaces allows greater stormwater infiltration, improving the ability to allow water to naturally filter through soils, improving overall water quality and reducing the quantity of stormwater runoff. While limiting impervious surfaces on a site by site basis can decrease the amount of runoff generated on-site, attention should also be focused on what type of land use is generated within a watershed. A very low density development pattern can create sprawl and result in greater cumulative stormwater impacts than is generated from a tight, dense land use pattern.

An inefficient land use pattern increases both the cost of providing future infrastructure improvements and increases the cumulative stormwater runoff into the Great Lakes. Taking a watershed approach, impervious surface coverage is best limited by encouraging higher density development that accommodates a





larger population on an existing infrastructure system that can support it.

Identify and preserve critical ecological areas and contiguous open space areas.

Natural vegetated areas are most effective in protecting water quality when they are large and connected. Identify these areas on a map and work with adjacent communities to maximize the protection of natural areas within a watershed when reviewing future development proposals.

Make maximum use of existing infrastructure and previously developed sites.

Directing development to areas with existing infrastructure helps preserve critical environmental areas and the water quality benefits they provide to the watershed. St. Clair County has several areas where development densities are significantly limited by poorly draining soils. Locating development in areas

where infrastructure exists reduces the dependence on individual septic systems, which leach into area waters when they fail.

Consider the cumulative effect of development over the entire watershed.

When developing master plans and reviewing development proposals, consider how the intensity and location of new development fits into the context of the watershed as a whole. Inform adjacent communities of development plans and coordinate planning efforts with them.

By planning proactively, the cost of stormwater infrastructure can be reduced and the costs associated with stormwater management can be more equitably shared between the private and public sectors.

Resources

St. Clair County Watershed Planning:
<http://www.cis.stclaircounty.org/planning4041745.asp>

Michigan Dept. of Environmental Quality Watersheds Page:
http://www.michigan.gov/deq/0,1607,7-135-3313_3682_3718---.00.html

Into Every Life a Little Rain Must Fall, Michigan Dept. of Environmental Quality



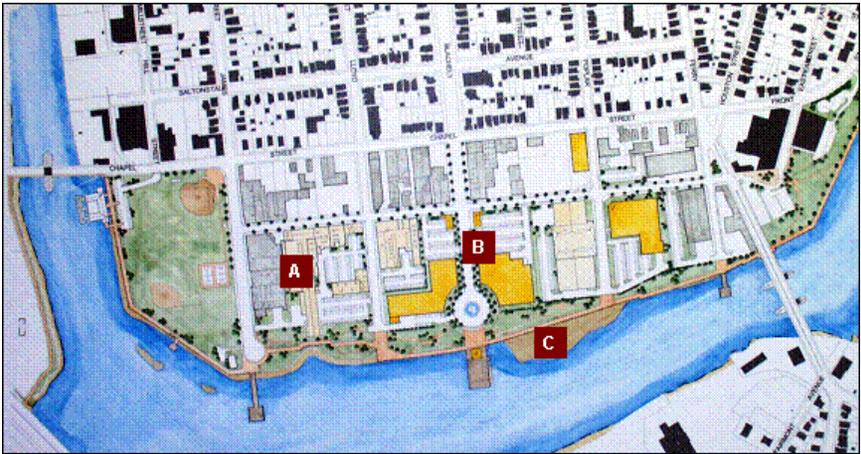
Infill Development

Overview

Planning for infill development means accommodating growth on land that already contains impervious surfaces and encouraging the reuse and upgrade of existing utilities. Infill sites include vacant or underutilized land in developed areas, former industrial sites (brownfields) and outdated, and underutilized commercial sites (greyfields). Communities should promote infill development in master plans and develop incentives to encourage developers to select infill sites.

Benefits

Infill development uses existing infrastructure, which is more efficient than extending services to new sites. Extension of services increases the linear extent of infrastructure, which worsens leakage, increases long-term maintenance costs, and



lowers return on investment. Developers of infill sites will often invest in upgrading existing infrastructure, which helps reduce the maintenance costs of utilities that already serve citizens.

By directing growth to existing areas, infill development can help revitalize existing neighborhoods and reduce pressure on development of rural areas.

Infill development or redevelopment can create mixed-use communities, which are more efficiently served by infrastructure and public services.

Since infill lots are generally smaller, they demand less water for irrigation, which leads to overall water savings.

Relevant Locations

Cities, villages and urbanized areas of townships where utilities already exist.



Recommended Implementation Guidelines

Identify infill development as a goal in master plans.

Master plans should encourage infill development by identifying it as a goal in master plans. This will be the basis for land use controls that regulate infill development in the zoning ordinance and other regulatory documents.

Identify incentives for infill development in master plans.

Infill development can be encouraged with incentives such as density bonuses, height bonuses expedited permit reviews, and reduced permitting fees. Include these incentives in the master plan to create a legal basis for providing them in development codes.

Plan for higher densities in redevelopment areas.

Higher densities can provide additional revenues for communities in areas where neighbors will be more willing to accommodate density in exchange for neighborhood reinvestment.



Consider Downtown Development Authorities (DDA) and Tax Increment Financing (TIF) districts to fund improvements in targeted redevelopment areas.



DDA’s are organizations made up of government and business representatives that plan for redevelopment of downtowns and finance improvements for downtowns. TIFs can be used as a funding mechanism to issue bonds to pay for infrastructure improvements. The increased property tax revenues that result from redevelopment are earmarked to repay the bonds. Brownfield redevelopment authorities are similar organizations that can plan, facilitate and finance cleanup and redevelopment of contaminated sites.

Identify and map potential infill sites.

Create an inventory of land targeted for infill development and make it available to developers to help encourage infill development.

Resources

Michigan Suburbs Alliance (MSA):
<http://www.suburbsalliance.org/redevelopment/>

MSA Redevelopment Ready Communities Program:
<http://www.redevelopmentready.com/>



Overview

A brownfield refers to abandoned industrial or commercial sites that have been contaminated by previous uses that involved hazardous materials. Costs and liabilities related to contamination can complicate its redevelopment and reuse. These impacted sites require significant environmental remediation before redevelopment can occur. Liability issues make resale of brownfield sites difficult and can hamper redevelopment efforts.

Greyfield sites are outdated or underutilized sites that may require site improvements from renovation and upgrade to complete removal and reconstruction of site improvements. Examples include outdated strip commercial sites that could be redeveloped as mixed-use neighborhoods.

Benefits

Brownfield and greyfield sites are typically located in developed areas, often with infrastructure in place. Reusing infrastructure is a far more efficient than extending services to areas not yet served, as noted for the tool *Promote Infill Development*. Brownfield redevelopment also provides significant environmental benefits from the cleanup of contaminated sites.



Relevant Locations

Brownfield and greyfield redevelopment is an efficient use of land in all areas, but most efficient in areas with existing utility services. These tend to be located in older cities and villages, but townships also often have these types of sites.

Recommended Implementation Guidelines

Inventory and map potential brownfield and greyfield sites.

Identify the location of brownfield and greyfield sites and prioritize their redevelopment based on infrastructure capacity, proximity to existing developed areas, and the estimated extent of remediation activities.

Apply for state and federal brownfield cleanup funds.

The EPA National Brownfields Program includes revolving loans and cleanup grants. Eligible applicants include state, county, and local governments, special district authorities and redevelopment authorities, Native American tribes, and non-profit organizations.

Perform a baseline environmental assessment of impacted sites to determine the level of contamination and extent of mitigation necessary.

A clear understanding of the cleanup required will help prioritize sites for cleanup and redevelopment and help determine the cost required for each site. A land owner or perspective purchaser would typically conduct the environmental assessment. Under Michigan law, where a purchaser conducts a baseline environmental assessment that is approved by the MDEQ, this will limit their liability for contamination that was created by a previous owner.

Establish a brownfield redevelopment authority to help fund cleanup.

Brownfield Redevelopment Authorities can apply for state and federal cleanup funds, issue bonds to fund remediation, and establish a tax increment finance district to use increased property tax revenues in the redevelopment district to repay bonds.

Consider other incentives such as density bonuses or reduced stormwater management requirements.

To encourage developers to take on the task of redeveloping brownfield or greyfield sites, provide incentives such as density bonuses, height bonuses, expedited permit processing, or reduced permitting fees. Also consider offering reduced stormwater management requirements since redevelopment of existing sites (which are already covered with impermeable surfaces), rather than development of undisturbed sites, will reduce stormwater impacts on the watershed level.

Negotiate liability issues with the property owner before a seller is identified.

Often, property owners are unwilling to sell contaminated sites because of the liability that may be exposed by an environmental assessment by a potential buyer. Expedite redevelopment of contaminated sites by negotiating liability issues with owners ahead of time. Also, ask the EPA grant a covenant not to sue a prospective purchaser of a contaminated site.

Encourage "greyfield" redevelopment to redevelop outdated sites as mixed-use neighborhoods.

Underutilized, obsolete, and unoccupied developments such as old malls and strip shopping centers should be redeveloped into neighborhoods with a mixture of residential and commercial uses.

Transforming a single-use, automobile oriented site into a mixed-use development will make more efficient use of land. Provide multiple uses on a site also places peak demand on utilities, roads and parking at different times of the day, which results in more efficient use of infrastructure.



Resources

MDEQ Land Redevelopment Homepage:
http://www.michigan.gov/deq/0,1607,7-135-3311_4110--,00.html

MDEQ Redevelopment Coordinator
EPA Region 5 (IL, IN, MI)
EPA Brownfield Homepage:
<http://www.epa.gov/brownfields/index.html>

Mixed-Use Development

Overview

Mixing of land uses combines different land uses in a building, on a site, or in a district. Mixing of uses can be horizontal, such as a single site with condominiums, and single-family residences in adjacent buildings or a district with restaurants and retail interspersed with apartments and offices. Mixing of uses can also be horizontal, such as buildings in downtown areas with retail at the street level and offices and condominiums above. Mixing of land uses was the predominant land use pattern during the historic development of most of Michigan's cities. Modern use-based zoning regulations have tended to segregate uses.

Benefits

Mixed-use development creates vibrant, walkable, and transit-friendly neighborhoods. They can reduce dependence on the automobile because people are more able to find restaurants, shopping, schools, parks, and employment within walking



distance than in single-use districts. Reducing automobile dependence decreases impervious surfaces such as roads and parking lots, which in turn reduces stormwater runoff and the pollutants it conveys to surface waters. Mixed-use development is typically higher density and consumes less land than conventional single-use development, helping preserve open space and natural features.

Mixed-use developments improve efficiency of existing infrastructure capacity with multiple uses having different peak usage times.

Relevant Locations

Mixed-use development is most appropriate in higher density locations with existing services, but mixed-use hamlets or villages can be located in rural and suburban areas without services, if properly designed.





Recommended Implementation Guidelines

Provide incentives for incorporating mixed-uses.

Mixed-use projects and districts are usually developed at a higher density than conventional projects. Incentives should be provided to developers who propose a mixture of uses such as density bonuses and reduction in parking requirements.

Create a mixed-use zoning district.

Define one or more areas in the community where a mixture of uses is appropriate, such as a downtown, village center, or any area with a concentration of commercial uses, especially if there is existing infrastructure that can be capitalized upon by new infill development. Amend the zoning ordinance to establish a mixed-use district and define the mixture of uses that are appropriate. Include standards for a vertical mix of uses if desired.

Permit residential units above or adjacent to commercial uses.

In existing commercial zoning districts, permit developers to add residences above or adjacent to non-residential uses. Residential

units can be rental or owner-occupied, stacked apartments or side-by-side townhomes.

Permit certain commercial uses in residential districts.

Amend the zoning ordinance to allow low-impact neighborhood commercial uses such as boutiques, corner stores, and small offices to be established in residential districts. To ensure minimal impact on a neighborhood, limits should be placed on the size of these uses.

Permit a mixture of residential uses in certain residential districts.

Allow small-lot single-family attached and detached residences in multiple-family districts. In single-family districts, permit garage and basement apartments and duplexes and triplexes that are designed to match the character of the neighborhood.

Resources

Smart Growth Network's Mixed-Use Principle:

<http://www.smartgrowth.org/about/principles/principles.asp?prin=1&res=1280>

American Planning Association's Model Mixed-Use Regulations:

<http://www.planning.org/smartgrowthcodes/phase1.htm#1>



high-impact development proposals. Additionally, a zoning district may require that any use that uses more than an average demand for services can be made a special land use.

Adopt special land use standards for high-water consuming uses and uses that may impact the wastewater system.

Uses that are known to require high quantities of water should be reviewed by the community's engineer to determine the impact of the use on the water system. Also, uses that involve hazardous materials or materials that may impact the community's wastewater treatment system should also be reviewed by the community's engineer. Limitations on the type of materials discharged to the sewer system may be imposed as a condition of approval, with alternative means of hauling off and properly disposing of hazardous materials identified.

Resources

Genoa Township, Livingston County Michigan
Master Plan and Zoning Ordinance

www.genoa.org/



Overview

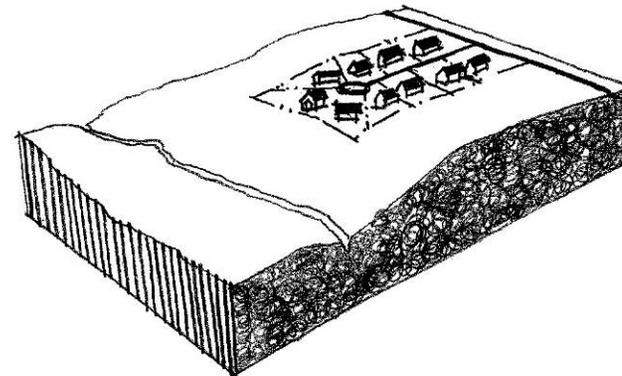
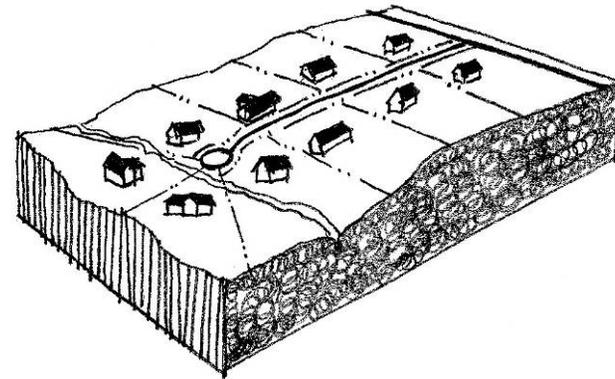
Cluster development is a style of residential development where the number of units permitted by right on a site are clustered on smaller lots on a portion of the site. Remaining acres are preserved as open space, either natural, recreation, or both. Michigan's Zoning Enabling Act now requires that communities provide a cluster option to developers. The cluster option can be permitted by right or as a special land use. Also, incentives can encourage developers to choose a clustered site plan.

Relevant Locations

Cluster development is appropriate in all areas, but especially in lower-density areas where open space protection is important. In communities with utilities, the cluster option allows more efficient provision of infrastructure. In communities without utilities, the residences can be clustered on the area of the site with soils most suitable for septic systems.

Benefits

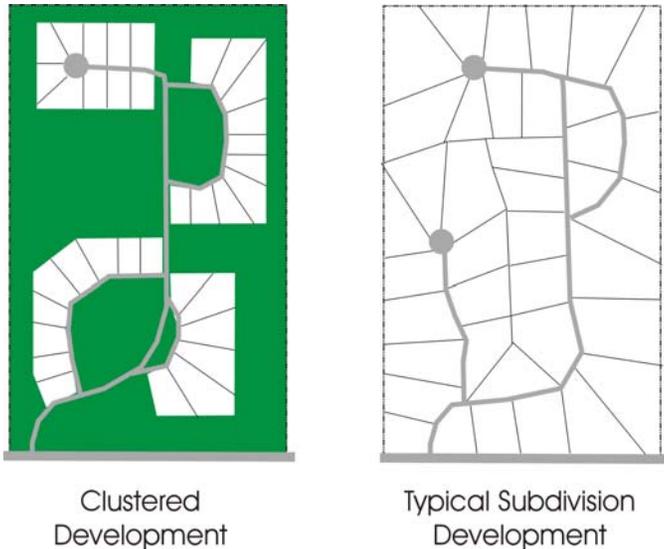
Cluster development sets aside a portion of the site as permanently protected open space, which helps reduce stormwater runoff, preserves habitat, and creates recreational opportunities. Homes developed in a clustered pattern are also less expensive to build, require less land clearing and grading, and allow more efficient infrastructure provision, as they require shorter roads, driveways, and water and sewer pipes, and transmission lines.



Recommended Implementation Guidelines

Provide incentives for developers to use cluster development.

Density bonuses are the most common incentive for using cluster development on a site. Other incentives are expedited permits, reduced permit fees, and reduced stormwater management requirements.



Clustered
Development

Typical Subdivision
Development

Permit cluster development by right or special land use.

Amend zoning and subdivision ordinances to have a cluster option. If the same number of units are clustered on a portion of the site, permit it by right. If a density bonus allows more units on the clustered site than would otherwise be allowed in the zoning district, consider making it a special land use. This will give the community some discretion before allowing higher densities than permitted by right. Clustering can also be achieved through a Planned Unit Development.

Require the undeveloped portion of the site to be protected permanently with a conservation easement.

To ensure the permanent protection of the open space portion of a cluster development site, require the developer to place that portion in a conservation easement. The easement runs with the

land, not with the owner or permit, so the preserved acres cannot be developed at a future date.

Resources

Michigan Association of Planning (MAP) Open Space Guidelines:
http://www.planningmi.org/downloads/open_space_guideline.pdf

Southeastern Wisconsin Regional Planning Commission Model Rural Cluster Ordinance:
http://www.sewrpc.org/modelordinances/cluster_ordinance.pdf

MDEQ Cluster and PUD Model Ordinances:
<http://www.deq.state.mi.us/documents/deq-ess-cm-ftg-appendix-clusterandpudexamples.pdf>

MSU Conservation Design Pamphlet
<http://web1.msue.msu.edu/wexford/pamphlet/BetterDesignsBrochure.pdf>

APA Planning Advisory Service Report *Cluster Subdivision*
<http://www.planning.org/apastore/Search/Default.aspx?p=2289>



Overview

Planned unit development (PUD) is a zoning concept that allows modifications to the zoning requirements of a site to achieve a pattern of development that is suited to the unique site characteristics and allows for negotiation between the community and the developer to achieve a mutual benefit. The PUD option permits a single site to be planned as a unit with a variety of housing types, land uses, and densities. Design flexibility is granted in return for a comprehensively planned site, preserved



open space, infrastructure improvements and significant site plan scrutiny. A PUD can be a zoning district with its own use, density and setback requirements or an overlay zoning district where use and bulk regulations are based on the underlying zoning. Instead of a PUD zoning district, a PUD may also be processed as a special land use. This will be dependent on how the PUD is set up in the zoning ordinance.

Density bonuses are often offered to developers choosing the PUD option in exchange for community

benefits, which must be demonstrated by the developer. The community may use the PUD option to require off-site improvements or infrastructure upgrades to offset the impact of the development.

Relevant Locations

PUDs are appropriate in all areas, but are most often applied on large parcels.

Benefits

PUDs are an attractive option for communities because they can preserve a portion of the site as protected open space, allow the requirement of off-site infrastructure improvements, provide an added level of regulatory scrutiny, and enable significant parcels to be developed comprehensively according to sound planning principles such as mixing of uses.

Recommended Implementation Guidelines

Require traffic and other impact studies to determine the infrastructure necessary improvements.

Traffic and other impact studies should be required to determine the infrastructure improvements that will be necessary to support the development. These may include improvements to nearby roads or utility upgrades necessary to support the development. These infrastructure improvements should be required as a condition of the developer receiving certain trade-offs such as a density bonus.



A public benefit of a PUD that may warrant increased density is the provision of utility improvements to serve a larger area of the community.

With a PUD, the developer receives certain incentives in exchange for public benefits. A public benefit could be to provide utility improvements to serve a larger area of the community. Larger PUDs that are bringing in new sewer and water to serve a higher density development can provide the benefit of making sewer and water available to other existing residences in the area. For a larger PUD in a township that is need of sewer and water, the developer and community can use the PUD to enter into a public/private partnership to finance and construct wastewater treatment plants and public water systems.

Required improvements should be outlined in the PUD agreement.

All agreed upon improvements, on-site and off-site, should be detailed in the PUD agreement, which is adopted with the site plan at the time of approval.

Require a performance bond to ensure the completion of promised improvements.

Local governments have been forced to deal with bankrupt or unscrupulous developers and should protect themselves by requiring a performance bond to make sure they are not responsible for improvements not completed by the developer.

Require open space to be placed in a conservation easement and commonly owned by a homeowners association or deeded to the local government or a land trust.

To ensure long-term maintenance and preservation of protected open spaces, place the land in a conservation easement and make

sure an appropriate body owns and is responsible for management of the land.

Make open space requirements and terms of incentives clear in the PUD ordinance.

The PUD requirements, like requirements in all zoning districts, should be clear and specific and open to as little interpretation as possible.

Create a specific provision for revoking the PUD authorization.

If standards are not met or development fails to proceed at a reasonable pace, provisions for revoking PUD approval should be specified.

Make sure open spaces and recreational amenities like bike paths and sidewalks are open to the public.

The developer must demonstrate that the PUD will benefit the community, and public access to amenities should be required to meet that standard.

Resources

MDEQ Cluster and PUD Model Ordinances:

<http://www.deq.state.mi.us/documents/deq-ess-cm-ftg-appendix-clusterandpudexamples.pdf>

Michigan Zoning Enabling Act of 2006

<http://web1.msue.msu.edu/wexford/pamphlet/StatuteMichiganZoningEnablingAct.pdf>



Overview

The Michigan Zoning Enabling Act provides for conditional rezoning. This allows a property owner who is applying for a rezoning to voluntarily offer conditions for the rezoning.

Relevant Locations

Conditional rezoning can be utilized by all local zoning authorities including cities, villages and townships.

Benefits

Conditional rezonings can add a level of flexibility to the zoning process by providing the potential to account for some of the negative effects of rezoning. For example, rezoning denials are often based on supporting infrastructure not being in place to support the change in the intensity of uses allowed in the proposed new district. Conditional rezoning can give greater predictability for local jurisdictions and neighbors because the conditions of land use, such as landscaping, building design and necessary utility improvements can be specifically tied to the rezoning. A development project that deviates from any aspect of the agreement cannot move forward and, in fact, will require the municipality to return the zoning to its former classification. Because the owner must offer the conditions to be included in the agreement, it can be a “win-win” for the community and the land owner.

Recommended Implementation Guidelines

Conditional rezoning should not be granted where the zoning district does not make sense from a community planning standpoint.

Conditional rezoning should only be used for rezonings that meet most standards for rezoning such as consistency of the master plan and compatibility with surrounding uses. The conditional rezoning should only be used to overcome certain site specific limitations where the rezoning would otherwise be consistent with sound planning and zoning practice. An example would be a rezoning that is consistent with the master plan, if certain infrastructure improvements are made to serve the site.

The conditions of rezoning must be related to the impacts of the rezoning.

The offered conditions must be related to offsetting impacts of the rezoning itself. As an example, if the increased density allowed by a rezoning will require utility upgrades, those utility upgrades could be conditions of the rezoning. Offers from applicants to contribute to a community’s recreation programs, or offers to build new community facilities that have no connection to the application for rezoning should not be considered. A community cannot put itself in a position where it appears as though an applicant has “bought” the rezoning.

Conditions should be reviewed by the Planning Commission concurrent with the rezoning.

Conditions to rezoning should ideally be offered with the initial application for rezoning. In practice, however, an applicant may not know what offers might be acceptable until well into the application review process. The community should be cautious of changing the recommendations for a rezoning based upon conditional offers made after the public hearing has been held on the rezoning.



The offers for conditional rezoning should be documented in a legally recorded zoning agreement.

Prior to entering into any agreement, it should be thoroughly reviewed by the community's planner, attorney, and other appropriate professionals. The agreement should cover a broad range of situations and leave as little as possible to interpretation.

The agreement should clearly state that the rezoning is to run with the land and bind all future owners to its provisions. An executed copy should be recorded at the County Register of Deeds. When considering voluntary offers they must be clearly stated, avoiding vague terms or conditions. Attach reduced plans and supporting documents to the agreement and make sure they are clearly referenced by title and date. In many instances, a site plan may be needed to clearly show the conditions included in the agreement.

For public improvements, such as streets and utilities, make sure the construction schedule is clear and that it has a breakdown of costs and obligations; for example who is required to pay for engineering drawings, inspection fees, obtain permits and prepare as-built drawings? If other agencies are involved, such as a road, or drain commission, make sure the decision making process for final design approvals is clearly specified and get the agency involved in reviewing the offer early in the process. As an additional layer of protection, include submission of performance bonds or similar tools in the agreement to guarantee that infrastructure and road improvements committed to by a developer will in fact be made.

Conditions offered with a rezoning may place additional restrictions on the development of the land, but may not vary requirements of the zoning ordinance.

Conditions offered cannot permit a land use or activity that would not otherwise be allowed in the new zoning district. Similarly, the agreement should not be used to vary any of the requirements of the district, such as the number of parking spaces, signs, etc. The Zoning Board of Appeals must still address any issues that would require variances. In addition, if a special land use approval is required for the use being considered as part of the agreement, the special land use process must still be pursued following the rezoning.

Timeframes must be set for fulfilling conditions for rezoning.

The agreement needs to set forth time frames for completing conditions to rezoning. If the conditions are not satisfied within the time period specified, then the zoning will revert to the original zoning district. These time periods can be extended for good cause when requested by the petitioner and approved by the municipality. For infrastructure improvements that are tied to a development, the municipality should require some form of performance guarantee.

Conditional rezoning must conform to the limitations in the Act.

The Act specifically states that a conditional rezoning must be offered by the petitioner. The municipality may not require that conditions be offered.

Resources

Michigan Townships Association:

<http://www.michigantownships.org/mta9661950.asp>

Michigan Municipal League:

<http://www.mml.org>



Overview

Subdivision and condominium design standards regulate the layout and design of a development parcel and the design, location, and installation of infrastructure on the site. Subdivision standards regulate sites to be divided into smaller lots while condominium standards regulate a site where units are individually owned but the land is owned in common. The standards are the primary tools to ensure that there is adequate infrastructure in place to serve the development. The approval process prevents developers from selling lots or making improvements to a site without governmental approval, thereby protecting prospective buyers by ensuring that their properties will be buildable and served by utilities, whether private or public, when it is time to build.



Approvals are a two-step process requiring submittal and review of a preliminary plan and a final plat. The preliminary plan generally shows the arrangement and layout of proposed streets and lots (if applicable), the type, size and location of utilities, and existing site conditions such as topographic contours, streams and ponds, large trees and other vegetation, flood hazards and wetlands, and existing buildings. Following preliminary approval, construction plans are approved and installation commences on streets, utilities and drainage. The recording of the

final plat conveys the proposed public improvements to the local government and creates the legal land title for establishing lots.

Relevant Locations

Subdivision and condominium design standards are applicable in all areas. All communities should adopt them if they have not.

Benefits

Properly crafted subdivision and condominium design standards ensure lots will be served by proper utilities, have improved roadway access and effective stormwater management.

Recommended Implementation Guidelines

Incorporate current standards for utilities and infrastructure.

Standards can become outdated as communities develop and their infrastructure capacities and technologies change. Make sure to incorporate current standards for utilities and infrastructure and update standards to reflect policies for such issues as stormwater management, natural feature buffers, impervious surface limits, tree protection, and land clearing.

Incorporate engineering standards for sewer and water.

In depth engineering standards for water and sewer infrastructure should be detailed in subdivision and condominium regulations to provide clear intent and expectations of developers.

Clearly state what infrastructure will be conveyed to the public and what will remain privately owned.

Roads, driveways, parking areas, water and sewer lines, and wells and wastewater systems can be privately owned and maintained or deeded to a public agency. Make sure standards clearly identify the final ownership of improvements.

Require all utilities such as electrical and telephone to be buried below ground.

Utilities such as telephone, electricity and cable TV should all be buried underground as opposed to overhead lines. Utility lines should be brought to the site underground. Consideration should also be given to the location and screening of transformer boxes and substations.

Develop roadway design standards that minimize pavement requirements.

Minimum road width requirements often demand excessive impervious surface coverage, which has a negative impact on the quantity and quality of stormwater. Work with state and county road officials to minimize design standards (see Low Impact Development on page 60).

Incorporate stormwater BMPs.

Permit the full range of stormwater best management practices (BMPs), incorporate standards for their use, and provide incentives to developers who employ them on their sites (see Low Impact Development on page 60).

Encourage clustered development, open space, and natural landscaped areas.

Encourage open space protection by providing incentives and requiring identification of natural features on preliminary plans and final plats. Early identification of prime open space makes its protection more palatable to developers.



Make condominium design standards consistent with subdivision design standards.

Condominium developments are an effective way to develop a site without subdividing the property into separate parcels. They are popular for residents who wish to own their home but do not wish to own or maintain the grounds, which remain in common ownership. Condominium developments often appear no different from conventional subdivisions and their design standards should be consistent with subdivision design standards to ensure that all new development is compatible with community expectations and values. Communities that do not have condominium design standards should establish them, either as a stand-alone ordinance or as a part of their zoning ordinance.

Resources

Meck, Stuart, et al. 2000. "Zoning and Subdivision Regulations," in *The Practice of Local Government Planning*. eds. Charles J. Hoch, Linda C. Dalton, and Frank S. So. Washington, DC: ICMA.



Overview

Natural areas serve as habitat, recreational areas, aquifer and groundwater recharge areas, stormwater filtration, floodwater retention, and drinking water sources. These areas must be preserved to ensure that the ecological services they provide continue to function properly. An effective method for protecting critical environments is to downzone them to a density appropriate for conservation purposes. Low density development, in combination with natural feature buffers, stormwater best management practices, and limited impervious surface coverage, can protect critical natural areas and their ecological services.

Relevant Locations

Critical natural features should be protected by downzoning the parcels that contain the features and adjacent parcels that directly impact them, where supported by the master plan.

Benefits

On a watershed level, higher density development reduces total impervious surface coverage and stormwater runoff. On the site level, however, low density development reduces impervious surface coverage and stormwater runoff. Downzoning critical environmental features protects them by minimizing the allowable land disturbance and improving the quality and quantity of stormwater that drains to those areas. This can also help manage water treatment needs by improving the quality of surface waters used for drinking water intake. Minimizing the amount of development in critical environmental areas will also encourage infill development in areas with utilities that are target for higher intensity development.



Recommended Implementation Guidelines

Update master plans to identify critical environmental areas.

Master plans should identify significant natural areas and articulate the critical ecological services they provide to the community. Indicate those areas on a natural features map in the community's master plan. Include water supply areas such as groundwater recharge areas and wellhead protection zones, hazard protection areas such as floodplains and steep slopes, and habitat like breeding grounds for endangered and threatened species. This helps establish the basis for zoning amendments to protect natural areas.

Update master plans to identify protection of critical environmental areas as a community goal.

Master plans should state that protecting critical natural areas is a goal of the community. This, in combination with identifying the areas on a master plan map, will help establish the basis for zoning amendments to protect natural areas.

Create one or more conservation zoning districts.

Create one or more new zoning districts for critical environments. The district may be a conventional zoning district or an overlay. Areas for groundwater and aquifer recharge, wellhead protection, and surface drinking water supplies may warrant significant reductions in maximum densities. Be sure to identify the uses that are appropriate in conservation districts and appropriate requirements for setbacks, buffers, and lot coverage. Consider a minimum lot area of five or more acres.

Plan for areas to better accommodate development.

While we may downzone critical environmental areas that are not well suited for development, it is important to consider the other side of the equation – locations where we want to encourage development; such as locations with utilities. The master plan should identify locations in the community that are appropriate for development and provide the right amount density in that area to support projected population growth.

Resources

EPA Model Ordinances to Protect Local Resources:

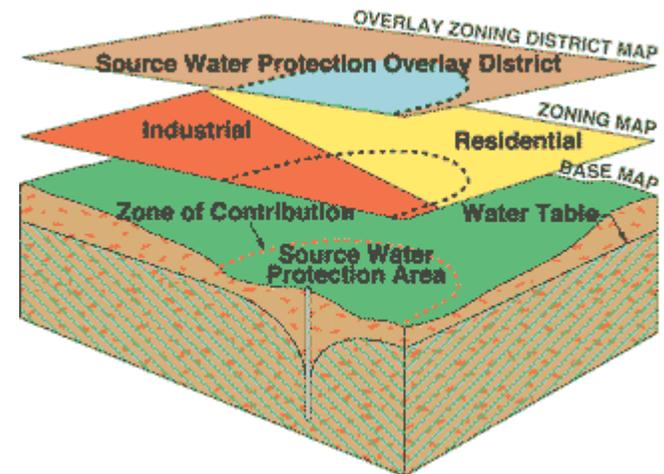
<http://www.epa.gov/owow/nps/ordinance/mol7.htm>

Center for Watershed Protection

<http://www.cwp.org/>

APA's Source Water Protection Program Article:

<http://www.planning.org/thecommissioner/19952003/winter01.htm>



Transfer and Purchase of Development Rights

Overview

Transfer of development rights (TDR) and purchase of development rights (PDR) programs can be used to limit development in areas not planned for utilities and, with TDR, transfer the development rights to infill sites that are currently served by public utilities.

In a PDR program, a land owner sells the right to develop his or her property to a buyer such as a governmental body or a conservation organization. Depending on the details of the agreement, the original owner may retain certain use rights, such as the right to use the property as a farm, park, or single home site. It is an effective tool for environmental, historical, and farmland preservation efforts.

In a TDR program, a community targets certain lands for conservation (the sending area) and other lands for development (the receiving area). The sending area will typically be a rural area and the receiving area will be an urban site with utilities that



is planned for higher density development. Development rights purchased from the sending area can be applied to the receiving area in the form of density or height bonuses. In its simplest form, a developer can apply to the sending area the same number of units that otherwise could have been developed in the receiving area. PDR is easily incorporated into a TDR program since development rights can be held for conservation purposes rather than transferred to a receiving area for development incentives.

St. Clair County established a PDR program for farmland preservation. The program includes funds to purchase the development rights of prime farmland. Communities interested primarily in agricultural preservation should partner with the County in identifying prime candidates for permanent protection. For more information, use the link found on the next page.

Relevant Locations

PDR is appropriate anywhere, especially in rural areas or areas with significant natural areas that need protection. TDR is appropriate in communities where a portion of the community



has utilities and other areas planned to remain rural. *Note: TDR has not been specifically authorized in Michigan and local governments should consult their legal counsel before trying to implement this tool.*

Benefits

PDR and TDR are popular tools for land preservation and natural resource protection because a seller receives the economic benefit of selling a property for development but the land is permanently protected rather than developed. The protected land continues to benefit the community by achieving goals like rural or agricultural preservation and/or open space and natural features protection. The additional density applied to a receiving parcel or parcels in a TDR program helps achieve community goals like efficient infrastructure provision and building mixed-use, transit-friendly communities. TDR programs are appealing to local governments because it transfers to the private sector the burden of compensating landowners of areas designated for protection.

Recommended Implementation Guidelines

Protected lands should be placed in a conservation easement.

PDR or TDR properties whose development rights have been purchased should be placed in a conservation easement to protect the land from development in perpetuity.

Check with your legal council before establishing a TDR program.

The State Legislature has not specifically authorized use of TDR for Michigan communities. The Zoning Enabling Act does

specifically provide for PUDs on non-contiguous parcels, which could be used to transfer density from one site to another.

Designate sending and receiving areas according to community value and infrastructure capacity.

Target areas within existing service areas as TDR receiving areas and valuable rural and natural areas as sending areas.

Offer relaxed site design standards for receiving areas.

The watershed-wide stormwater benefits of holding the sending property in an undeveloped state will generally outweigh the site-specific negative impacts of increased stormwater from the receiving site. To promote preservation efforts, reduce stormwater management and other site design standards for developers who have purchased development rights areas targeted for conservation.

Resources

St. Clair County PDR Program:

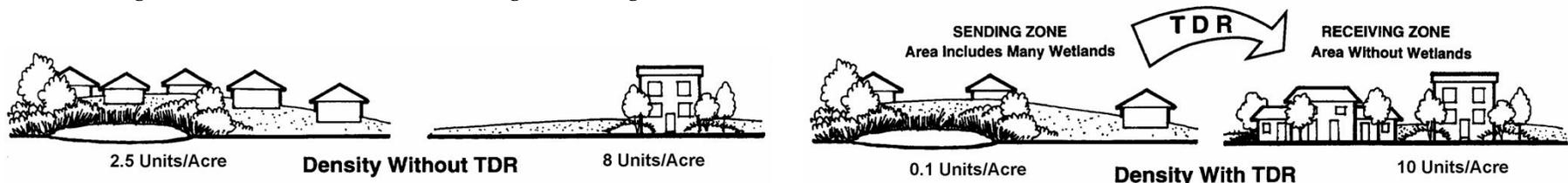
<http://www.cis.stclaircounty.org/planning3059553.asp>

Huron River Watershed Council TDR website:

http://www.hrwc.org/program/land_tdr.htm

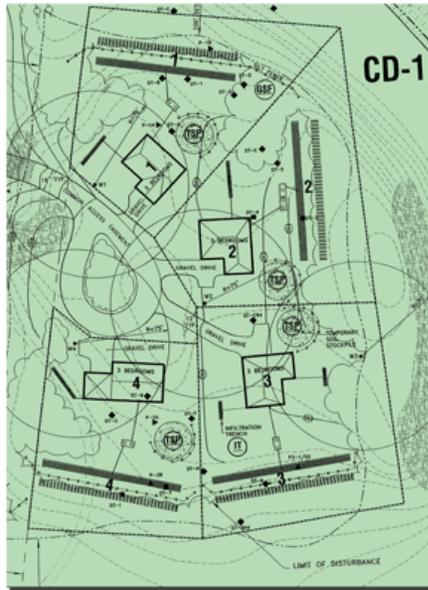
Southeast Michigan Land Conservancy:

<http://www.landconservancy.com>



Overview

Development applications must generally be accompanied by a site plan indicating the location, dimensions, materials, and other characteristics of site improvements like roads, buildings, parking areas, utilities, signs, stormwater management practices, lighting fixtures, fencing, and landscaping. Also indicated are dimensional measurements such as setbacks, buffers, and yards and the location of natural features such as topographic contours, wetlands, water features, and significant trees. The site plan review process should be used to ensure that a development will be adequately served by utilities and measures are being taken to properly control stormwater runoff.



Relevant Locations

Site plan review of natural features is appropriate in all communities, but especially in areas with many sensitive environmental resources.

Benefits

Site plan review provides local governments with an opportunity to ensure that developments are meeting requirements for design

and installation of utilities. Site plan review standards can also incorporate stormwater management requirements.

Recommended Implementation Guidelines

Adopt engineering standards for utilities as part of site plan review.

Communities should adopt a set of detailed engineering standards that address design and construction of utilities, roads, parking lots, grading and stormwater management. These are typically engineering standards manuals that are adopted by resolution and incorporated into the site plan review regulations by reference.

Make sure zoning regulations for site plan review include standards for stormwater management and allowances for Low Impact Development.

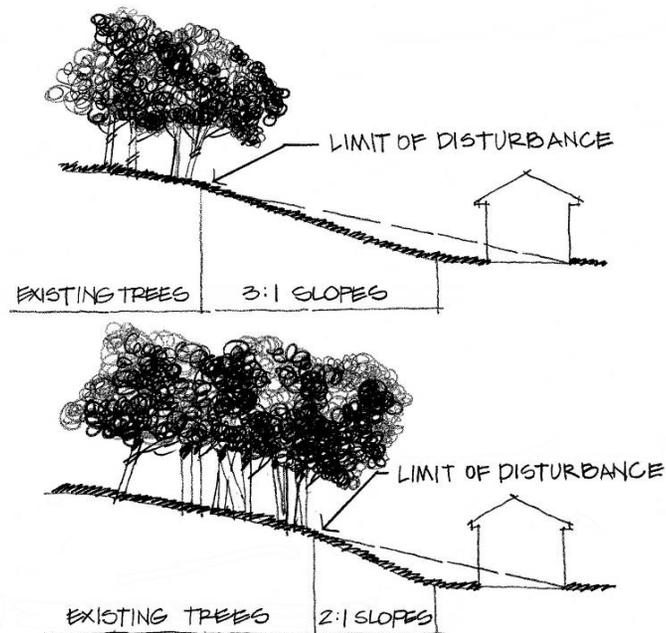
The site plan review regulations contained in the zoning ordinance should include general standards for stormwater management to ensure that post-development stormwater discharge does not exceed pre-development stormwater discharge. Use of stormwater best management practices should be required (see Low Impact Development on page 60). These may be expanded into a separate stormwater ordinance or engineering standards. The zoning ordinance should also include provisions that allow flexibility to minimize stormwater runoff from a site, such as allowing a reduction in parking and alternative LID designs that will minimize the amount of impermeable surface on a site and the amount of stormwater runoff.

Make sure site plan review regulations include minimum standards for protection of critical environmental features.

Critical environmental features include woodlands, landmark trees, rolling topography, dunes, steep slopes, waterways, floodplains, and wetlands. Protecting these features will improve the quality of water resources.

Consider requiring an environmental impact assessment.

An environmental impact assessment (EIA) is a process that attempts to identify the environmental impacts of development. Require an environmental impact assessment on all sites or on sites that exceed a minimum threshold of environmental constraints.



Make a site visit.

There is no substitute for visiting a site to see the location, extent, quality, and health of natural resources as well as other site characteristics.

Resources

MSU Extension Site Plan Review Checklist:

<http://www.leelanaucounty.com/downloads/sprcheck.pdf>

Michigan Association of Planners. Site Plan Review: A Guidebook for Planning and Zoning Commissioners.

New Hampshire Subdivision and Site Plan Review Handbook:

<http://www.nh.gov/oep/resourcelibrary/referencelibrary/s/siteplanreview/documents/subdivisionandsiteplanreviewhandbook.pdf>

Indiana Citizen Planner's Guide, Site Plan Review Chapter

http://www.indianaplanning.org/Citizen/10_SitePlanReview_2005.pdf



Overview

Pure performance zoning does not expressly restrict land uses to specific zoning districts. Instead, it addresses the impact of development on its surroundings by limiting the intensity of development through establishment of maximum and/or minimum performance standards for criteria such as traffic, noise, hours of operation, lot size, and height. Any use that conforms to all of the standards of a district is permitted.

Performance zoning is not widely used in its pure form because it has been criticized as being overly complicated; however, many ordinances incorporate performance standards into conventional zoning districts to allow more variety in permitted land uses while still providing protection from land use conflicts. Performance standards limit the intensity rather than use of properties and permit integration of more land uses than a conventional zoning ordinance.

Performance standards do not need to be limited to reducing land use conflicts, however. Development intensity can be regulated based on the availability of services. In this scenario, residential density can be controlled so that higher density developments with greater service demands are only permitted within a minimum proximity to existing infrastructure. Likewise, only very low-density development with minimal utility demands would be permitted in areas distant from existing infrastructure.

Performance zoning has also been used to protect natural resources. In some cases, a point system is used to assess the impact of development proposals on the environment. Projects are required to score a minimum number of points before approval of a permit. Environmental protection standards might

Sample performance standards

Maximum Distance to Utilities	Maximum Density
0-199'	20 units per acre
200-499'	8 units per acre
500-999'	4 units per acre
1000'-2000'	1 unit per 5 acres
2000'+	1 unit per 20 acres

include impervious coverage limitations or incorporation of BMPs. Greater use of encouraged development techniques results in a higher score and a more favorable application.

Relevant Locations

A zoning ordinance that relies completely on performance standards is generally appropriate in larger communities that have an experienced planning staff or in those communities with skilled planning consultants. Performance standards that are incorporated into traditional zoning ordinances are more easily implemented and can be used in any community. Smaller communities may need assistance in developing appropriate performance standards for their specific circumstances.

Benefits

Regulating the intensity of development with performance standards based on utility availability coordinates land use and development with the provision of infrastructure, making efficient use of a jurisdiction's land and capital improvements expenditures. Development with high utility demands will be directed toward existing infrastructure of sufficient capacity and



development with very low utility demands will be directed to areas with appropriate capacity.

Recommended Implementation Guidelines

Consult the community capital improvements plan.

For utility-based performance zoning, a capital improvements plan (see Capital Improvements Plan on page 76) should be consulted. It will detail the infrastructure improvements planned for the next 5 to 10 years. The location of utility performance zones should take into account future capital investment in infrastructure such as water and sanitary sewer improvements.

Base performance standards on existing utility demand data from local utility provider.

Performance standards for utilities should be based on real data and projections particular to local utility system and users. Use utility system personnel as a resource when developing standards.

Refine performance standards over time to ensure development meets desired outcomes.

Performance standards must be calibrated to perform properly. Initial standards may have to be adjusted before the desired development objectives are achieved. Ordinances should include procedures that facilitate updating performance standards.

Resources

Bucks County, Pennsylvania Performance Zoning Ordinance:
<http://www.smartcommunities.ncat.org/codes/bucks.shtml>

Eastern Michigan University Performance Zoning Description:
<http://www.emich.edu/public/geo/557book/c232.perfzoning.html>

Sample performance standards

Number of Dwellings in Development	Minimum Number of Dwelling Unit Types	Maximum any Dwelling Unit Type	Minimum any Dwelling Unit Type
1-60	1	100%	20%
61 - 150	2	60%	15%
151 - 400	3	40%	10%
401+	4	40%	5%

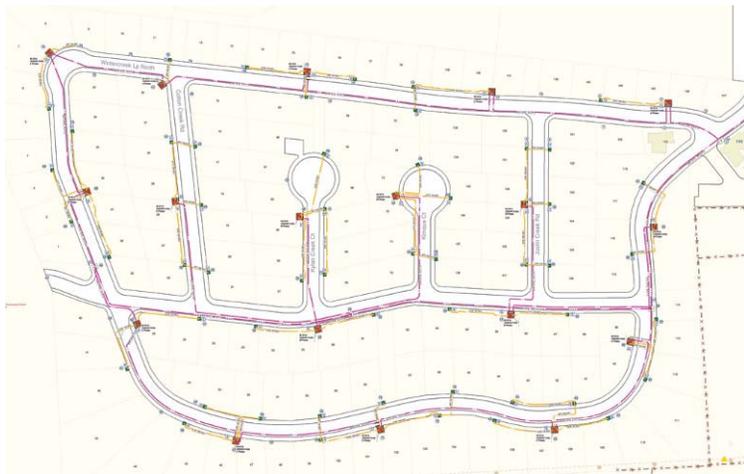


Overview

A geographic information system (GIS) is a collection of computer hardware, software, and geographic data for capturing, managing, analyzing, and displaying all forms of geographically referenced information (ESRI). Geographic data include:

- **Natural Features:** water, wetlands, topography, soils, floodplains, watersheds, land cover.
- **Administrative Areas:** city/township limits, utility areas, growth boundaries, zoning districts.
- **Land Records:** parcels, land use, rights-of-way, easements.
- **Networks:** water lines, sewer lines, roads, hydrants, pumps, manholes, other utility lines.
- **Imagery:** aerial photography, infrared radiometry, and spectral satellite images.

Each feature in a geographic data set can be linked to associated data, such as land ownership for parcels, names of roads and waterways, length and diameter of pipes, maintenance history and capacity for pumps, population and households in a land use



district, etc. GIS can query a data set by its attributes, enabling the user to select all parcels greater than 25 acres or the 4-inch pipes that have not been serviced in the past 10 years. GIS can also perform a spatial query, enabling the user to select the parcels within 300 feet of all water supply sources or the wellheads within a half-mile of water service.

More advanced GIS analysis includes generating geometric measurements (length and area) and performing statistical analysis. Existing conditions can be analyzed. Future scenarios can be explored and projections can be forecast. For example, suitability analysis can be performed to find appropriate sites for locating facilities. Buildout analysis can be used to model future growth based on land use alternatives.

The Michigan Center for Geographic Information maintains a clearinghouse of geographic base data for all Michigan counties that includes data such as administrative and census boundaries, roads, water bodies, wetlands, floodplains, soils, and elevation

contours. The St. Clair County Metropolitan Planning Commission also maintains geographic datasets for the County, including parcel boundaries and 2005 aerial photography. Contact these organizations for more information.

Most Computer Aided Design (CAD) data can be imported into a GIS and is often available from engineering and public works departments and from consultants. CAD data provides a convenient starting point for developing GIS base data.

Relevant Locations

GIS can be useful to communities of all sizes, but some communities may find it cost prohibitive. Contact the County GIS department for more information.

Benefits

GIS permits users to catalogue and access large amounts of spatial and tabular data related to land use, natural features, and infrastructure, among other things. This data can be invaluable for land use, utility, environmental, health, transportation, and hazard planning. Complex analyses can be performed easily and



output can be mapped for easy comprehension.

Recommended Implementation Guidelines

Import CAD data into GIS.

Many local governments or their consultants use CAD systems to design and describe utility systems. CAD data can be imported into a GIS system to manage the location and associated attributes of infrastructure.

Import attribute data into GIS.

Tabular data from Excel, Access, or other spreadsheet and database formats can be imported into a GIS and dynamically linked to feature data.

Clarify and update data agreements with consultants.

Some consultants are more accommodating than others about sharing data created for local governments with public funds. Make sure consultant contracts clearly indicate ownership and sharing expectations. Include specific language about format and be sure to request source data files in addition to final output files.

Resources

Metropolitan Planning Commission GIS Staff:
Phone (810) 989-6950 Email: sccmpc@stclaircounty.org

Michigan Center for Geographic Information:
<http://www.michigan.gov/cgi>

ESRI What is GIS? Webpage:
<http://www.gis.com/whatisgis/index.cfm>

ESRI GIS for Water and Wastewater webpage:
<http://www.esri.com/industries/water/index.html>



Overview

Sustainable design identifies ecological, infrastructural, and cultural characteristics of a site and/or building with related open spaces which results in the integration of the environment. The intent is to promote sensitive infill development that relates well to both natural systems and existing infrastructure with an overall design and construction that reduces energy use.

The United States Green Building Council's Leadership in Energy and Environmental Design (LEED) provides the benchmark for the design, construction, and operation of high performance green buildings and site design. LEED promotes a whole-building approach to sustainability by recognizing performance in five key areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality.

A rating system has been developed and is continually updated through an open consensus based process which is the standard for environmentally healthy neighborhoods around the nation. New developments and revitalization of existing ones can be LEED-certified based on qualifying guidelines.

Benefits

Sustainable design encourages optimum use of natural/existing features in architectural and site design of new infill and adaptive reuse of buildings, such that the building energy use is diminished and the environment is enhanced. It has been tested and seen that LEED-certified buildings have lower operating costs, promote healthier neighborhoods, and conserve energy and natural resources, which leads to the overall sustainable development.

Recommended Implementation Guidelines

Follow the general guidelines of LEED certification programs.

Place, orient, and configure the building on the site to minimize energy use by means of day light, solar heating, natural ventilation, and shading from vegetation or other buildings.

Provide incentives to promote green architecture in the form of landscaped roof decks or roof gardens.

Regulations should be in place to encourage water-conserving landscaping.

Use of pervious pavers in parking lots along with sustainable design concepts like rain garden in open space/landscaped areas and low impact developments should be encouraged. This will assist in water quality standards of runoff and also render an aesthetically pleasing environment.



Addition of streetscape elements like shaded trees, landscaped areas, benches and alternative means of transportation can conserve energy use.

Energy conservation techniques should encourage business owners to turn off signage lighting at night.

Energy production techniques should be implemented that include solar panels as a by-right accessory use and override obstructive private covenants to encourage ways of alternate energy generation.



Resources

The Harborside Office Center developed by Acheson Ventures, LLC in Port Huron is a local example of a building that received LEED Certification

U.S. Green Building Council
<http://www.usgbc.org/>



Overview

Native plants are well adapted for local weather conditions, and require minimal maintenance. Landscaping with native plants can be maintained with minimal use of fertilizers, pesticides, or water, all of which contribute to water quality problems.

The impact of non-native plants is that they quickly replace native plants unable to compete for available sunlight, water, and nutrients. For example, wetlands infested with purple loosestrife lose as much as 50% of their original native plant populations. This limits the variety of food and cover available to birds and may cause the birds to move or disappear from a region altogether.

Benefits

Plants found natively within your community have many advantages, including hardiness to Michigan weather, resistance to pests and disease and longer root systems that naturally retain and absorb stormwater while minimizing soil erosion.



Because native plants require less irrigation, yards landscaped with a significant portion of these materials will use less water and create less runoff. This practice is commonly referred to as Xeriscaping.

Recommended Implementation Guidelines

Specify native planting requirements within ordinance landscaping provisions and provide a list of preferred species.

Any development proposal should be checked during site plan review to verify that native landscaping provisions are being met.

Require the protection of existing species onsite by requiring review approval prior to any land clearing activities.

Include site preservation requirements in the zoning ordinance to prohibit any clearing, grading or excavating of land without local approval.



Include policy statements addressing the importance of native landscaping in protecting local water quality systems.

The master plan and landscape design standards should include policy statements detailing the importance of native landscaping and encourage its use with development.

Require native landscaping along lakes and streams and steep slopes to filter pollutants and reduce soil erosion.

Native landscaping along waterways will help stabilize shorelines and bluffs from erosion. The vegetation will also intercept sediments that are contained in sheet flow runoff prior to entering a waterway.

Include provisions to re-establish the natural vegetation in areas where lands have been cultivated, such as farming operations.

Once lands are taken out of agricultural use, either for development of conservation, invasive plant species should be

removed and native vegetation established. If a site is to be developed as a clustered development or a PUD with open space, native plant materials should be established in the open space as part of the development.

Resources

St. Clair Conservation District

<http://www.St.Claircd.org>

Michigan Native Plant Producers Association

<http://www.mnppa.org>

Rain Gardens of West Michigan

<http://www.raingardens.org>

Southeast Michigan Land Conservancy

<http://www.landconservancy.com/>

Tree Protection Ordinance

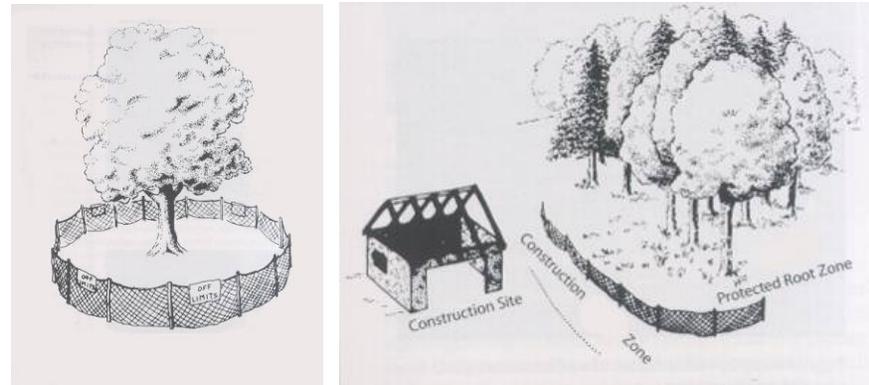
Overview

Site plan review may require the identification of all trees and plants on a site prior to development. Most communities do not require their preservation once a site plan is approved.

Trees have been shown to have a significant effect on reducing runoff. Trees not only reduce the amount of impervious surface, but they slow drainage from a site by providing a location where water may be absorbed. A tree preservation ordinance can be implemented to reduce the number of trees removed from a new development site. A natural features inventory and a site design that incorporates natural features are typical requirements.

Relevant Locations

Tree protection ordinances are beneficial in all communities.



Benefits

Forest vegetation moderates the effects of winds and storms, stabilizes and enriches the soil, and slows runoff from precipitation, allowing water to be filtered through the forest floor and into the groundwater reserve. Preserving naturally vegetated areas involves no cost for construction or maintenance.

Trees intercept and slow rainwater, help soil absorb more stormwater, and delay release of stormwater into water sources. Clearing and grading reduces the pre-development stormwater capacity by removing trees and compacting soils.

Recommended Implementation Guidelines

Provisions for pre-construction, on-site monitoring, and post-construction maintenance

Provisions for stormwater control during and after construction and green





infrastructure for stormwater management can alleviate loss. Phased construction of sites can minimize total land clearance.

Regulate land clearing.

In order to protect existing trees and woodlands, provisions for land activities, such as clearing, grading and excavating should be addressed in local regulations. Require a local review and permit process before any person engages in land clearing, including the stripping and removal of topsoil or existing vegetation, from any site, parcel, or lot. Agricultural and forestry activities can be exempt from this requirement.

Establish a root protection zone.

In order to protect woodlands in a healthy condition, the root system needs to be protected. Driving construction equipment and compaction of soils over the root zone can damage or kill a tree. The root zone around the tree should be protected with fencing. The root zone will typically extend outward to the outer edges of the drip line of the tree.

Require development to minimize tree removal and grading area to qualify for land clearing permits.

Prior to the issuance of a building permit, the trees for a particular lot should be marked differentiating between those trees to be saved and those to be removed. Trees to be retained shall have the drip line blocked off with snow fence or other acceptable means to prevent damage to root zones.

Provide clear guidelines and rules on how to plant and manage new and existing trees on new development sites and along public streets.

Maintenance of proposed landscaping should be addressed during the review and approval process. Available water, light and space should be verified.

Resources

National Arbor Day Foundation

www.arborday.org

Minnesota Shade Tree Advisory Committee

www.mnstac.org

Southeast Michigan Council of Governments

www.semco.org



Overview

Low Impact Development (LID) techniques mimic pre-development site hydrology to store and detain stormwater runoff. This is unlike conventional approaches that typically convey and manage runoff in large facilities located at the base of drainage areas. These multifunctional site designs incorporate alternative stormwater management practices such as functional landscape that act as stormwater facilities, flatter grades, depression storage and open drainage swales. The goal of low impact development is to reduce large runoff volumes that traditionally have been created by development.

Relevant Locations

LID techniques can be encouraged with all new development and incorporated into redevelopment where possible.

Benefits

A LID system of controls can reduce or eliminate the need for a centralized best management practice (BMP) facility for the control of stormwater runoff. Although traditional stormwater control measures have been documented to effectively remove pollutants, the natural hydrology is still negatively affected, which can have detrimental effects on ecosystems, even when water quality is not compromised.

Long-term maintenance cost savings of living in a Low Impact Development is an incentive for many builders. As a local municipality, consider creating a stormwater BMP certification program for developers to assist in marketing strategies.

Recommended Implementation Guidelines

Provide development incentives, like reduced permit fees or expedited permits to accelerate use of LID techniques.

Zoning regulations should have provisions for encouraging use of LID techniques and incentives such as density bonuses, reduced permitting fees or expedited review process.

Preserve open space and minimize land disturbance.

The first approach to minimizing stormwater runoff is to reduce the amount of land area disturbed or covered by impermeable surfaces. The sites' existing natural systems and processes should be preserved such as drainage ways, vegetation, soils and sensitive areas. Natural site elements such as wetlands, stream corridors and mature forests should be incorporated into the site as design elements. Areas of natural drainage should be protected and preserved, insofar as practical, in their natural state to provide areas for natural habitat and stormwater management.

Reexamine the use and sizing of site infrastructure (lots, streets, curbs, gutters, parking, sidewalks) and customize site design to each site

Many strategies exist to reduce the amount of impervious surface in development areas. Designing residential streets for the minimum required width needed to support traffic, on-street parking and emergency service vehicles, can reduce imperviousness. Other practices include shared driveways and parking lots, alternative pavements for overflow parking areas, center islands in cul-de-sacs, alternative street designs rather than traditional grid patterns and reduced setbacks and frontages for homes.



Incorporate bioretention into the stormwater standards.

A bioretention area can be composed of a mix of functional components, each performing different functions in the removal of pollutants and attenuation of stormwater runoff. Typical components found in bioretention cells include:

- Grass buffer strips reduce runoff velocity and filter particulates.
- Sand bed provides aeration and drainage of the planting soil and assists in the flushing of pollutants from soil materials.
- Ponding area provides storage of excess runoff and facilitates the settling of particulates and evaporation of excess water.
- Organic layer performs the function of decomposition of organic material by providing a medium for biological growth (such as microorganisms) to degrade petroleum-based pollutants. It also filters pollutants and prevents soil erosion.
- Planting soil provides the area for stormwater storage and nutrient uptake by plants. The planting soils contain some clays which adsorb pollutants such as hydrocarbons, heavy metals and nutrients.
- Vegetation functions in the removal of water through evapotranspiration and pollutant removal through nutrient cycling.
- Grass swales or channels function as a mechanism to reduce runoff velocity and as filtration/infiltration devices.
- Green roofs can minimize runoff from buildings.
- Rain Gardens can be used to treat stormwater on-site.

Allow the use of permeable pavers in parking lots.

The use of permeable pavements is an effective means of reducing the percent of imperviousness in a drainage basin. Porous pavements are best suited for low traffic areas, such as parking lots and sidewalks. Permeable pavements allow stormwater to

infiltrate into underlying soils promoting pollutant treatment and recharge, as opposed to producing large volumes of rainfall runoff requiring conveyance and treatment.

Incorporate and encourage the use of rain gutter disconnects.

Rain gutter disconnects redirect rooftop runoff out of storm sewers, and into grass swales, bioretention systems and other functional landscape devices. Redirecting runoff from rooftops into functional landscape areas can significantly reduce runoff flow to surface waters. As an alternative to redirection of stormwater to functional landscape, rain gutter flows can be directed into rain barrels or cisterns for later use in irrigating lawns and gardens.

Resources

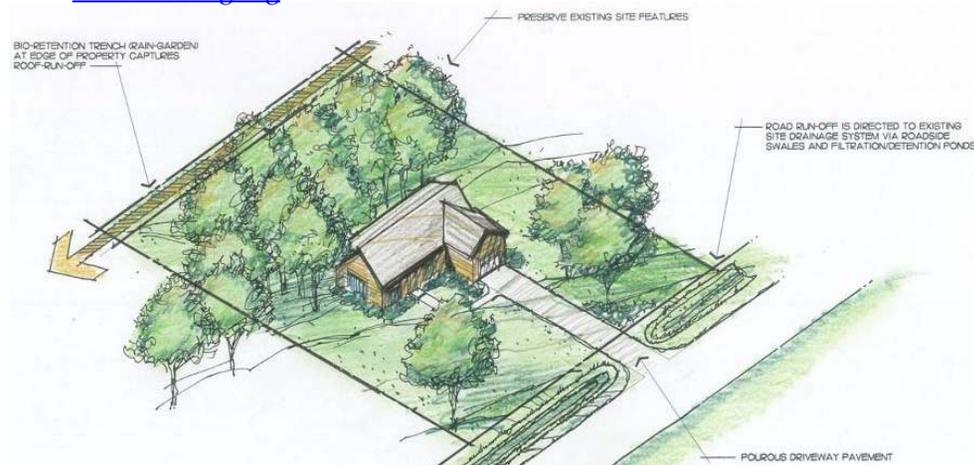
Low Impact Development Center

<http://www.lowimpactdevelopment.org/home.htm>

Low Impact Development Manual

Southeast Michigan Council of Government

www.semco.org



Best Management Practices (BMPs)

Overview

Best Management Practices (BMP) and techniques mitigate the adverse impacts caused by land development on water quality. BMPs can be structural, such as vegetated swales or bioretention facilities, or they can be non-structural practices, such as policies, plans, and educational programs.

Relevant Locations

There are a variety of BMPs available that should be evaluated on a site by site basis to address appropriate methods of retaining and detaining stormwater runoff. For example, vegetative BMPs such as grassed swales and rain gardens are compatible in a rural setting; whereas oil/grit separators are most appropriate in an area with high traffic, such as a gas station.

Benefits

BMPs provide flood control by detaining a large quantity of water from running off-site, limiting the chance for a 'flash flood'. BMPs also improve area water quality by removing sediment and runoff from entering water systems. Vegetated BMPs promote a natural appearance and contribute to area wildlife.

Recommended Implementation Guidelines

There are many available BMP techniques:

- **Detention/Wet ponds** – Wet ponds allow incoming stormwater runoff to replace pond water. Wet pond systems allow runoff sediment and pollution to settle to the bottom of the pond and not out into natural waterways.
- **Infiltration basins.** Pollutants and sediment from stormwater can be handled with infiltration basins. This system is

effective for fine grained pollutants, but coarse grained pollutants can clog infiltration basins. A basin is an engineered BMP that holds stormwater before letting into enter into the ground.

- **Vegetative BMPs.**
 - **Rain gardens.** A bowl-shaped or saucer-shaped garden, designed to absorb stormwater run-off from impervious surfaces such as roofs and parking lots with perennial, wetland plants. Landscaping provisions should encourage the use of rain gardens.
 - **Vegetated swales and strips.** Vegetated filter strips or swales are an affordable and natural option for stormwater control. Require native plants in these areas, and prohibit the use of exotic species.
 - **Green rooftops.** A green rooftop is a thin layer of vegetation installed on top of a flat roof. The vegetation will take up some of the water, which reduces the amount of stormwater runoff discharging from the rooftop. Also,



green rooftops provide an insular layer for buildings, providing cool buildings in the summer and warm buildings in winter, reducing the dependence on heating and cooling.

- **Grassed swales.** Stormwater can be cannalized through grassed swales as opposed to pipes. This slows down the flow of stormwater, allows more stormwater to infiltrate the soil and the grass helps to intercept sediments contained in the stormwater.
- **Porous pavement.** Interlocking tiles or bricks allow stormwater runoff to infiltrate the pavement and enter the soil. This removes fine grain pollutants and provides erosion control.
- **Water quality inlets (oil/grit separators).** Course sediment and oil and grease can be removed through multi-chambered structures designed to remove pollutants from stormwater. Separators are often used as pretreatment on parking lots, streets or areas with vehicular traffic. Best used in small areas which produce heavy loads of hydrocarbons and sediment, such as roads, parking lots, gas stations and convenience stores. Require catch basins to contain oil filters or traps to prevent contaminants from being discharged into the natural drainage system in site plan review standards.

Resources

U.S. Environmental Protection Agency, Greenscapes

www.epa.gov

Michigan Department of Environmental Quality

www.michigan.gov/deq



Overview

Impacts to surrounding properties may require the need to store stormwater on-site. By mitigating many of the common areas where stormwater runoff can occur, adverse flooding impacts to neighboring properties can be prevented.

Relevant Locations

Structural improvements can be made with all new development or redevelopment to reduce the amount of direct runoff onto area properties.

Benefits

Providing onsite runoff storage is a very simple and cost-effective way to prevent area flooding. Community education campaigns can be an effective method of outreach to provide homeowners with the ability to retrofit their home systems.

Recommended Implementation Guidelines

Require a minimum amount of stormwater to be stored and treated onsite.

Most grading plans direct stormwater off-site. Requiring a minimum amount of onsite storage in site plan review can better mimic the natural, pre-development hydrologic cycle.

Provide green building points and/or other development incentives to encourage onsite storage.

Green rooftops, as discussed under Best Management Practices, absorb rainwater and may redirect it to rooftop gardens or rain barrels. Incentives, such as reduced setbacks, may encourage new developments to utilize green building design techniques to retain water onsite.

Develop master plan policies to prevent over-engineering of on-site stormwater conveyance.

Policies regarding the management of land use within a community are expressed through the master plan. Policies promoting the use of natural stormwater management techniques, such as vegetated swales and greenspace can minimize the amount of engineered infrastructure.

Prohibit direct connection of downspouts to stormwater system.

Contain rooftop runoff before it is discharged into yard areas by using gutters to direct rain water to rain barrels. Rain barrels can store water for future use; reducing area water demand and releasing stormwater slowly back into the environment.

Encourage developers to reduce the amount of off-street surface parking.

The size of parking areas can be reduced through shared parking agreements between adjacent properties. Businesses or uses with different hours of service, such as a bank a church, benefit from this arrangement. Municipalities can encourage shared parking by applying reduced parking standards where appropriate.

Resources

Smart Growth Network, 'Getting to Smart Growth: 100 policies for implementation'
www.smartgrowth.org



Overview

On-site stormwater mitigation, such as detention ponds, is less practical for infill developments where the desire is to create a more compact, walkable mixed-use environment.

Relevant Locations

Allow developers to treat stormwater at off-site locations, which has the same overall effect on regional water quality. This would be most beneficial for infill developments in urban areas.

Benefits

Enables better location of mitigation facilities and more efficient use of valuable land.

Recommended Implementation Guidelines

Provide incentives for off-site mitigation for developments in areas targeted for higher-intensity uses.

On-site stormwater detention facilities may not be practical in urban areas of a community planned for higher density development or mixed-use neighborhoods. The intent of these areas is to concentrate development within areas most suited and create a critical mass necessary to support a vibrant neighborhood. In these areas, it may be more cost effective to provide a regional stormwater detention system.

Allow nearby developers to pool stormwater management efforts, which can reduce the total acreage devoted to stormwater mitigation.

Require a shared storm drainage and stormwater management plan for each development.



Off-site treatment area should have same or greater acreage as development site.

Off-site stormwater management is not an exemption from the obligation for development to properly manage and treat stormwater runoff. Even in incidences where stormwater is being treated off-site, provisions still need to be made for adequate storage.

Overview

The condition of riparian areas, where land and water meet, influences how much sediment can runoff into adjacent waterways. Area water bodies supply St. Clair County's water system. In order to provide as much natural sediment removal as possible, it is important to have an area of natural vegetation that can provide a line of defense to the local waterway.

Relevant Locations

Also known as a 'greenbelt' or 'vegetative' buffer, these land areas are located along the waters edge. This practice would be most applicable for new developments in rural areas. In developed waterfront areas, establishing a new 'vegetative buffer' may be difficult; however, property owner education may assist in preventing residents to fertilize their lawns to the waters edge.

Benefits

By reducing runoff, greenbelts help reduce pollution transport to lakes and streams and provide numerous other benefits. Riparian buffers of at least 30 feet are suggested, and depending on the quality of area water ways, 55 feet is suggested to reduce pollution from sediment nutrient and pesticide runoff.

Recommended Implementation Guidelines

Add buffer policies to master plan and setback requirements to site plan review standards.

A critical element to actively protect the watershed and its natural resources is providing sufficient justification in the master plan. Add policy statements, such as, "Stabilization of stream banks and the protection of stream channels will be achieved through vegetated strip requirements" and "Establish minimum transition

area for the protection of natural features". Within site plan review, require all natural features and their required setbacks to be clearly identified and marked.

Restrict vegetation and soil disturbance during maintenance.

Require trees and shrubs be planted within 180 days of land disturbance to maintain good soil erosion control. Phase land development within large scale PUDs and site condominiums to prevent large scale land clearing.

Regulate uses along waterways to reduce pollutants entering riparian zone.

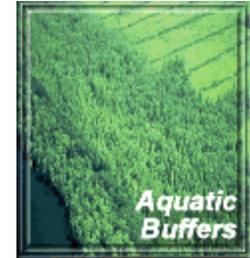
Overlay zones preserve natural vegetative buffers along streams that meander through several zoning districts or political jurisdictions.

Develop a number of generic lakefront restoration planting plans that can be given to residents. These plans can include a combination of plant types and list of native species that can be planted to provide filtering buffer strips and wildlife habitat in place of lawn along lakefront properties.

Include tables illustrating buffer width adjustment by percent slope and type of stream.

The width of an appropriate stream buffer will vary depending on topography, land cover and type of stream. A 'one size fits all' approach may not protect all waterways. Some of the relevant factors to consider when determining the size of a buffer are:

- The quality of stream or wetland to be protected.
- The intensity of the adjacent land use.



- The quality or density of the buffer (larger buffers are needed for high-value wetlands and streams buffered from intense land uses).
- The function of the buffer.
- The soil type and how surface water filters into the ground.
- The types and amount of vegetative cover and how it stabilizes the soil.
- The slope of the land within the zone and how significant it is for retaining sediment from reaching the streams.

In general, it has been hypothesized that smaller buffers are adequate when the buffer is in good condition (e.g., dense native vegetation, undisturbed soils), when the water body or resource is of low functional value, and the adjacent land use has low impact potential (park land or very low density residential development).

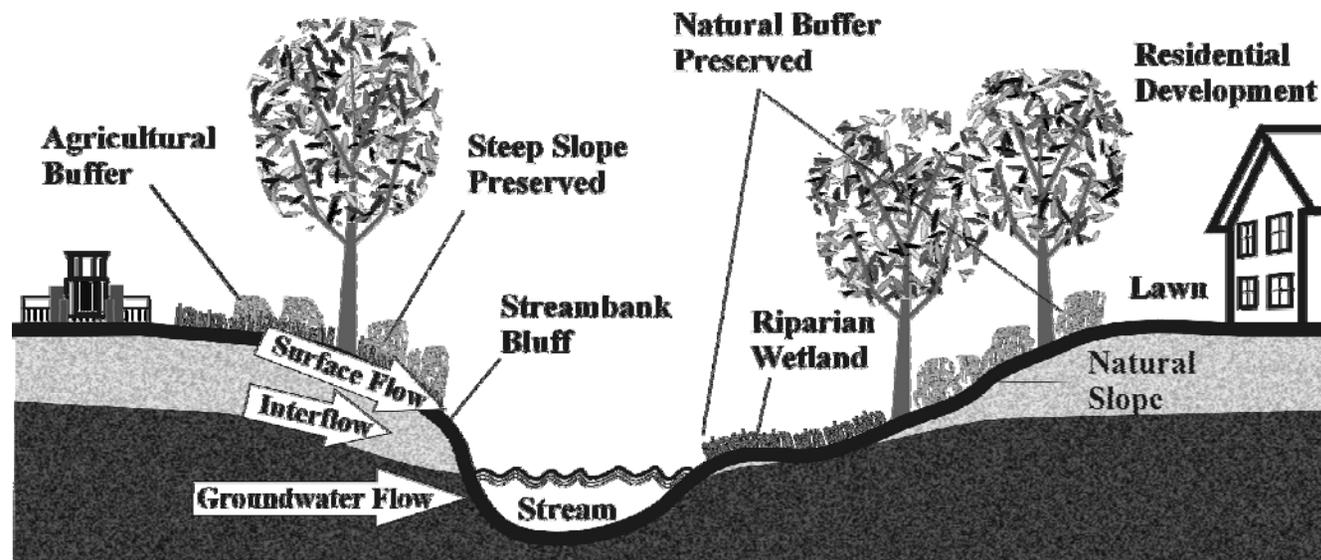
Large buffers will provide water quality protection for high impact land uses such as highly developed commercial areas dominated by parking lots.

Mark buffer boundaries on planning maps.

Establish a riparian buffer on natural feature inventory maps to identify to area landowners where additional development restrictions may apply.

Require permanent markers to delineate buffer boundaries.

Riparian open space has the potential to be slowly encroached upon by area property owners, such as storing boats, creating pathways, etc. Require developments to set permanent markers to clearly identify areas that should not be disturbed.



Resources

Huron River Watershed Council, Riparian Buffer Model Ordinance, www.hrwc.org

USDA National Agroforestry Center: <http://www.unl.edu/nac/>

Tip of the Mitt Watershed Council www.watershedcouncil.org



Overview

Developers may elect to develop a site that does not have public sewer available by means of a "private community wastewater system"(PCWS). These can be prevalent in areas where poor soil qualities limit the ability to have individual on-site sanitary drain fields or where lot sizes are smaller than allowed for individual on-site sanitary drain fields.

The MDEQ is authorized to issue permits for PCWS that serve more than one property. While a PCWS may be preferred over individual septic systems in some limited circumstances, the local unit of government should require assurances that the community is indemnified from any costs or liability in connection with the design, construction, operation, maintenance, repair and/or replacement of that PCWS. Also, if a PCWS fails or begins to function improperly, there needs to be an adequate replacement reserve for the PCWS. For these purposes, a local community should have regulations in place for PCWSs.



Relevant Locations

Private community wastewater systems will typically be located in communities that do not have public sewer systems, so this tool is most applicable to rural townships. A community system may also be relevant in an area where seasonal homes will be converted to full time residences.

Benefits

In areas of sensitive natural features, or poor soils, community wastewater systems will reduce the possibility of contamination of individual septic systems. In addition, when compared to individual systems, such as septic tanks, shared treatment systems typically cost less per home.

Recommended Implementation Guidelines

In a maintenance agreement, specify all parties responsible for operation and maintenance of the facility and require associations to hire a certified operator

Consult with the community attorney and have sample maintenance agreement language drafted to formalize the agreement and have a legally binding document in case of system failure. The agreement should specify the following:

- The parties responsible for inspection, monitoring, repairing, replacing, operating and maintaining the PCWS.
- Standards for inspection, monitoring, operation, maintenance, repair and replacement of the PCWS.
- Indemnification of the community by the applicant, owners and homeowners association.

- A requirement that the association maintain an insurance policy for the replacement value of the PCWS

Provide standards for inspection, monitoring, and maintenance.

The PCWS should be inspected, monitored, operated, maintained, repaired and replaced by the homeowners association. The homeowners association should hire a certified operator approved by the MDEQ and the County Health Department. The association should provide the community with copies of signed agreements with the certified operators and the results of the inspections.

Provide local government with option to require connection to the public sanitary sewer, when available.

The agreement should provide the local government with the authority to require that systems be abandoned and connected to the public sanitary sewer, when public sewer becomes available in the area, with all required fees and costs paid by the homeowners association.

Require financial reserve for operation and adequate replacement reserve.

Each homeowners association should be required to maintain a financial reserve sufficient for 5 years of monitoring, inspection, operation, maintenance and repair of the PCWS and an adequate replacement reserve in the amounts certified by a design engineer or the certified operator.

Establish a special assessment district for the development at the time of approval.

Prior to recording the PCWS maintenance agreement and sale of any unit, lot or parcel served by a PCWS, the developer should

establish a special assessment district for the development. This would typically be done at the time of final preliminary plat approval. The purpose of SAD is to provide for assessment of the units or lots by the community for the costs of inspection, monitoring, maintenance, repair, operation or replacement of the PCWS in the event the association fails to properly perform the work.

Disclosure document delivered to the prospective purchaser of a unit.

Often, perspective homeowners will buy a lot or dwelling in a development that is served by a PCWS without fully understanding the conditions and liabilities associated with it. With developments that contain a PCWS, the provisions of the maintenance agreement should be included in a disclosure document that is delivered to the prospective purchaser of a unit or lot prior to the execution of a purchase agreement.

Provide adequate buffering of systems from natural features, such as wetlands and streams.

The zoning ordinance should require a buffer or setback between a PCWS and any off-site dwelling, all proposed on-site dwelling, any existing well and any surface water, wetlands, or floodplain.

Resources

U.S. Environmental Protection Agency,
www.epa.gov/reg3wapd/septic/index.htm

Toolbase Services
www.toolbase.org



Overview

Land development and population growth increase the demand for more water. How much additional water and at what cost is related to how that growth takes place. Communities should use their 20-year population projections as a basis for projecting future water needs over the next 20 years. Areas planned for public water supply will depend on the extent of planned growth areas and the existing and projected capacity of the public water supply system.

Relevant Locations

Smart growth techniques that reduce the need for water can be implemented in every community. Urban fringe communities may require more aggressive policies to manage demand.

Benefits

Policies to manage water demand are an effective way to manage the costs of growth. In the Journal of the American Planning Association a study evaluated the influence of land use on the cost of water distribution and sewer services. Estimated service costs for a household on a .25 acre lot near a service center was approximately \$143, as compared to a house on a 1 acre lot at \$272.

Recommended Implementation Guidelines

Connect utility and land use plan to provide predictability in development process.

The availability of public water together with other public utilities and services can have a significant impact on the willingness of industry and business to locate in an area. Promote capacity

enhancement to make the community attractive to new development and to sustain existing development.

Integrate water budgeting into land use planning.

Large lots are a major contributor to commercial and residential water use. Large lot size increases costs of required infrastructure through longer pipes which increases the potential for water system leaks. Discourage development in areas that would threaten long-term public water supplies and promote compact development. Encouraging infill of vacant land and underutilized downtown sites can reduce necessary extensions of public water.

Formation of special authorities to finance, implement and operate infrastructure improvements.

Special assessments are levied against individual properties benefiting from an infrastructure improvement through the establishment of a district.

Variable utility fees based upon development location (i.e. infill vs. system expansion).

Graduated utility fees will erase potential subsidies by charging new construction something closer to what it costs.

Set rates to fully cover costs through conservation pricing or incremental block pricing.

Regulators should integrate the average and marginal cost approaches in water-rate design. Average cost could be used in allocating revenue requirements to specific



customer classes and services. That is, average, embedded cost would determine rate levels for individual classes and services. Marginal cost could be used for designing actual rate structures for individual classes and services.

Zone pricing based upon distance from utility source.

Recognizing that the unit cost of providing water service can vary substantially for customers at different locations within the utility service area, pricing should be based on distance for the utility source.

Resources:

U.S. Environmental Protection Agency, "Case Studies of Sustainable Water and Wastewater Pricing"

www.epa.gov/ogwdw

U.S. Environmental Protection Agency, Growing Toward More Efficient Water Use: Linking Development, Infrastructure, and Drinking Water Policies

www.epa.gov



Overview

In most communities, sewer hookup fees are calculated and assessed by localities without regard to location. As a result, hookup fees often do not reflect distance-dependent costs. Each municipality should promote compact growth to minimize impacts on the landscape and increase the efficiency of area systems coordinated with utility expansion. Revenue from hookup fees should be directly related to the capital costs of expansion and costs for operation and maintenance of utility service should be recovered from service/usage fees.

Relevant Locations

Areas experiencing growth and development that are located outside of a planned urban service boundary should recover the costs of utility service sprawl. Graduated utility rates will erase subsidies for this growth, by charging customers something closer to what it costs to provide services.

Benefits

Monetary incentives and disincentives are powerful tools for influencing growth patterns to minimize their water quality impact. Recovery of marginal/additional cost of service extension can be more accurate (some would say more fairly) than average cost pricing.

Recommended Implementation Guidelines

Sliding-scale hookup fee schedule based on proximity to existing service lines, service facilities, or designated growth area.

The establishment of hookup fees should reflect the distance-dependent costs associated with sewer service to encourage development to take place in a central location.

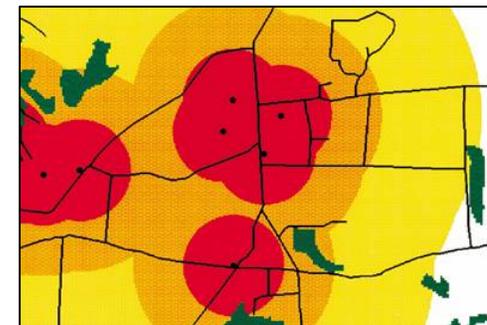
Sliding-scale usage fee schedule to cover capital cost to system in expanding the geographic area served.

Fees can augment public loans and other funding resources and provide capital for upgrades, expansions and other enhancements to the infrastructure systems.

Resources

Environment Colorado Research and Policy Center, '[The Fiscal Costs of Sprawl](#)'

www.environmentcolorado.org



Overview

Public facilities ordinances can help stimulate private investment in utilities by requiring that sewer and water lines be in place before development can begin. An adequate public facilities ordinance will help ensure that services are available prior to new development approval, consistent with local master plans and urban service district plans.

Development's demand for public services is evaluated against capacity. While there is no enabling legislation in Michigan, public facility growth guidelines could be stated in the master plan and used with rezonings and PUDs. Municipalities can track and allocate services available for new development, and plan for reserved and used infrastructure capacity.

Relevant Locations

Implementation of a public facilities ordinance must be used in coordination with master plan and adequate infrastructure funding. A capital improvement plan can outline schedules and funding opportunities.

Benefits

If capital improvements are not scheduled, development may not proceed unless the developer provides the necessary improvement. This can be a great benefit for communities and prevent the unnecessary waste of available resources. This will eliminate the unintended consequences of deflecting development to other areas not planned for growth which can create sprawl and degraded water quality.

Recommended Implementation Guidelines

Encourage centralized sewage systems to coordinate efforts to address pollutant loading into area waterways.

In order to address the issue of private development and growth, site plan review regulations should prohibit the construction of on-site systems until local approval is granted. Communities can require better tools for the regulation of land uses, such as adopting urban service districts showing where higher density growth is permitted and where it is prohibited. New residential developments should utilize centralized sewage systems for better local management and quality assurances to prevent groundwater contamination.

Prohibit group systems in groundwater recharge protection zones.

Proposed development should not pollute ground or surface water. Group systems should be evaluated during site plan review to determine that their placement will not be located in a highly susceptible groundwater recharge zone.

Link timing of development to infrastructure availability.

Often plans for water and sewer service expansion are more heavily influenced by utilities projections for future demand than by a community's growth plan. New developments should be evaluated for consistency with the master plan and CIP, and ensure that adequate infrastructure is available.

Resources

The National Center for Smart Growth Research and Education,
University of Maryland
www.smartgrowth.umd.edu



Overview

The Michigan Conditional Land Transfer Act (PA 425 of 1984) permits two or more local units of government to enter into a written agreement to conditionally transfer land from one local unit to another. When land in the township is conditionally transferred, the transferred property comes under the jurisdiction of the city. The property becomes subject to the property tax levy of the city; the property is afforded access to the full scope of services provided by the city, including public utilities; the property assessment records and voting records of residents will be transferred to the city; and the transferred land becomes subject to the planning and zoning controls of the city.

PA 425 allows the transfer of control and jurisdiction to be limited. The language of the Act provides for complete transfer “unless the contract specifically provides otherwise.” The city and township can agree to a transfer of something less than complete jurisdiction. Agreements commonly require mutual assent between the two units on decisions related to the planning and zoning of the subject property.

The Act provides that the local units of government may conditionally transfer property “for a period of not more than 50 years.” The agreement may be renewed for additional periods not to exceed 50 years upon approval of the legislative bodies of the involved units and the acquiescence of their citizens. The contract must specify which local unit has jurisdiction over the property upon the expiration, termination or nonrenewal of the agreement.

Relevant Locations

An Act 425 agreement permits two or more local units of government to enter into a written agreement to conditionally transfer land from one local unit to another. This is most commonly done between townships and cities.

Benefits

The purpose of PA 425 is to enhance economic development, housing, and environmental protection. “Economic development project” is defined as “land and existing or planned improvements suitable for use by an industrial or commercial enterprise, or housing development, or the protection of the environment, including, but not limited to groundwater or surface water.” Projects covered by Act 425 include everything from industrial park development to port improvements. PA 425 was amended in 1990 to redefine “housing development” as an economic development project in and of itself.

Recommended Implementation Guidelines

Statutory considerations.

When formulating a 425 agreement, the local units of government are directed to consider several factors, including:

- Population.
- Land area and land uses.
- Assessed valuation.
- Past and probable future growth, including population increase, and commercial and industrial development.
- The need for organized community services.
- The cost and adequacy of governmental services in the area to be transferred.



- Probable change in taxes and tax rates in relation to the benefits expected to accrue from the transfer.
- The ability of the receiving jurisdiction to provide and maintain services.
- The relationship of the proposed action to any relevant land use plans.

Contract provisions.

The 425 agreement must include the following provisions:

- The length of the contract.
- Specific authorization and terms for the sharing of taxes and other revenues.
- Methods of contract enforcement.
- Identification of which unit has jurisdiction over the transferred area upon expiration of the agreement.

In addition to these basic provisions, the agreement may include the following considerations:

- Method by which the contract may be rescinded or terminated prior to the stated date of termination.
- The manner of employing personnel required for the economic development project to be carried out under the contract.
- The fixing and collecting of fees.
- The adoption and enforcement of ordinances.
- How contracts are entered into for improvements.
- Issues related to any liabilities that might be incurred through performance of the contract.

Public meetings; referendum

PA 425 requires each local legislative body to hold at least one public hearing on the proposed agreement prior to its approval by a majority vote of both legislative bodies. The draft agreement is subject to referendum if 20% or more of the registered voters in the land area to be transferred, or persons owning 50% or more of the land to be transferred sign a petition or if or either local unit call for a referendum.

County and state review.

The agreement must be filed with the Secretary of State and the County Clerk. The Michigan Department of Transportation is required to review each agreement to ensure the accuracy of the boundary descriptions.

Ownership of infrastructure.

If the agreement calls for the transferred land to revert to the transferring jurisdiction upon expiration of the agreement, then responsibility for all municipal functions reverts to the transferring jurisdiction, and the receiving jurisdiction’s laws concerning taxation and zoning in effect at the time of the reversion control the property. An issue that should be addressed is the ownership of any infrastructure installed by the receiving jurisdiction during the period of the contract and whether this reverts to the transferring jurisdiction.

Resources

Michigan Townships Association www.michigantownships.org
www.michigantownships.org/resourcetoolkits.asp



Overview

Capital Improvement Plans (CIP) identify major capital projects expected in the next several (5 to 10) years, as well as the anticipated funding mechanism. Revenues supporting the CIP may include some or all of tax revenues, user rates and charges, special assessments, connection fees, and capital reserve funds.

Capital Projects can be thought of as belonging to one of the following categories:

- Water and waste.
- Streets, streetscapes and transportation.
- Community facilities.
- Energy and telecommunications.
- Low income housing.
- Equipment and vehicles.

Water facilities, including water treatment plants, stormwater and water lines, are major infrastructure components and have a powerful influence on the location of development. CIPs should identify potential funding sources for water system improvements, expansion, and water source protection.

Relevant Locations

Identify CIP in the master plan and develop utility service areas based on CIP. Any municipal CIP should be consistent with the future land use map of the master plan and the zoning map.

Benefits

CIPs can identify potential funding sources for water system improvements that provide water source protection. The US



Department of Agriculture's Rural Utilities Service offers loans and grants for water and wastewater projects in rural areas and communities of fewer than 10,000 people. By having an adopted CIP, communities can leverage local system improvements with grants and other resources, that can protect local water resources and improve the overall quality of life of area residents.

Recommended Implementation Guidelines

Identify the extent of the current system and any future infrastructure improvements.

Where public sewer lines are planned, public water lines should be considered as well, particularly in areas with low groundwater yields.

Develop a timeline for when improvements will be made.

With a 5 to 10 year timeline, identify and prioritize capital improvements. Sometimes, multiple purposes can be served

through the same CIP project. An identified wellhead or aquifer protection area can also provide an area for a local park or open space.

Tie development permits and site plan review standards to CIP.

The proposed development should be evaluated for consistency with the master plan and CIP, and for compliance with the zoning ordinance's site plan review standards. The planning commission should ensure through site plan review standards that adequate potable water will be available to the proposed development and will continue to be available to existing neighboring water users. The proposed development should not pollute ground or surface water through excessive stormwater runoff or encroachment into natural features, such as wetlands and streams.



Inventory green infrastructure system and coordinate natural capacity of systems with the CIP.

Planning for water quality begins with identifying surface watersheds, groundwater aquifers, and existing and potential water pollution sources. By conducting a green infrastructure inventory, master plans, zoning ordinances and CIPs can be revised where appropriate to protect the quality of streams, lakes, reservoirs, wetlands and groundwater.

Resources

Lincoln Institute of Land Policy,
www.lincolnst.edu/subcenters/TFDP/capital.asp



Priority Funding Areas

Overview

Public infrastructure is the foundation for every vibrant community. The need for public investment in streets, sewers and water systems can far outgrow a community's ability to provide for it. Investing in new infrastructure while deferring maintenance of older systems can worsen system inefficiencies. Communities face more long-term costs for improvements and upgrades if existing infrastructure is not maintained. Priority funding measures influence where new growth and development may occur.

Relevant Locations

Designate priority funding areas where infrastructure exists and/or is close to developed areas:

- Existing urban areas
- High growth areas

Benefits

Focusing investment and infrastructure within a particular area

Recommended Implementation Guidelines

Invest in existing infrastructure: Fix-It-First.

Local government can help area utilities implement a fix-it-first policy by targeting growth to areas on existing infrastructure systems.

Coordination of improvements between agencies (MDOT, road commission, county, local municipality, school district).

To be effective, coordination should involve all relevant agencies that impact land use in the community. Often, road and transit

agencies are not informed of land development plans until late in the process. A commitment to reciprocal early notification and ongoing coordination will make for better land use and transportation decisions.

Regulate minimum density/intensity requirements.

Priority funding areas are intended for use in high growth areas, based on the availability of water and sewer systems, with at least 3.5 dwelling units per acre.

Locate public facility improvements within priority funding areas wherever possible.

By certifying priority growth areas, public facility improvements should be focused to promote investment and development.

Resources

US EPA

http://www.epa.gov/smartgrowth/getting_to_sg2.htm

State of Maryland

www.mde.state.md.us/Programs/MultimediaPrograms/Smart_Growth/PriorityFunding/index.asp



Overview

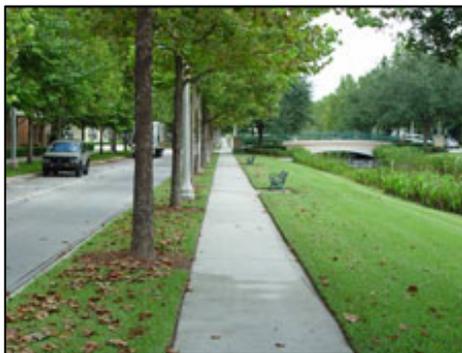
A major influence in the amount of impervious surface and runoff is our transportation network. Where motor vehicle travel is the only practical form of transportation, there is little incentive for area residents to use any type of transportation alternative that may lessen impacts on the watershed. Bike paths, sidewalks, and transit provide mobility to citizens regardless of age, health, or income and reduce the need for vehicles and related road improvements.

Relevant Locations

While multi-modal transportation is more commonly applied in cities and villages transportation options should be considered for all communities.

Benefits

Transportation infrastructure (roads, driveways, and parking lots) account for up to 70% of the impervious surface area, even in residential developments (University of Wisconsin 2002 and University of Connecticut 2003). Reducing the number of automobiles can reduce traffic, air and water pollution, and costly road widenings.



Recommended Implementation Guidelines

Require new development to install sidewalks and/or bike paths.

During site plan review, look for opportunities for cross access easements at points east and north of the property lines to adjacent properties. Verify that new development will install sidewalks and bike paths during the first phase of development, rather than constructing this infrastructure at the end, which can be 5-6 years before final construction of a development.

Transit oriented development design

Transit oriented development (TOD) offers a more compact arrangement of buildings and services for residents that choose to live near and use alternative transportation. Compact development can reduce infrastructure costs of expanding water, sewage and roads for municipalities, while providing for alternative housing options. A mixture of residential dwellings and commercial land uses is encouraged within the TOD area. The area should be well-connected to the pedestrian sidewalk/pathway system to encourage less reliance on automobiles.

Provide Transportation Options

Plan and zone for higher density districts that are transit supportive.

Transit-oriented development in coordination with bus and non-motorized pathways can provide for areas of high-density development without the need for new road construction and access management of cars and trucks. Greater emphasis on pedestrian walkways, bike paths and trails that interconnect the places people live, work and play can assist in offered transit-supportive systems. Mixed-use zoning and neotraditional development can reduce the need for travel by offering life services within close proximity to residential dwelling units.

Resources

Michigan Land Use Leadership Council
www.michiganlanduse.org/resources

Southeast Michigan Council of Governments
www.semcog.org

Michigan Suburbs Alliance
www.michigansuburbsalliance.org

Federal Transit Administration
www.fta.dot.gov



Funding

While most infrastructure funding comes from user fees, the following is an overview of alternative funding options that are available to implement some of the infrastructure programs recommended in this study. These State and Federal funding programs are subject to ongoing change.



Drinking Water Revolving Fund

Established by the 1996 Amendments to the Safe Drinking Water Act (SDWA), the Drinking Water Revolving Fund (DWRf) provides capitalization grants to states. The DWRf is a multifaceted tool for states to use in achieving the public health protection objectives of SDWA. The MDEQ operates the DWRf program and receives annual capitalization grants from the Environmental Protection Agency (EPA) which they use to support low-interest loans and other types of assistance to public water systems. Additional provisions also allow DWRf programs to target extra assistance to those communities with the greatest economic need.

The MDEQ also administers the Public Water System Supervision (PWSS) program. The PWSS program carries out many key activities, including developing and maintaining drinking water regulations, tracking compliance information, and ensuring that all public water systems follow state regulations.

Examples of Key PWSS Program Activities.

- Developing state drinking water regulations.
- Maintaining an inventory of public water systems.
- Conducting sanitary surveys of public water systems.
- Providing technical assistance to PWS operators.
- Ensuring all systems comply with state requirements.

DWRf programs may provide assistance to all publicly- and privately-owned community water systems or nonprofit non-community water systems. For a nonprofit system to be eligible for SRF funding, it must have a federal tax exempt status

identification number. Nonprofit systems may include school systems, day care centers, churches, or retreat centers. Systems that are federally-owned or recognized as for-profit non-community water systems are not eligible for assistance through the Fund.

DWRf assistance is provided for projects that address a current violation or will prevent a future violation of health-based drinking water standards. Eligible project categories include:

- Consolidation of drinking water supplies.
- Creation of new systems.
- Costs for maintaining drinking water sources.
- Storage capacity costs.
- Transmission and distribution costs.
- Drinking water treatment costs.
- Drinking water security measures.

Resources

EPA:

www.epa.gov/safewater/dwsrf.html

MDEQ:

http://www.michigan.gov/deq/0,1607,7-135-3307_3515_3517---.00.html



Clean Water State Revolving Fund (CWSRF)

Authorized by the 1987 Amendments to the Clean Water Act (CWA), the Clean Water State Revolving Fund (CWSRF) provides capitalization grants from the EPA to states. States must match 20 percent of their annual capitalization grants. The Michigan Department of Environmental Quality administers the fund in Michigan as the Strategic Water Quality Initiatives Fund (SWQIF). The state program provides low-interest loans or other assistance to publicly owned wastewater systems and nonpoint source pollution control and estuary management projects. Funding is available for water quality protection projects for wastewater treatment, nonpoint source pollution control, and watershed and estuary management.

Key features of the program include:

- **Low Interest Rates, Flexible Terms.** Nationally, interest rates for loans average 2 percent, compared to market rates that average 4.5 percent. For a CWSRF program offering this rate, a CWSRF funded project would cost 20 percent less than projects funded at the market rate. CWSRFs can fund 100 percent of the project cost and provide flexible repayment terms up to 20 years.
- **Significant Funding for Nonpoint Source Pollution Control and Estuary Protection.** CWSRFs provide more than \$370 million in 2006 to control pollution from nonpoint sources and for estuary protection, more than \$2.4 billion to date.
- **Assistance to a Variety of Borrowers.** The CWSRF program has assisted a range of borrowers including municipalities, communities of all sizes, farmers,

homeowners, small businesses, and nonprofit organizations.

- **Partnerships with Other Funding Sources.** CWSRFs partner with banks, nonprofits, local governments, and other federal and state agencies to provide the best water quality financing source for their communities.

The CWSRF/SWQIF program funds municipal wastewater treatment facilities, including secondary and advanced treatment works, collector sewers, sanitary and combined sewer overflow correction, and stormwater management. The CWSRF/SWQIF program also funds a significant amount of nonpoint source and estuary activities, such as watershed management, wetlands protection, contaminated urban and rural runoff control, brownfield remediation, ground water protection, habitat protection, and estuary management.

Resources

EPA:

www.epa.gov/owm/cwfinance/cwsrf/index.htm

MDEQ:

http://www.michigan.gov/deq/0,1607,7-135-3307_3515_4143---.00.html

USDA 's Rural Development Grants. The US Department of Agriculture provides infrastructure assistance for rural drinking water and wastewater utilities through leadership, financial assistance, and technical guidance. Its Water Programs Division (under the Water and Environmental Programs) administers four grant and loan programs for the development of safe and



affordable water supply systems, sewage systems, and other waste disposal facilities.

Resources

USDA:

www.usda.gov/rus/

US Department of Housing and Urban Development Community Development Block Grants

Since 1981, Housing and Urban Development (HUD) has distributed Community Development Block Grants (CDBG's) directly to entitlement communities and to states for distribution to non-entitlement communities, which include cities with populations of fewer than 50,000 and counties with populations of fewer than 200,000. HUD aims to provide decent housing, healthy living conditions, and economic opportunities primarily for lower income communities. Projects funded by block grants must either benefit lower income people or help prevent or eliminate "slums and blight." Systems have used assistance from block grants to meet state and federal regulations by developing new water sources, improving treatment, replacing distribution system pipes, and taking other actions.

Communities receiving CDBG funds from the State may use the funds for many kinds of community development activities including, but not limited to:

- Acquisition of property for public purposes;

- Construction or reconstruction of streets, water and sewer facilities, neighborhood centers, recreation facilities, and other public works;
- Demolition;
- Rehabilitation of public and private buildings;
- Public services;
- Planning activities;
- Assistance to nonprofit entities for community development activities; and
- Assistance to private, for profit entities to carry out economic development activities (including assistance to micro-enterprises).

Michigan Economic Development Corporation provides CDBG funds for public works activities. Preferred public works projects are projects that upgrade existing public infrastructure systems either by replacing deteriorating or obsolete systems or by adding needed capacity to existing systems. In addition, funds under this program can be utilized for public facilities which will have significant impact throughout the community. Projects must benefit low and moderate income households.

Resources

HUD

www.hud.gov/offices/cpd/communitydevelopment/programs



Department of Commerce's Economic Development Administration

The Economic Development Administration's (EDA) mission is to "enhance community success in attracting private capital investment and lucrative job opportunities." EDA offers assistance to rural and urban areas where unemployment is high and incomes are low. EDA grants can be used to underwrite the planning and construction costs for projects in these areas that will lead to the creation of jobs in the community. EDA's Public Works Program helps communities that are in economic decline upgrade their physical infrastructure, including drinking water and wastewater facilities. Public Works and Economic Development grants can be used for the construction or rehabilitation of essential public infrastructure and facilities necessary to generate or retain private sector jobs and investments, attract private sector capital, and promote regional competitiveness, including investments that expand and upgrade infrastructure to attract new industry, support technology-led development, redevelop brownfield sites and provide eco-industrial development.

Resources

<http://www.eda.gov/AboutEDA/Programs.xml>

Michigan Clean Water Fund (CWF)

The purpose of the CWF is to implement the MDEQ's surface water quality monitoring plan and to implement water pollution controls.

The legislation for the CWF stated that the highest priority for the Fund would be the monitoring strategy; therefore, \$45 million of the \$90 million was set aside to implement the monitoring strategy. Implementation of the monitoring strategy is being done using both grants and direct contracts to vendors.

The other half of the CWF is intended to implement water pollution control activities, which, under the CWF administrative rules, were identified as the following:

- Providing state match to establish and implement the conservation reserve enhancement program (CREP) in Michigan.
- Implementing water quality protection or improvement activities in approved watershed management plans that are required under a NPDES voluntary storm water permit.
- Implementing water quality protection or improvement recommendations in approved watershed plans that place a strong emphasis on protecting high quality waters.
- Implementing water quality recommendations in Remedial Action Plans and Lakewide Management Plans, other than those involving contaminated sediments.
- Implementing programs to identify and require the correction of illicit connections to storm sewer systems.
- Identifying failing on-site septic systems.
- Implementing corrective measures to correct failing on-site septic systems.
- Locating and plugging abandoned wells.



Resources

MDEQ:

http://www.michigan.gov/deq/0,1607,7-135-3307_3515_4143---,00.html

Abandoned Well Management Grants

These grants provide funding to communities, townships, and nonprofit organizations to locate and plug abandoned wells inside community public water supply wellhead protection areas (WHPA).

The goals of the or the program are to prevent the contamination of drinking water aquifers through old, deteriorated, abandoned well casings, to educate the public concerning the hazards associated with abandoned wells, and to protect the health of the public.

Projects must be affiliated with a community public water supply that uses groundwater as its source and must have an approved WHPA. Applicants may be a community, township, or a non-profit organization.

Resources

MDEQ:

http://www.michigan.gov/deq/0,1607,7-135-3313_3675_3689-7951--,00.html

Brownfield Redevelopment Grants and Loans

Brownfield Redevelopment and Site Reclamation Grants. These grants provide funding to local units of government and other public bodies to investigate and remediate known sites of environmental contamination, which will be used for identified economic redevelopment projects. The goals of the program are to ensure safe reuse of abandoned, vacant, or underutilized properties that are known to be contaminated, and to promote redevelopment of brownfields.

To be eligible for a grant, a proposed project must result in economic benefit for the community through job creation, private investment, and/or property tax increase. The property must meet the definition of a facility under Part 201 of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended.

Any county, city, village, township, Brownfield Redevelopment Authority, or other authority or public body created pursuant to state law may apply for a grant. Eligible activities include environmental investigations and assessments, interim response, and due care response activities necessary for the proposed development.

Clean Michigan Initiative Brownfield Redevelopment Loans (CMIBRL) and Revitalization Revolving Loans (RRL). These loans are designed to support the redevelopment of brownfield properties by providing low-interest loans to local units of government and other public bodies to investigate and remediate sites of known or suspected environmental contamination.

The goals of the program are to promote the economic redevelopment and safe reuse of abandoned, vacant, or underutilized brownfield properties where contamination is



known to exist or believed to have occurred based on current or historic use.

To be eligible, a proposed project must have economic development potential. A municipality must pledge its full faith and credit to secure the loan. When the Brownfield Redevelopment Authority (BRA) is the applicant, the municipality under which the BRA was formed, must make this pledge. The Michigan Department of Treasury will approve the applicant's ability to incur the debt. Loans are offered at an interest rate of no more than 50% of prime. Currently the interest rate is set at 2%, simple interest. There are no payments or interest due for the first five years after a loan is awarded. Annual payments begin in the fifth year of the loan. The full amount must be repaid within 15 years of the loan award. This arrangement provides an excellent opportunity for a community, or the BRA, to use tax incremental financing under the provisions of the Brownfield Redevelopment Financing Act, 1996 PA 381, as amended, to capture future taxes generated from the redevelopment of the property, to repay the loan. Often, through this approach, a community is able to capture additional tax dollars after having repaid their loan, to use for future brownfield redevelopment activities in their communities.

Any county, city, township, village, BRA, or other authority or public body created pursuant to state law may apply for a loan. Eligible activities include environmental investigations and assessments, interim response activities, and in some cases demolition. Due care response activities are eligible under the CMIBRL funding but are not eligible for RRL funds. Only one project may be awarded to an applicant during any fiscal year.

The Site Assessment Fund. This program provides grants up to \$1 million to eligible local units of government to assess the nature

and extent of contamination at properties with economic development potential.

The goal of the program is to ensure safe reuse of abandoned, vacant, or underutilized properties that are known to be contaminated, and to promote redevelopment of brownfields.

The property must have economic development potential and result in both environmental and economic benefit. The funding request must be to conduct a Baseline Environmental Assessment, evaluate due care requirements, or remedial investigation, in compliance with Part 201 of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, and proposed response activities will allow the applicant to market the property for sale to a new user. Only Core Communities such as Port Huron are eligible for Site Assessment Fund Grants.

Resources

MDEQ:

http://www.michigan.gov/deq/0,1607,7-135-3311_4110---,00.html

Coastal Zone Management Grants

The purpose of the Coastal Zone Management Program is to assist coastal communities and other eligible applicants in meeting the goals and objectives identified in the federal Coastal Zone Management Act and Michigan's Coastal Management Program.

The goals of the program are to protect, manage and restore coastal communities and habitats; restore historic structures; revitalize urban waterfronts; and increase recreational opportunities along Michigan's Great Lakes coast.



Projects must do one or more of the following:

- Enhance or create public access to Michigan’s coast.
- Protect, manage and/or restore coastal resources, habitats and watersheds.
- Revitalize urban waterfronts.
- Preserve and restores historic and cultural coastal resources.
- Research or provides education on Great Lakes and coastal issues.
- Reduce development in coastal hazard areas.
- Assist communities in managing the cumulative and secondary impacts of coastal development.
- Protect coastal water quality.

Coastal units of government including cities, counties, villages and townships, area-wide agencies, including regional planning commissions and conservation districts, universities and school districts, non-profit organizations and tribal governments are eligible.

Resources

MDEQ:

http://www.michigan.gov/deq/0,1607,7-135-3313_3677_3696-11198--,00.html

High Quality Waters Program

High Quality Waters Program provides funding to implement MDEQ-approved water plans that place an emphasis on protecting high quality waters. The goal is to provide for the permanent long-term protection of Michigan’s high quality waters.

Eligible agencies included county or local units of government and non-profit agencies.

Resources

MDEQ:

http://www.michigan.gov/deq/0,1607,7-135-3313_3686_3728-32361--,00.html

Illicit Connections Grants

This program provides funding to identify and require the correction of illicit connections to storm sewers. Illicit connections are pipes from businesses and homes that are improperly connected to storm sewers; waste is discharged to water bodies rather than directed to a wastewater treatment plant. The goal of the program is to identify illicit connections and require them to be connected to a sanitary sewer.

Eligible agencies included county or local units of government and non-profit agencies.



Resources

MDEQ:

http://www.michigan.gov/deq/0,1607,7-135-3308_3323-85584--,00.html

Local Water Quality Monitoring Grants

Local Water Quality Monitoring Grants provide funding to local governments and organizations to implement water quality monitoring programs throughout the state. The goal of the program is to collect water quality data that can be used to support local decision-making; to identify sources of pollution; and to generate local interest in water quality. Grantees may collect chemical, physical, and/or biological data as appropriate based on local issues and concerns.

Local governments (city/townships), county health departments, tribal governments, watershed councils, and conservation districts, and academia are eligible.

Resources

MDEQ:

http://www.michigan.gov/deq/0,1607,7-135-3308_3323-143435--,00.html

Michigan Great Lakes Protection Fund

The Michigan Great Lakes Protection Fund provides a source of reliable funding for new research and demonstration projects to preserve, enhance, and restore the Great Lakes and component

ecosystems. The goal of the program is to further the objectives of the United States/Canada Great Lakes Water Quality Agreement and the Great Lakes Toxic Substances Control Agreement. Emphasis is placed on research that results in needed policy development or significant near-term improvement in water quality and environmental health.

Local, state, and federal governments, universities, non-governmental organizations, and profit and non-profit organizations are eligible.

Resources

MDEQ:

http://www.michigan.gov/deq/0,1607,7-135-3313_3677_3699-126643--,00.html

Nonpoint Source Pollution Control Grants – Clean Michigan Initiative

Nonpoint Source Pollution Control Grants provide funding to implement the physical improvements in approved watershed management plans, and to address specific sources of nonpoint source pollution as identified by the MDEQ. Physical improvements are structural and vegetative best management practices.

The goal of the program is to reduce, eliminate and prevent nonpoint source pollution with long-term solutions on a watershed basis.

Eligible agencies include county or local units of government and non-profit agencies. An MDEQ-approved watershed plan is



required to be eligible for these funds. Remedial Action Plans and Lakewide Management Plans are considered approved watershed management plans. All other watershed management plans must be submitted to the MDEQ for approval.

Resources

MDEQ:

http://www.michigan.gov/deq/0,1607,7-135-3308_3323-97415--00.html

Nonpoint Source Pollution Control Grants – Federal Clean Water Act Section 319

Nonpoint Source Pollution Control Grants provide funding to: 1) develop watershed management plans to address nonpoint sources of pollution; and 2) implement nonpoint source activities identified in MDEQ-approved watershed management plans.

The goal of the program is to reduce, eliminate and prevent nonpoint source pollution with long-term solutions on a watershed basis. This funding source provides for the implementation of physical improvements as well as information/education strategies, land use planning, the installation of easements and related activities.

Eligible agencies include county or local units of government and non-profit agencies. An MDEQ-approved watershed plan is required to be eligible for implementation funds. Remedial Action Plans and Lakewide Management Plans are considered approved watershed management plans. All other watershed management plans must be submitted to the MDEQ for approval.

Resources

MDEQ:

http://www.michigan.gov/deq/0,1607,7-135-3313_3682_3714-158668--00.html

Remedial Action Plans and Lakewide Management Plans

Remedial Action Plans and Lakewide Management Plans are intended to implement water quality recommendations in Remedial Action Plans (RAPs) and Lakewide Management Plans (LaMPs). RAPs are developed under the Great Lakes Water Quality Agreement to address sources of contamination in specific areas of concern. LaMPs are developed under the Great Lakes Water Quality Agreement to address sources of contamination in the Great Lakes.

The goal of the program is to implement water pollution controls in Remedial Action Plans in order to restore and de-list Michigan's Great Lakes Areas of Concern, or, as part of MDEQ's participation in the Lakewide Management Plans.

Eligible agencies included county or local units of government and non-profit agencies.

Resources

MDEQ:

http://www.michigan.gov/deq/0,1607,7-135-3313_3677_15430-55255--00.html



Small Business Pollution Prevention Revolving Loans

The Small Business Pollution Prevention Loan Program was established to provide eligible small businesses with low-interest loans to implement pollution prevention projects. Projects may either be identified through a waste reduction assessment under the Retired Engineers Technical Assistance Program (RETAP) or by the loan applicant.

The goal of the program is to remove financing barriers for small businesses in Michigan by offering low-interest loans for projects that reduce waste, or conserve water or energy. The program provides an incentive for small businesses to initiate or expand on pollution prevention activities in order to reduce waste, energy, and water usage and save money.

This financial assistance is available to any business that is independently owned and operated, is not dominant in its field, and employs 500 or fewer individuals. Projects considered for funding must meet the regulatory criteria for pollution prevention. In addition, the applicant's lending institution must be willing to finance the project and participate with the MDEQ in the loan. The maximum loan amount is \$400,000 with the MDEQ contributing a maximum of \$200,000. To be eligible, a pollution prevention project must reduce waste generated by the facility, reuse or recycle that waste in an environmentally sound way, or reduce water or energy usage. Types of projects that may be funded include:

- Equipment or technology modifications.
- Process or procedure modifications.
- Redesign of products and substitution of raw materials.

- Improvement in housekeeping, maintenance, training, or inventory control.
- Certain energy efficiency or water conservation improvements.
- Agricultural energy production systems.

Resources

MDEQ:

http://www.michigan.gov/deq/0,1607,7-135-3307_3515_4144---,00.html

Strategic Water Quality Initiatives Fund

The Strategic Water Quality Initiatives Fund (SWQIF) provides low-interest loans for water pollution control projects involving the on-site upgrade or replacement of failing septic systems or for the removal of groundwater or storm water from sanitary or combined sewer leads.

The goal of the program is to assist municipalities in funding wastewater treatment improvements that cannot qualify for assistance from the State Revolving Fund.

Any city, village, township, county, or related utility authority is eligible. Applicants must present environmentally sound, cost effective water pollution control projects which are drawn from Project Priority Lists (PPLs) administered by the Environmental Science and Services Division.



Resources

MDEQ:

http://www.michigan.gov/deq/0,1607,7-135-3307_3515_4143---,00.html

Targeted Watershed Grants Program

Targeted Watershed Grants are intended to implement watershed protection and restoration efforts at the community level and determine if those approaches: 1) produce short-term environmental results; 2) have the potential for long term maintenance in a watershed; and 3) have national applicability.

The goal of the program is to encourage successful community-based approaches to restore, preserve, and protect the nation's watersheds. To provide resources to organizations with watershed plans to implement projects that achieve quick, yet tangible environmental change.

Eligible agencies include State and tribal water pollution control agencies, interstate or inter-tribal agencies, local units of government, and non-profit entities. The project must be consistent with a watershed plan.

Resources

MDEQ:

http://www.michigan.gov/deq/0,1607,7-135-3307_3515_5989-11198--,00.html

Voluntary Storm Water Permits

This program provides funding to implement MDEQ-approved water plans that were developed under a National Pollutant Discharge Elimination System (NPDES) general wastewater discharge permit for storm water discharges from separate storm water drainage systems.

The goal of the program is to implement water quality protection or improvement activities in the MDEQ-approved watershed plans.

Eligible agencies include county or local units of government and non-profit agencies.

Resources

MDEQ:

http://www.michigan.gov/deq/0,1607,7-135-3313_3682_3713-10252--,00.html

Waterfront Redevelopment Grants

Clean Michigan Initiative (CMI) Waterfront Redevelopment Grants provide funding to local units of government and other public bodies to revitalize waterfront properties by funding property acquisition, demolition, response activities, and public infrastructure and public facility improvements.

The goal of the program is to encourage new private investment and private job creation along waterfronts. Projects which are primarily parks and recreation in nature will generally not be funded under this program.



Grant funds may be used for eligible activities that are part of a project described in a waterfront redevelopment plan. Waterfront means land that is contiguous to the Great Lakes or their connecting waterways, a river, a lake, or an impoundment that has a surface area of not less than 50 acres. The plan must include a description of how the project will significantly contribute to local economic and community redevelopment or the revitalization of adjacent neighborhoods, and how the project will provide for public access to the waterfront or will provide recreational opportunities for the public.

Any local unit of government, including a county, city, village, township, or an agency of a county, city, village, or township, or an authority or other public body created by or pursuant to state law is eligible. The applicant must submit a waterfront redevelopment plan. Grants may not be used for land or facilities that will be owned or operated by a gaming facility, a stadium or arena for use by a professional sports team, or a private or municipal marina.

Eligible activities include:

- Environmental response activities on waterfront property consistent with a waterfront redevelopment plan.
- Demolition of buildings and other facilities along a waterfront that are not consistent with a waterfront redevelopment plan.
- Acquisition of waterfront property or the assembly of waterfront property consistent with a waterfront redevelopment plan.

- Public infrastructure and facility improvements to waterfront property consistent with a waterfront redevelopment plan.

Resources

MDEQ:

http://www.michigan.gov/deq/0,1607,7-135-3311_4110_29262-151092--,00.html

Wellhead Protection Program Grants

Wellhead Protection Program Grants provide funding to community public water supplies and nonprofit non-community public water supplies for the development and implementation of wellhead protection (WHP) programs. A wellhead protection area represents the surface and subsurface area within a ten-year time of travel for groundwater surrounding a water well or well field.

The goal of the program is to provide incentives and financial assistance for development and implementation of WHP programs and management strategies.

Applicant must be a community public water supply or a non-profit non-community water supply.

Resources

MDEQ:

http://www.michigan.gov/deq/0,1607,7-135-3313_3675_3695---,00.html



Appendix



Summary List of Tools and Applicability

Policy	Relevant Area			Tool Type			Ease of Implementation			Benefits to Community		
	Existing Utility Service	Future Utility Service	No Utility Service	Land Use Regulation or Policy	Utility Regulation or Policy	Incentive	Easy	Moderate	Difficult	Economic	Environmental	Quality of Life
Adequate Public Facilities ordinance	X	X		X	X				X			X
Best Management Practices (BMPs)	X	X	X		X			X			X	
Brownfield and greyfield development	X	X	X	X		X		X		X	X	X
Capital Improvements Plan	X	X			X		X			X		X
Cluster Development	X	X	X	X		X	X				X	X
Conditional Rezoning	X	X	X	X		X	X			X	X	X
Downzone critical environmental areas	X	X	X	X				X			X	X
Geographic Information Systems	X	X	X				X			X	X	
Green Infrastructure Plan	X	X	X	X			X				X	X
Growth Management	X	X	X	X				X		X	X	X
Green buildings / LEED	X	X	X			X		X			X	X
Infill development	X			X		X	X			X	X	X
Low Impact Development	X	X	X	X	X			X			X	X
Mixed-use Development	X	X	X	X		X	X			X	X	X
Native Landscaping	X	X	X			X	X				X	
Onsite Runoff Storage	X	X	X		X		X				X	
Performance-based zoning	X	X	X	X	X				X		X	
Protect Riparian Areas	X	X	X	X				X			X	X
Priority Funding Areas	X	X			X			X		X		X
Private Community Wastewater Systems			X		X			X			X	
Planned Unit Development	X	X	X	X		X	X			X	X	X
Policies to Manage Water Demand	X	X	X		X				X	X	X	
Site Plan Review of Natural Features	X	X	X	X			X				X	
Subdivision Design Standards	X	X	X	X			X				X	X
Transportation Options	X	X	X		X			X		X	X	X
Transfer of development rights		X	X	X		X			X	X	X	
Transfer/Pooling of stormwater mitigation	X	X	X		X	X			X		X	
Tree protection ordinance	X	X	X	X			X				X	X
Utility Demand Zoning	X	X		X	X				X	X	X	
Watershed Plan	X	X	X	X				X			X	X



Model Ordinances

Storm Water Management A- 4

Private Community Wastewater Systems A-22

Transfer of Development Rights..... A-26

Natural Features Setback A-32

Shoreline Protection Overlay Zone..... A-33

Woodlands Protection Ordinance A-36



STORM WATER MANAGEMENT

Section 1. PURPOSE

The purpose of this chapter is to protect the public health, safety and welfare of COMMUNITY residents and to protect property values, quality of life, and natural systems relating to storm water runoff control and management. The COMMUNITY finds it is a matter of public concern and benefit to protect waterways and properties within the COMMUNITY and to reduce the future need for public expenditures relating to flooding, water quality, and storm water system maintenance. It is therefore the purpose of this chapter to establish minimum storm water management requirements and controls to accomplish the following objectives:

- A. To reduce flood damage;
- B. To minimize increased storm water runoff rates and volumes due to changes in land use;
- C. To minimize the physical deterioration of existing watercourses, culverts and bridges, and other structures;
- D. To encourage water recharge into the ground where geologically favorable conditions exist;
- E. To prevent an increase in non-point source pollution;
- F. To maintain the integrity of stream channels for their biological functions, as well as for drainage and other purposes;
- G. To minimize the impact of changes in land use upon stream bank and streambed stability;
- H. To reduce erosion from earth change or construction projects;

- I. To preserve and protect water supply facilities and water resources by means of controlling increased flood discharges, stream erosion, and runoff pollution;
- J. To reduce storm water runoff rates and volumes, soil erosion, and non-point source pollution, wherever practicable, from lands proposed for redevelopment that were not previously developed with storm water management controls meeting the purposes and standards of this chapter;
- K. To reduce the adverse impact of changing land use on neighboring properties and waterways and, to that end, this chapter establishes minimum standards to protect waterways from degradation resulting from changing land use;
- L. To regulate the contribution of pollutants to stormwater discharges and prohibit illicit discharges; and
- M. To establish legal authority to carry out all inspection, surveillance and monitoring procedures necessary to ensure compliance with this ordinance.

Section 2. DEFINITIONS

For purposes of this ordinance, the following terms shall have the following meanings:

- A. **Best Management Practices (BMPs):** A practice or combination of practices that have been determined by St. Clair County to be the preferred method of preventing, minimizing, or reducing pollution and other effects of storm water runoff.
- B. **Construction Site Storm Water Runoff:** Storm water runoff from a development site following an earth change.
- C. **Cut:** An earth change, which lowers topography or removes soil.



- D. **Design Storm:** A rainfall event of specified size and return interval that is used to calculate the runoff volume and peak flow rate that must be handled by a storm water management system.
- E. **Detention:** A system, which is designed to capture storm water and release it over a given period of time through an outlet structure at a controlled rate.
- F. **Detention Basin:** A constructed basin that temporarily stores storm water runoff before discharging into a surface water, including the following:
1. **Constructed Wetland:** A detention basin that uses a variety of depths to create conditions suitable for the growth of wetland plants.
 2. **Wet Extended Detention Basin:** A detention basin that removes sediments and other pollutants from storm water runoff by the use of a permanent pool and by detaining the storm water runoff for an extended time period.
- G. **Detention Time:** The length of time water is held in a detention basin. This time is dictated by the amount of water stored and the release rate of same.
- H. **Development:** The installation or construction of impervious surfaces on a development site that require, pursuant to state law or local law, the COMMUNITY approval of a site plan, subdivision plat, condominium, land division, road approval, or other approvals required for the development of land or the erection of buildings or structures; provided, however, that for purposes of this chapter only, developed or development shall not include the actual construction of, or an addition, extension or modification to, an individual single-family detached dwelling.
- I. **Discharge:** The rate of flow or volume of water passing a given point, expressed as cubic feet per second.
- J. **Disturbed Area:** The surface of land from which vegetation has been removed or subjected to earth moving activities.
- K. **Drain:** Any drain as defined in the Drain Code of 1956, as amended, being MCL 280.1, et seq., other than an established county or intercounty drain.
- L. **Drainage:** The collection, conveyance, or discharge of ground water and surface water.
- M. **Drainage Area:** The entire upstream land area from which storm water drains to a particular location.
- N. **Earth Change:** Any human activity which removes ground cover, changes the slope or contours of the land, or exposes the soil surface to the actions of wind and rain. Earth change includes, but is not limited to, any excavating, surface grading, filling, landscaping, or removal of vegetative roots.
- O. **Erosion:** The process by which the ground surface is worn away by action of wind, water, gravity or a combination thereof.
- P. **Fill:** Earth or other materials added to existing topography to change the contour of the land.
- Q. **First Flush:** Storm water runoff containing a highly concentrated pollutant load that occurs during the early stages of a storm as a result of the washing effect of runoff on pollutants that have accumulated on the land. For purposes of these rules, the first flush at a particular location within a storm water



management system consists of runoff from the first 0.5 inch of precipitation over the entire drainage area upstream of that location.

- R. **Hazardous Materials:** Any material, including any substance, waste, or combination thereof, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause, or significantly contribute to, a substantial present or potential hazard to human health, safety, property, or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.
- S. **Grading:** Any stripping, excavating, filling, and stockpiling of soil or any combination thereof and the land in its excavated or filled condition.
- T. **Illegal Discharge:** Any direct or indirect non-storm water discharge to the storm drain system, except as exempted in Section _____ of this ordinance.
- U. **Illicit Connections:** An illicit connection is defined as either of the following: Any drain or conveyance, whether on the surface or subsurface, which allows an illegal discharge to enter the storm drain system including but not limited to any conveyances which allow any non-storm water discharge including sewage, process wastewater, and wash water to enter the storm drain system and any connections to the storm drain system from indoor drains and sinks, regardless of whether said drain or connection had been previously allowed, permitted, or approved by an authorized enforcement agency or, Any drain or conveyance connected from a commercial or industrial land use to the storm drain system which has not been documented in plans, maps, or equivalent records and approved by an authorized enforcement agency.
- V. **Impervious:** The ground condition including roads, parking lots, sidewalks other paved areas, and rooftops, which do not allow percolation or infiltration of precipitation and causes water to accumulate on the surface resulting in increased runoff.
- W. **Infiltration:** The percolation and movement of water downward into and through the soil column, the rate of which is expressed in inches per hour.
- X. **National Pollutant Discharge Elimination System (NPDES) Storm Water Discharge Permit:** A permit issued by EPA (or by a State under authority delegated pursuant to 33 USC § 1342(b)) that authorizes the discharge of pollutants to waters of the United States, whether the permit is applicable on an individual, group, or general area-wide basis.
- Y. **Non-Storm Water Discharge.** Any discharge to the storm drain system that is not composed entirely of storm water.
- Z. **Non-Point Source:** Sources of pollution which enter surface or groundwaters through widely diffused small increments. This type of pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into streams, rivers and wetlands.
- AA. **100-Year Flood:** That water occupation adjacent to a waterbody which results from a storm event having a 1% probability of occurrence in any given year. Thus, a 50-year storm has a 2% probability, a ten-year storm a 10% probability, etc.
- BB. **Overland Flow-Way:** Surface area that conveys a concentrated flow of storm water runoff.



- CC. **Peak Discharge Rate:** The maximum rate of storm water flow from within a drainage area expressed as cubic feet per second.
- DD. **Point Source:** A discharge that is released to the surface waters of the state by a discernible, confined and discrete conveyance, including, but not limited to, a pipe, ditch, channel, tunnel or conduit.
- EE. **Pollutant:** Anything which causes or contributes to pollution. Pollutants may include, but are not limited to: paints, varnishes, and solvents; oil and other automotive fluids; non-hazardous liquid and solid wastes and yard wastes; refuse, rubbish, garbage, litter, or other discarded or abandoned objects, and accumulations, so that same may cause or contribute to pollution; floatables; pesticides, herbicides, and fertilizers; hazardous substances and wastes; sewage, fecal coliform and pathogens; dissolved and particulate metals; animal wastes; wastes and residues that result from constructing a building or structure; and noxious or offensive matter of any kind.
- FF. **Property Owner:** Any person, firm, or corporation having legal or equitable title to property or any person having or exercising care, custody, or control over any property.
- GG. **Retention Basin:** A storm water management facility, either natural or manmade, which does not have an outlet, which captures and holds runoff until it infiltrates the soil or evaporates.
- HH. **Runoff:** The portion of precipitation which does not infiltrate or percolate into the ground, but rather moves over the land, eventually reaching a waterbody, wetland, or low area.
- II. **Runoff Coefficient:** The ratio of the volume of runoff from a given drainage area over a given time period, to the total volume of precipitation that falls on the same drainage area over the same time period.
- JJ. **Sediment:** Any solid particulate matter which has been moved from the site of origin by erosion, is being transported by water, is in suspension in water, or has been deposited in a water body, wetland, or floodplain.
- KK. **Sheetflow:** Overland runoff which moves relatively uniformly over the ground surface rather than being concentrated in a conveyance channel.
- LL. **Site:** Any tract, lot, or parcel of land or combination of tracts, lots, or parcels, which compose an area proposed for development or earth change.
- MM. **Soil Erosion:** The stripping of soil and weathered rock from land creating sediment for transportation by water, wind or ice, and enabling formation of new sedimentary deposits.
- NN. **Soil Erosion Control:** Structures, facilities, barriers, berms, vegetative cover, basins, or any other installation, temporary or permanent, which are designed to minimize and prevent erosion.
- OO. **Storm Drain:** A system of open or enclosed conduits and appurtenant structures intended to convey or manage storm water runoff, ground water, and drainage.
- PP. **Storm Water Facility:** Methods, structures, BMP's, areas, or related items, which are used to control, store, receive, infiltrate, or convey runoff.
- QQ. **Storm Water Runoff:** The excess portion of precipitation that does not infiltrate the ground, but “runs off” and reaches a conveyance, surface water, or watercourse.



- RR. **Time of Concentration:** The time duration (typically in minutes) that is required for runoff from the most remote area of the watershed to reach a given location in a storm water management system..

Section 3. APPLICABILITY

A storm water management plan approved in accordance with this chapter shall be required for any earth change or development subject to the following:

- A. Site plan under the Zoning Ordinance.
- B. Subdivision subject to approval under the Subdivision Ordinance.
- C. Condominium subject to approval under the Condominium Ordinance.
- D. Land division that will create additional building sites.
- E. Any earth changes for an area of 43,560 square feet or more.

Section 4. EXCEPTIONS

A storm water management plan shall not be required for:

- A. Additions or modifications to any existing single family structure, including accessory structures.
- B. Landscaping or gardening involving less than 43,560 square feet of land.
- C. Construction of a dwelling on a legal lot of record in existence at the effective date of this chapter; provided that less than 43,560 square feet of land is cleared or graded for such construction.

- D. Construction of a dwelling on a lot created after the effective date of this chapter that is within a subdivision or condominium that itself previously received approval under this chapter; provided that less than 43,560 square feet of land is cleared or graded for such construction.

Section 5. STORM WATER MANAGEMENT PLAN REVIEW PROCEDURE

- A. **Process:** Fifteen (15) copies of the proposed storm water management plan for each development and earth change project shall be submitted to the COMMUNITY at the same time a site plan or subdivision final preliminary plat is submitted.

For any development other than a platted subdivision, the storm water management plan shall be received at least thirty (30) days prior to a Planning Commission meeting in order to be reviewed at that meeting. In the case of a platted subdivision, it shall be submitted at least fifteen (15) days prior to a Planning Commission meeting.

- B. **Agency Review**

Upon receipt of a completed application for approval of a storm water management plan, the COMMUNITY shall transmit copies of the plan to the St. Clair County Drain Commissioner and the COMMUNITY engineer for review and comment.

- C. **Planning Commission Review**

1. If the Planning Commission determines that all required information has not been received, the applicant may request that the matter be tabled, and the Planning Commission may, at its discretion, with or without such a request, table the matter to allow for the submittal of the required information.



2. The Planning Commission shall review the storm water management plan to determine compliance with the conditions contained in section 5.D.
3. The Planning Commission may add conditions for approval of the plan.
4. The Planning Commission shall consider the comments made by the agencies listed in this chapter in making its determination.
5. The authority to grant final approval for a storm water management plan shall be vested with the Planning Commission for all types of projects except for subdivisions and condominiums. In the case of a subdivision or condominium, final authority for approval of the plan shall be vested with the COMMUNITY Council/Board. Action of the COMMUNITY Council/Board shall occur after the Planning Commission has provided a recommendation on the plan.
4. The applicant provides all easements necessary to implement the approved storm water management plan and to otherwise comply with this chapter in form and substance acceptable to the COMMUNITY, and to be recorded with the St. Clair County Register of Deeds.
5. The storm water management plan conforms to all applicable design and performance standards for drains and storm water management systems, pursuant to section 7.
6. All storm water facilities are designed in accordance with current St. Clair County BMP's.
7. The applicant provides the required maintenance plan for routine, emergency, and long-term maintenance of all storm water facilities and in compliance with the approved storm water management plan and this chapter. The maintenance plan shall be in form and substance acceptable to the COMMUNITY and shall be recorded with the St. Clair County Register of Deeds.

D. Conditions of Approval: The COMMUNITY shall grant approval of a storm water management plan, which may impose terms and conditions in accordance with section 13, and which shall be granted only upon compliance with each of the requirements stated below.

1. The applicant has submitted a storm water management plan complying with this chapter.
2. The applicant has paid or deposited the management plan review fee pursuant to section 13.
3. The applicant has paid or posted the applicable financial guarantee pursuant to section 13.

Section 6. STORM WATER MANAGEMENT PLAN REQUIREMENTS

A. General Plan Requirements: Through maps, illustrations, reports, and calculations, the storm water management plan shall display the required information in a clear and logical sequence. The storm water management plan shall be sufficiently detailed to specify the type, location, and size of soil erosion control measures and storm water facilities, including calculations. The storm water management plan shall be drawn to a scale of at least one inch equal to 50 feet (1 inch = 50 feet) for property less than three (3) acres and one inch equal to one hundred feet (1 inch = 100 feet) for property three (3) acres or more in size.



- B. **Plan Submittal Requirements:** The following plan requirements are in addition to other requirements specified in sections 7 and 8 of this chapter and other applicable chapters of the Code. The applicant shall provide a storm water management plan to the COMMUNITY for review and approval. Upon request by the applicant, or at its own initiative, the Planning Commission may determine that one (1) or more requirements may not be applicable and may be waived. Applicant shall submit fifteen (15) copies of the storm water management plan, which shall identify and contain all of the following information:
1. **Contact Information:** The name, address, and telephone number of all persons having a legal interest in the property and the tax reference number and parcel number of the property or properties affected. Include information on the zoning classification of the applicant's parcel and all adjacent parcels.
 2. **Location Map:** A map depicting the location of the development site and all water bodies that will ultimately receive storm water runoff.
 3. **Topographic Base Map:** The existing and proposed topography of the development site, including the alignment and boundary of the natural drainage courses, with contours having a maximum interval of not greater than two (2) feet. The map shall also show existing surface water drainage (permanent and intermittent) and flow direction, including streams, ponds, culverts, ditches, and wetlands; location of 100-year floodplain, if applicable to the site; current land use including all existing structures; locations of utilities, roads, and easements; and significant natural and manmade features not otherwise shown.
 4. **Soils Information:** The site soil information from the St. Clair County Soil Map Survey.
 5. **Watershed:** A map showing the drainage boundary of the proposed development and earth change, each point of discharge from the development and earth change, and the drainage relationship with existing watershed patterns.
 6. **Calculations:** Storm water calculations shall be provided in accordance with the St. Clair County design standards referenced in section 7.
 7. **Site Plan Drawing:** A drawing showing all proposed storm water facilities with existing and final grades. This map shall also show existing and proposed lot lines, property lines, and structures, parking areas, etc. on the parcel and within 100 feet of the site.
 8. **Outlet and Culvert Information:** The sizes and locations of upstream and downstream culverts serving the major drainage routes flowing into and out of the development site, with arrows indicating the direction of flow to the ultimate receiving water body. Any significant offsite and onsite drainage outlet restrictions other than culverts should be noted on the drainage map. Storm sewer calculations indicating the number of acres, calculated to the nearest tenth of an acre, contributing to each specific inlet/outlet and maximum flow in cubic feet per second shall be stated on the plan. The applicant shall demonstrate that suitable conveyance exists downstream of the development site to receive the storm water, including easements, if necessary, for such conveyance. If easements do not exist, and cannot be acquired, the applicant shall demonstrate the means of



- volume controls. Any areas of offsite sheet flow shall be identified.
9. **Construction Plan:** An implementation and sequencing plan for construction and inspection of all storm water facilities, including a schedule of the estimated dates of completing construction of the storm water facilities shown on the plan and an identification of the proposed inspection procedures to ensure that the storm water facilities are constructed in accordance with the approved storm water management plan.
 10. **Sedimentation and Erosion Control Plan:** A soil erosion and sedimentation plan for all construction activities related to implementing any onsite storm water management practices. This plan shall provide the effective control of construction site storm water runoff and sediment track-out onto roadways.
 11. **Construction Specifications:** All construction specifications for the storm water facilities and a single sheet showing all proposed storm water facilities, including vegetative BMP's, with drainage easements overlaid onto the overall road and utility plan and drawn to the same scale.
 12. **Additional Drawings:** Drawings, profiles, and specifications for the construction of the storm water facilities reasonably necessary to ensure that storm water runoff will be drained, stored, or otherwise controlled in accordance with this chapter. All drawings will include the date (month, day and year), including dates of any revisions, a title block, scale, and north point.
 13. **Maintenance Plan:** A document in form and substance acceptable to the COMMUNITY for ensuring maintenance of any privately owned storm water facilities. The maintenance plan shall include a mandatory association or other enforceable commitment to provide routine, emergency, and long-term maintenance of the facilities and, in the event that the facilities are not maintained in accordance with the approved storm water management plan, the maintenance plan shall authorize the COMMUNITY to maintain any onsite storm water facility as reasonably necessary, at the owner's expense.
 14. **Firm Contact Information:** Name and signature of planner, architect, engineer, surveyor, wetland specialist, landscape architect, and other technical experts who have assisted in the preparation of the storm water management plan, designed the storm water facilities, and will inspect the final construction of the storm water facilities. The submitted plan shall be stamped and signed by the licensed engineer.
 15. **Vegetation/Landscape Plan:** A drawing that details the existing vegetation to remain, with woodland protective measures to be undertaken during construction, and new landscaping to the provided.
 16. **Other Environmental Permits:** All other applicable environmental permits shall be acquired for the site prior to construction.
 17. **Additional Information:** Any other information necessary for the COMMUNITY to verify that the storm water management plan complies with the COMMUNITY's design and performance standards for drains and storm water facilities.



18. **Fees:** Payment of applicable review fees is required before any review will commence.
19. **Phased Development Plans:** Should the applicant plan to subdivide or develop a given area but wishes to begin with only a portion of the total area, the original preliminary plan will include the proposed general layout for the entire area. The first phase of the subdivision will be clearly superimposed upon the overall plan in order to illustrate clearly the method of development and earth change that the applicant intends to follow. However, the storm water management plan shall be submitted for the entire development, with calculations and devices designed for buildout sufficient to demonstrate to the Planning Commission the feasibility of future phases complying with the standards of this chapter.
20. **Site Features:** The location and description of onsite and adjacent offsite features that may be relevant in determining the overall requirements for storm water management. These features may include, but are not limited to, the following:
 - a. Adjoining roads, subdivisions, and other developments and earth change activities;
 - b. Schools, parks, and cemeteries;
 - c. Drains, sewers and water mains;
 - d. Overhead power lines, underground transmission lines, gas mains, pipelines or other utilities;
 - e. Existing and proposed easements;
 - f. Natural and artificial watercourses, wetlands and wetland boundaries, floodplains, bays and lagoons;
 - g. Designated natural areas; and
 - h. Any proposed environmental mitigation features.
21. **Soil Borings:** Soil borings shall be required at various locations including the sites of proposed retention/detention/infiltration facilities.
22. **Weekly Construction Reports:** As required by section 11.A., construction reports shall be submitted weekly, unless some other period of time is approved by the Planning Commission.
23. **Previously Developed Sites.** For earth changes, development or redevelopment occurring on a previously developed site, an applicant shall be required to include within the storm water management plan measures for controlling existing storm water runoff discharges from the site in accordance with the standards of the chapter, or to match existing discharge rates, whichever is less.

Section 7. ST. CLAIR COUNTY STORM WATER MANAGEMENT STANDARDS

The COMMUNITY Council/Board by resolution adopted the storm water management standards of the St. Clair County Drain Commissioner, which establish the minimum design standards for calculating runoff, storm water discharge release rates, and requirements for dischargers to implement on-site detention, detention, infiltration, or other methods necessary to control the rate and volume of surface water runoff discharged into the storm water drainage system. In instances



where this ordinance requires a higher standard than the county, the requirements of this ordinance shall be met.

Section 8. PERFORMANCE/GENERAL STANDARDS

The COMMUNITY is not responsible for providing drainage facilities on private property for the management of storm water on the private property. It shall be the responsibility of the property owner to maintain private storm water facilities serving the property and to prevent or correct the accumulation of debris, which interferes with the drainage or storm water management function of the system.

All developments and earth changes subject to review under the requirements of this chapter shall be designed, constructed, and maintained to control runoff, prevent flooding and protect water quality. The particular facilities and measures required onsite shall reflect the natural features, wetland, and watercourses on the site; the potential for onsite and offsite flooding, water pollution, and erosion; and the size of the site.

A. Onsite and Offsite Storm Water Management

1. Storm water facilities shall be designed to prevent flood hazards and water pollution related to storm water runoff, soil erosion, and channel erosion from the proposed earth change.
2. Existing storm water from upstream and offsite locations shall be conveyed around or through the site, or stored onsite.
3. Every storm water facility shall control the release of storm water in accordance with the St. Clair County design standards.
4. Unless otherwise approved, storm water runoff shall be conveyed through swales and vegetated buffer strips so as to decrease runoff velocity, allow for natural infiltration and passive storage, allow suspended sediment particles to settle, and to remove pollutants.
5. Alterations to natural drainage patterns shall not increase runoff, create flooding or water pollution for adjacent or downstream property owners.
6. Cutting, filling, and grading shall be minimized and the natural topography of the site shall be preserved to the maximum extent practicable, except where specific findings demonstrate that major alterations will still meet the purposes and requirements of this chapter.
7. Grading of lands at locations that are adjacent to or near lands, streets, alleys, sidewalks, or other public or private property shall be done in a manner to protect the property from settling, cracking or sustaining other damage.
8. All development and other earth changes shall be designed, constructed, and completed so that the exposed area of any disturbed land is limited to the shortest possible period of time.
9. Damage to public utilities or services and damage to or impairment of any water body on or near the location of any water body shall be prevented.
10. Natural wetlands shall be maintained to the maximum extent practicable.
11. Increased offsite release of storm water shall be minimized to the maximum extent practicable. The



volume of storm water shall be managed and stored to the maximum extent practicable.

12. The increased volume of water discharged due to earth changes and development of the site shall not create adverse impacts to property owners and watercourses. These adverse impacts may include, but are not limited to flooding, excessive soil saturation, crop damage, erosion, and degradation in water quality or habitat.

B. Storm Water Facilities

1. **Infiltration Facilities:** This chapter encourages the use of infiltration systems as a part of storm water management plan design. Storm water storage and infiltration facilities, which protect water quality and minimize flooding, shall be designed to meet the standards of this chapter. Storage facilities may include, but are not limited to, detention basins, retention basins, infiltration trenches, swales with check dams, bioretention structures and other facilities and BMP's proposed by the applicant. It shall be the responsibility of the applicant to demonstrate that all proposed facilities meet the intent, goals, and standards of this chapter.

As the rate of percolation/infiltration of water into the soil column varies depending on the soil type, the type of infiltration system used may be site specific. Storm water management plan designers shall consider soil permeability when designing storm water infiltration components of a management system. The site developer shall attempt to minimize compaction of soil, which decreases infiltration and groundwater recharge and contributes to increased storm water runoff.

2. **Storm Water Storage Facilities:** All detention or retention basins shall be designed to meet the standards of this chapter.
 - a. Wet basins, or detention basins with a fixed minimum water elevation between runoff events. Wet basins, which serve to trap soil particles onsite, are preferable to dry basins.
 - b. Detention basins, which detain the first flush of an event and attenuate its release over an extended period.
 - c. Extended detention basins, which hold storm water from a less frequent storm event over an extended period before completely draining to become a dry basin. Dry basins without extended detention shall not be permitted.
 - d. Manufactured detention systems consisting of underground pipes designed to provide the required storage volume for a development project and a restricted outlet will only be allowed when a wet extended detention basin or constructed wetland are not feasible for a given site.
3. Detention and retention basins shall be designed to hold runoff from a 100-year frequency storm event. Basins shall be permanently stabilized to minimize erosion.
4. Detention and retention basins shall have an overflow system. If the overflow system cannot discharge to a creek, lake, or wetland without causing flooding on adjacent or downstream properties, then the basin shall



be designed to hold storm water runoff from back-to-back 100-year storm events.

5. Detention and retention basins and associated berms and landscaping shall be designed to protect public safety and to be visually attractive. Detention and retention basins shall be "free form" following the natural shape of the land to the greatest practical extent. Wherever possible, detention and retention basins shall be designed with shallow depth and gradual side slopes that do not require security fencing based upon St. Clair County standards.
6. For residential subdivisions or condominiums, detention and retention basins shall be provided in common areas or open space areas and not located within individual residential lots.

Section 9. SOIL EROSION AND SEDIMENTATION CONTROL

- A. All persons who cause, in whole or in part, any earth change to occur shall provide soil erosion and sedimentation control to adequately prevent soils from being eroded and discharged or deposited onto adjacent properties or into a storm water drainage system, a public street or right of way, wetland, creek, stream, water body, or floodplain. All earth changes shall be in accordance with all applicable federal and state laws, and local ordinances and applicable rules, regulations, and standards. The strictest of such requirements shall apply. The applicant shall obtain and comply with the terms of a soil erosion and sedimentation control permit if required by law.
- B. No grading, site preparation, or removal of vegetative cover shall take place prior to obtaining a soil erosion and sedimentation control permit from St. Clair County Drain Commissioner and the installation of erosion control facilities.

Section 10. LANDSCAPING/REVEGETATION

An applicant shall address the following guiding principles and standards:

- A. Native, natural existing vegetation shall be retained to the maximum extent practicable, recognizing earth changes will occur and it is not possible to retain much of what exists and still accomplish the basic project purpose.
- B. Native species shall be used for revegetation and landscaping. One (1) deciduous shade or evergreen tree and ten (10) shrubs shall be planted for every fifty (50) lineal feet of pond perimeter as measured along the top of the bank elevation. The required trees and shrubs shall be planted in a random pattern or in groupings. The placement of required landscaping is not limited to the top of the pond bank, where the plant species is adapted to saturated soil conditions.
- C. The flood tolerance of proposed species shall be considered, particularly in storm water management areas and components.
- D. Water requirements of species proposed in areas other than storm water management facilities shall be considered, with the goal of reducing their water demand and nutrient requirements to the maximum extent practicable.
- E. The storm water management components shall be chemical-free zones within the development, with the exception of accepted management techniques for the establishment and maintenance of native landscapes.
- F. Bio-retention areas shall be vegetated with species, which maximize the infiltration, uptake and evapotranspiration of water.



Section 11. MAINTENANCE AND INSPECTION

- A. **Construction Maintenance Requirements:** The applicant shall be responsible for maintenance and inspection of storm water BMP's and management components on a regular basis during construction.

Authorized representatives of the COMMUNITY may enter the project site to conduct onsite inspections at any time during construction, and is by reference a condition of any approval, and may review any log the applicant maintains pursuant to Subsection B.

- B. **Inspection:** The applicant shall notify the COMMUNITY in advance before the commencement of construction. A licensed professional engineer shall conduct regular observations of the storm water facilities construction. All observations shall be documented with brief, written reports prepared, and submitted to the COMMUNITY, the frequency of which shall be determined at the time the plan is approved. The report shall contain the following information:

1. The date and location of the site visit;
2. Recent precipitation events;
3. Copies from the NPDES construction site logbook, if applicable;
4. Whether construction is in general compliance with the approved storm water management plan;
5. Variations from the approved construction specifications; and

6. Any violations that exist with a timetable for completing corrective actions or a brief description of corrective actions completed.

If any violations are found, the property owner shall be notified by the COMMUNITY in writing of the nature of the violation and the corrective actions necessary. No additional work shall proceed until all violations are corrected by the applicant and approved by the COMMUNITY.

Should a COMMUNITY observation reveal noncompliance with the approved storm water management plan, a violation and stop work order may be issued in accordance with section 18.

- C. Every person owning property through which a watercourse passes, or such person's lessee, shall keep and maintain that part of the watercourse within the property free of trash, debris, excessive vegetation, and other obstacles that would pollute, contaminate, or significantly retard the flow of water through the watercourse. In addition, the owner or lessee shall maintain existing privately owned structures within or adjacent to a watercourse, so that such structures will not become a hazard to the use, function, or physical integrity of the watercourse.

Section 12. APPROVED PLANS AND AMENDMENTS

- A. **Approved Plans**

1. Approval of final development plans, site plans, and final preliminary subdivision plats shall not be granted prior to approval of the storm water management plan.
2. Upon approval of the storm water management plan, the Planning Commission chair, or the chair's designee, shall sign three (3) copies thereof. One (1) signed copy shall be made a part of the COMMUNITY's files; one (1) copy



shall be forwarded to the COMMUNITY engineer; and, one (1) copy shall be returned to the applicant.

3. Planning Commission approval shall expire two (2) years from the date of such approval, unless construction has commenced and proceeds satisfactorily. An applicant may request from the Planning Commission unlimited one (1) year extensions of the plan approval, provided such request is applied for in writing prior to the date of expiration of plan approval. The Planning Commission shall grant the request if plan requirements and standards, including those of this chapter that are reasonably related to the earth change, have not changed.

B. Amendments. Amendments to an approved storm water management plan may occur only under the following circumstances:

1. The holder of an approved plan shall notify the COMMUNITY of any proposed amendment to such approved plan.
2. Minor changes may be approved by the COMMUNITY upon certification in writing to the Planning Commission that the proposed revision does not alter the basic design nor any specified conditions of the plan as agreed upon by the COMMUNITY. The COMMUNITY shall have the authority to administratively approve minor changes for the following:
 - a. Any change that does not decrease the effectiveness of approved storm water facilities.
 - b. Any change that does not cause an increase in runoff rate or volume.

c. Any change deemed to be minor as determined by the Planning Commission from time to time.

3. Should the COMMUNITY determine that the requested modification to the approved plan is not minor, then the applicant shall submit a new plan for review as required by this chapter.

Section 13. FEES AND PERFORMANCE GUARANTEES

A. Review Fees: Fees and escrow account payments shall be sufficient to cover administrative and technical review costs anticipated to be incurred by the COMMUNITY.

1. All expenses and costs incurred by the COMMUNITY directly associated with processing, reviewing and approving or denying storm water management plan application shall be paid to the COMMUNITY from the funds in an escrow account established by the applicant and held by the COMMUNITY.
2. The COMMUNITY may draw funds from an applicant's escrow account to reimburse the COMMUNITY for out-of-pocket expenses incurred by the COMMUNITY relating to the application. Such reimbursable expenses include, but are not limited to, expenses related to the following:
 - a. Services of the COMMUNITY attorney directly related to the application.
 - b. Services of the COMMUNITY engineer directly related to the application.



- c. Services of other independent contractors or consultants working for the COMMUNITY, which are directly related to the application.
 - d. Any additional public hearings, required mailings and legal notice requirements necessitated by the application.
3. At the time an applicant applies for approval of a storm water management plan, the applicant shall deposit with the COMMUNITY Clerk, as an escrow deposit, an initial amount equal to six percent (6%) of the estimated cost of constructing the proposed storm water management plan improvements as submitted by the applicant and reviewed and approved by the COMMUNITY engineer unless the COMMUNITY determines that a greater amount is appropriate, in which case the basis for such determination shall be provided to the applicant in writing. Any excess funds remaining in the escrow account after the application has been fully processed, reviewed, and the final COMMUNITY approval and acceptance of the earth change has occurred will be refunded to the applicant with no interest to be paid on those funds. Additional amounts may be required to be placed in the escrow account by the applicant, at the discretion of the COMMUNITY.
4. Construction observation fees shall be equal to two percent (2%) of the cost estimate, which shall be submitted prior to the start of construction and approved by the COMMUNITY as noted above. Any excess funds remaining in the escrow account after the application has been fully processed, reviewed, and the final COMMUNITY approval and acceptance of the earth change has occurred will be refunded to the applicant with no interest to be paid on those funds. Additional

amounts may be required to be placed in the escrow account by the applicant, at the discretion of the COMMUNITY.

B. Performance Guarantees

1. The COMMUNITY shall not approve a storm water management plan until the applicant submits to the COMMUNITY, in a form and amount satisfactory to the COMMUNITY, an irrevocable letter of credit or other similar financial guarantee for the timely and satisfactory construction of all storm water facilities in accordance with the approved storm water management plan. Performance bonds are not acceptable. The amount of the financial guarantee shall be equal to the estimated cost of constructing the improvements, approved by the COMMUNITY as noted above.
2. Upon designation by the COMMUNITY engineer that the storm water facilities appear to have been completed in general accordance with the approved storm water management plan, the COMMUNITY may release the irrevocable letter of credit, subject to final COMMUNITY acceptance and approval. The COMMUNITY shall retain not less than ten percent (10%) of the original face value of the irrevocable letter of credit for a period of one year and one day after the COMMUNITY engineer's designation noted above. The purpose of this retainage is to guarantee that the storm water facilities perform as designed.
3. This chapter shall not be construed or interpreted as relieving an applicant of its obligation to pay all costs associated with onsite private storm water facilities as well as those costs arising from the need to make other



drainage improvements in order to reduce an earth change's impact to property owners and watercourses.

Section 14. PROHIBITION OF ILLEGAL DISCHARGES.

- A. No person shall discharge or cause to be discharged into the storm drain system or watercourses any materials, including but not limited to pollutants or waters containing any pollutants that cause or contribute to a violation of applicable water quality standards, other than storm water. The commencement, conduct or continuance of any illegal discharge to the storm drain system is prohibited, except as described below.
1. The following discharges are permitted: water line flushing or other potable water sources, landscape irrigation or lawn watering, diverted stream flows, rising ground water, ground water infiltration to storm drains, uncontaminated pumped ground water, foundation or footing drains (not including active groundwater dewatering systems), crawl space pumps, air conditioning condensation, springs, non-commercial washing of vehicles, natural riparian habitat or wet-land flows, swimming pools (if dechlorinated - typically less than one (1) PPM chlorine), fire fighting activities, and any other water source not containing pollutants.
 2. Non-storm water discharge may be permitted under an NPDES permit, waiver, or waste discharge order issued to the discharger and administered under the authority of the Federal Environmental Protection Agency, provided that the discharger is in full compliance with all requirements of the permit, waiver, or order and other applicable laws and regulations, and provided that written approval has been granted for any discharge to the storm drain system.

- B. Notwithstanding other requirements of law, as soon as any person responsible for a facility or operation, or responsible for emergency response for a facility or operation has information of any known or suspected release of materials which are resulting or may result in illegal discharges or pollutants discharging into storm water, the storm drain system, or water of the U.S. said person shall take all necessary steps to ensure the discovery, containment, and cleanup of such release. In the event of such a release of hazardous materials said person shall immediately notify emergency response agencies of the occurrence via emergency dispatch services. In the event of a release of non-hazardous materials, said person shall notify the COMMUNITY no later than the next business day. If the discharge of prohibited materials emanates from a commercial or industrial establishment, the owner or operator of such establishment shall also retain an on-site written record of the discharge and the actions taken to prevent its recurrence. Such records shall be retained for at least three (3) years.

Section 15. VARIANCES AND APPEALS

- A. The COMMUNITY Council/Board shall have the authority to interpret this chapter and may grant waivers to these requirements provided such waiver is not contrary with achieving the general purpose and intent of the requirements. When waivers are requested from the chapter, the applicant shall show that storm water management systems have been provided to the maximum extent feasible with the requirements of this chapter. Waivers shall not be granted to permit pollutants to be discharged into a storm drain or watercourse.
- B. An applicant who is aggrieved by a decision of the COMMUNITY in enforcing the provisions of this Ordinance may appeal such decision to the COMMUNITY Council/Board.



- C. All appeals must be filed, in writing, within seven (7) days following the decision.
- D. Adjacent property owners within three hundred (300) feet of the subject site shall be notified of the appeal and the date, time and place at which the appeal will be considered.

Section 16. VIOLATIONS

A person who violates any provision of this chapter is responsible for a municipal civil infraction, subject to payment of a civil fine. If a person has violated or continues to violate the provisions of this ordinance, the COMMUNITY may petition for a preliminary or permanent injunction restraining the person from activities which would create further violations or compelling the person to perform abatement or remediation of the violation.

Section 17. STOP WORK ORDER

- A. **Stop Work Order:** Where there is work in progress that causes a violation of any provision of this chapter, the COMMUNITY is authorized to issue a stop work order to prevent further or continuing violations. All persons to whom the stop work order is directed, or who are involved in any way with the work or matter described in the stop work order shall fully and promptly comply with the order. The COMMUNITY may also undertake or cause to be undertaken any necessary measures to prevent violations of this chapter or to avoid or reduce the effects of noncompliance. The cost of any such protective measures shall be the responsibility of the owner of the property upon which the work is being done and the responsibility of any person carrying out or participating in the work, and such cost shall be a lien upon the property until paid.
- B. **Emergency Measures:** When emergency measures are necessary to moderate a nuisance, to protect public safety, health

and welfare, or to prevent loss of life, injury or damage to property, the COMMUNITY is authorized to carry out or arrange for all such emergency measures. Property owners shall be responsible for the cost of such measures made necessary as a result of a violation of this chapter, and shall promptly reimburse the COMMUNITY for all of such costs. Such costs shall be a lien upon the property until paid.

Section 18. RESTORATION

Any violator of this chapter may be required to restore land to its undisturbed condition and repair and stabilize damaged areas. In the event that restoration or repairs are not undertaken within a reasonable time after notice, the COMMUNITY may take necessary corrective action, the cost of which shall become a lien upon the property until paid.

Section 19. MAINTENANCE

- A. **Responsibility:** Maintenance of storm water facilities shall be the responsibility of the person or persons holding title to the property. These persons are responsible for the continual operation, maintenance, and repair of storm water facilities and BMPs in accordance with the provisions of this chapter. A maintenance agreement shall be recorded with the County Register of Deeds and, in the case of a condominium, be included in the master deed.

For privately maintained storm water facilities, the maintenance requirements specified in this chapter shall be enforced by the COMMUNITY against the owner(s) of the property served by the storm water facilities.

- B. **Maintenance Plan:** A maintenance plan, as specified in section 7, shall include specific maintenance activities for each storm water facility and any other elements of the approved storm water management plan. The maintenance plan shall be



submitted simultaneously for municipal review with all other required elements of the storm water management plan.

The person(s) or organization(s) responsible for maintenance shall be designated in the plan. Options include:

1. Property owner's association provided that provisions for financing necessary maintenance are included in deed restrictions or other contractual agreements.
2. Means of permanent maintenance through agreement with the St. Clair County Drain Commissioner, or other appropriate governmental agency.

- C. **Record Keeping:** Parties responsible for the operation and maintenance of storm water facilities shall make records of the installation and of all maintenance and repairs, and shall retain the records for at least five (5) years. These records shall be made available to the COMMUNITY during inspection of the facility and at other reasonable times upon request.

Section 20. ACCESS

When any new storm water facilities are installed on private property, or when any new connection is made between private property and a public drainage control system, the property owner shall grant to the COMMUNITY through an easement the right to enter the property at reasonable times and in a reasonable manner for the purpose of inspection. This access includes the right to enter a property when the COMMUNITY has reason to believe that a violation of this chapter is occurring or has occurred, and to enter when necessary for the abatement of a public nuisance or correction of a violation of this chapter.

Section 21. EASEMENTS

The owner shall provide all easements necessary to implement the approved storm water management plan and maintenance plan and to

otherwise comply with this chapter in form and substance required by the COMMUNITY and St. Clair County Drain Commissioner, and shall record such easements as directed by the COMMUNITY. The easements shall assure access for proper inspection and maintenance of storm water facilities in perpetuity and shall provide adequate emergency overland flow-ways. The maintenance plan shall, among other matters, assure access for proper inspection and maintenance of storm water facilities and adequate emergency overland flow-ways.

Easement widths will be determined by the COMMUNITY and be situated in such a way as to allow maximum maintenance access. In general, easement widths shall conform to the following:

- A. **Open Channels And Watercourses:** A minimum of fifty (50) feet total width. Additional width may be required in some cases, including but not limited to: watercourses with floodplains delineated by FEMA; steep slopes and at access points from road crossings.
- B. **Open Swales (Cross Lot Drainage):** A minimum of thirty (30) feet total width.
- C. **Enclosed Storm Drains:** A minimum of twenty (20) feet will be required, situated in such a way as to allow maximum maintenance access. Additional width will be required in some cases including but not limited to, pipe depths exceeding four (4) feet from the top of pipe, sandy soils, and steep slopes.



PRIVATE COMMUNITY WASTEWATER SYSTEMS

Section 1. PURPOSE

Pursuant to Act No. 451 of the Public Acts of 1994, as amended, the Michigan Department of Environmental Quality (MDEQ) is authorized to issue permits for private community on-site wastewater disposal systems that serve more than one (1) property (referred to as a "private community wastewater system" or "PCWS"). While the [Community] recognizes that a private community wastewater system may be preferred over individual septic systems in some limited circumstances, the [Community] requires assurance that, should an Act 451 permit be issued, the [Community] shall be indemnified from any costs or liability in connection with the design, construction, operation, maintenance, repair and/or replacement of that PCWS. The [Community] also recognizes that should the services of a PCWS fail or improperly function, an adequate replacement reserve for the PCWS is essential. For these purposes, this section is intended to regulate PCWS within the [Community].

Section 2. DEFINITION

A Private Community Wastewater System (PCWS) shall mean a facility for the transportation, collection, processing or treatment of sanitary sewage, which is owned by a non-governmental entity and which is proposed to service more than one structure. The PCWS shall include any individual septic tanks, pumps, lines and appurtenances serving each residence, in addition to the community drainfield and treatment system.

Section 3. APPLICABILITY

A. Prior to the construction or expansion of a PCWS, the plans for the system design and installation shall be approved by the [Community] Legislative Body, St. Clair County Health Department, the Michigan Department of Public Health, the

MDEQ, the Michigan Public Service Commission and any other governmental authority having jurisdiction.

B. A PCWS may only be permitted with approval from the [Community] Legislative Body, subject to all of the requirements of this Ordinance. The [Community] Legislative Body shall not consider an application for a PCWS until all necessary approval have been obtained for the PCWS from the St. Clair County Health Department, the Michigan Department of Public Health, the MDEQ and any other governmental authority having jurisdiction.

Section 4. DESIGN STANDARDS

Any PCWS shall comply with the terms of this Ordinance and applicable requirements of [Community] engineering standards, the Michigan Department of Environmental Quality, the Michigan Department of Public Health, the St. Clair County Health Department, the Michigan Public Service Commission, the Michigan Occupational Safety and Health Administration, and any other applicable laws and regulations of the federal government, State of Michigan, St. Clair County, and the [Community].

Section 5. APPLICATION

The applicant shall provide the following to the [Community] before approval of a PCWS may be granted:

- A. PCWS construction plans for review and approval by the [Community] engineer.
- B. A valid permit for installation of a PCWS issued by the applicable regulatory agency.
- C. A certification from the PCWS design engineer indicating that the PCWS as designed and constructed will adequately process



sanitary sewage and waste as required by applicable laws and regulations of the federal government, State of Michigan, St. Clair County and the [Community]. The [Community] engineer shall review and make a recommendation regarding the adequacy of such certification. The [Community] engineer's review shall include review of plans and documents for compliance with [Community] ordinances, engineering standards, general engineering practices and best management practices.

- D. A draft PCWS maintenance agreement for review and approval by the [Community] attorney.

Section 6. MAINTENANCE AGREEMENT

- A. A PCWS maintenance agreement among the applicant, owner, the homeowners association and the [Community] shall be approved and recorded in a form acceptable to the [Community] specifying:
1. The party or parties responsible for inspection, monitoring, repairing, replacing, operating and maintaining the PCWS.
 2. Standards for inspection, monitoring, operation, maintenance, repair and replacement of the PCWS in accordance with guidelines recommended by the design engineer, PCWS equipment manufacturer, the certified operator, the MDEQ, and the [Community] engineer. Standards shall include periodic reports to the [Community] and the right of the [Community] to inspect and compel remediation if these standards are not met.
 3. Indemnification of the [Community] by the applicant, owners and association, jointly and severally, from any

and all loss, liability, costs and expense incurred by the [Community] with respect to inspection, monitoring, operation, maintenance, repair and replacement of the PCWS.

4. A statement that the applicant, owner and association shall maintain a policy of casualty insurance for the replacement value of the insurable components of the PCWS and a policy of comprehensive general liability insurance with limits acceptable to the [Community], naming the [Community] as an additional insured. The [Community] shall be provided with certificates of insurance on an annual basis.
 5. A statement that the [Community] shall have the option in its sole discretion to require that PCWS be abandoned and all properties in the development be connected to any public sanitary sewer system or publicly-owned community sewer system that may be constructed in the future and accessible to the development at the expense of the owners. If a PCWS is required to be abandoned, the costs of environmental remediation are to be borne by the owner or homeowners association.
- B. The PCWS maintenance agreement and the development documents shall be recorded at the office of the St. Clair County Register of Deeds after approval by the [Community]. The development documents, as they pertain to the PCWS, shall not be changed without [Community] approval and shall contain language to that effect.

Section 7. SPECIAL ASSESSMENT DISTRICT

Prior to recording the PCWS maintenance agreement and sale of any unit, lot or parcel served by a PCWS, applicant and owner shall establish a special assessment district for the development, the purpose of which



shall be to provide for assessment of the units, lots or parcels in each development by the [Community] for the costs of inspection, monitoring, maintenance, repair, operation or replacement of the PCWS in the event the association shall fail to properly perform such work. The [Community] may elect to collect all costs it may incur in connection with the PCWS through the special assessment.

Section 8. DISCLOSURE DOCUMENT

The provisions of the PCWS maintenance agreement described above and other obligations of the association set forth in this section shall be included in a separate disclosure document and the development documents in the form approved by the [Community] attorney and shall be delivered to the prospective purchaser of a unit, lot or parcel served by a PCWS prior to the execution of a purchase agreement.

Section 9. COMMON AREA

Each PCWS shall be included in the general common elements of a condominium or a commonly owned “park” of a subdivision in which it is located, and included in the common areas of any other development.

Section 10. BUFFERING

- A. Adequate buffering, as determined by the [Community] Legislative Body based upon the recommendation of the Planning Commission, shall be provided from residential uses and adjacent properties to minimize process machinery noise level, minimize light intrusion, maximize odor dispersal and to ensure adequate isolation distances so that drinking water wells are not adversely affected by the PCWS.
- B. The PCWS shall provide a minimum 500 foot buffer from any off-site dwelling and 100 feet from any on-site dwelling, or such distance as required by the appropriate regulatory agency. The

PCWS shall provide a minimum 100 foot buffer from any surface water, wetlands, or floodplain.

Section 11. EASEMENT TO [COMMUNITY]

A permanent and irrevocable easement shall be granted by the applicant, owner and association to the [Community] and its employees, agents, and assigns authorizing the [Community] to enter on the development upon which the PCWS is located for the purpose of inspections.

Section 12. INSPECTION DURING CONSTRUCTION

The PCWS shall be inspected during construction by the [Community] engineer at the applicant's expense to ensure proper system construction and installation, and after construction to certify annually system capacity and function.

Section 13. AS-BUILTS

A complete copy of the as-built prints, including electric, water, chemical, and physical systems, drain fields and final topography, shall be provided to the [Community] upon completion of the PCWS, and before it is approved for operation. As-builts shall be provided in both print form and digital files in either CAD or shape file format, along with survey control points.

Section 14. INSPECTION AND MONITORING

- A. The PCWS shall be inspected, monitored, operated, maintained, repaired and replaced by the association with the right of the association to assess owners for all such costs. Each Association shall hire a certified operator approved by the MDEQ, the St. Clair County Health Department, the [Community] and other applicable governmental authorities to perform such inspection, monitoring, operation, maintenance, repair and replacement at the expense of the association, and the association shall provide



the [Community] annually with copies of the signed agreements with the certified operators.

- B. Each association shall maintain a financial reserve sufficient for five (5) years of monitoring, inspection, operation, maintenance and repair of the PCWS and an adequate replacement reserve in the amounts certified by a design engineer or the certified operator and required by applicable governmental authorities and shall be subject to [Community] review and approval.

Section 15. RESPONSIBILITY OF COSTS

- A. The operator, the applicant, the association and the individual owners and users of the PCWS shall be responsible for all costs associated with the installation, operation, monitoring, inspection, maintenance, repair, replacement of the PCWS and all liability associated with the PCWS.
- B. The [Community] shall not be responsible for or obligated to perform any needed or desired repairs, maintenance, improvement, and/or replacement of the PCWS or any portion thereof.



TRANSFER OF DEVELOPMENT RIGHTS

Section 1. Intent and Scope

- A. Transfer of development rights is intended as one method of implementing the [Community] Master Plan, permitting the transfer of development rights from a location that is intended to be preserved for agriculture or open space to another location where the associated development can be more appropriately accommodated by the natural environment, surrounding land uses and infrastructure.

- B. The purpose of this Article is to achieve economy and efficiency in the use of land, energy, and the provision of public services and utilities; to encourage useful open space and the conservation of natural resources, and to support adequate infrastructure, consistent with the provisions of the Zoning Enabling Act and the Township/Municipal Planning Act, and, particularly, to advance the goals set in the [Community] Master Plan related to the preservation of valuable agricultural land and the promotion of efficient use of land and public resources in designated areas where further residential development is feasible and desirable. In order to accomplish these objectives, this Section:
 - 1. Designates *Agricultural Preserve Sending Areas* as a zone overlaying the lands designated as Rural Reserve in the [Community] Master Plan. At the same time that the development rights are transferred from sending area, a development limitation is placed on the sending area to control the nature and extent of its subsequent use and development.

 - 2. Designates *Development Receiving Areas* as a zone overlaying lands designated as Urban Services Area in the [Community] Master Plan and meeting certain

conditions of this Article. The receiving area shall only be developed as an open space cluster development meeting the requirements of this Ordinance.

- C. Development rights may be transferred through approval of both the Agricultural Preserve Sending Area and Development Receiving Area as a TDR/PUD through the use of Planned Unit Development legislation, as authorized by Section 16c of the Zoning Enabling Act subject to the requirements of this Article.

Section 2. Definitions

- A. **Agricultural Conservation Easement:** A grant, by an instrument, by which the owner relinquishes in perpetuity the right to use and subdivide the land for any residential or other development which is not incidental to agriculture and open space. It contains a covenant running with the land which defines the limitation on the development on a Sending Area site, including the number of Development Rights severed from the site upon the sale of Development Rights.

- E. **Agricultural Preserve Sending Area:** A parcel or parcels eligible for selling Development Rights and to transfer them in the form of Development Credits to a Development Receiving Area site.

- C. **Development Credit:** A measure of the amount of the residential development allowed on a Receiving Area site which comes in addition to the number of development units otherwise permitted in the Development Receiving Area as a result of purchasing Development Rights from a Sending Area. One (1) Development Credit equals one (1) dwelling unit.

- D. **Development Receiving Area:** A parcel or parcels eligible for utilizing the Development Rights, purchased from an eligible Sending Area site, to use them as Development Credits in order



to increase the density permitted under the provisions of the zoning district in which the site is located.

- E. **Development Right, or Transferrable Development Right:** An interest in and the right to use and subdivide land for any residential or other purposes and activities which are not incidental to agriculture and open space.
- F. **Transferor:** A landowner of an approved site within a Sending Area, who sells Development Rights which are to be transferred as Development Credits to an eligible site within the Development Receiving Area.
- G. **Transferee:** A person or entity who purchases Development Rights from a Transferor as to use them as Development Credits in the development of a site within a Development Receiving Area.

Section 3. Agricultural Preserve Sending Areas

Development rights may be transferred from an Agricultural Preserve Sending Area to a Development Receiving Area, subject to all of the following provisions:

- A. **Qualifying Conditions.**
 - 1. Eligible parcels must be located within a Sending Area as depicted as Agricultural in the [Community] Master Plan.
 - 2. The combined acreage of all parcels must be at least forty (40) acres in area, unless the parcel is adjacent to another approved Sending Area site so that the total land area that is to be committed for agricultural preservation is at least forty (40) acres.

- 3. A Sending Area parcels may not include any lots within an approved subdivision lots in existence as of the date of the adoption of this Section.
- 4. The developed acreage of a Sending Area site shall not be included in the calculations of Development Credit.
- 5. The transferor of the Sending Area site must own or have an interest either through a purchase agreement or other similar legal instrument, in the property included in the site.

- B. **Development Credit.** The amount of development credit that can be transferred from the Agricultural Preserve Sending Area shall be number of dwelling units normally permitted.
- C. **Agricultural Conservation Easement.** Prior to the transfer of development rights, the property owner shall grant an agricultural conservation easement to [Community] or other conservation organization found acceptable to the [Community]. Such easement shall limit use of the transferring property to agricultural, conservation or recreation, use only, excluding golf courses, and shall prohibit all other uses of the land in perpetuity. The easement may provide, however, upon [Community] Legislative Body approval, for existing uses to continue and for limited development of new uses based upon any residual development rights remaining after the development rights have been transferred. Upon the establishment of conservation easements pursuant to this section, the [Community] shall not authorize their release. The conservation easement shall assure that the land will be protected from all forms of development, except as specified in the easement and permitted by this Article, and shall never be changed to another use.
- D. **Obligation of Landowner to Convey Development Rights.** The sale and conveyance of Development Rights occurs solely



on a voluntary basis. Landowners of eligible Sending Areas may not be compelled to sell and convey their transferable Development Rights. Unconveyed Development Rights may be transferred with land sold, donated or bequeathed. Owners of eligible Sending Area sites who choose not to convey their Development Rights may develop their land as permitted by the Zoning District in which the site is located.

E. **Value of Development Rights.** The monetary value of Development Rights is solely determined between Transferor and Transferee.

Section 4. Development Receiving Areas

Development rights may be transferred to a Development Receiving Area, subject to all of the following provisions:

A. **Qualifying Conditions.**

1. Eligible parcels must be located within a Sending Area as depicted as Urban Services Area in the [Community] Master Plan.
2. Parcels must be not less than ten (10) acres total area.
3. Development Receiving Areas must be served by adequate facilities and services such as public water and sewer.
4. The proposed densities of the Receiving Area site must be consistent with the [Community] Master Plan and existing uses and densities of surrounding properties.
5. The Receiving Area site must be owned by the Transferee.

B. **Development.** The Development Receiving Area may only be developed as a PUD under this Chapter at a density which combines that permitted by the underlying zoning, as determined by Section ___ and that allowed by any development credit transferable to the land in the Development Receiving Area.

C. **Density Limit.** It is not intended that by designating land in a Development Receiving Area that rezoning to higher density is appropriate for the land generally or its surrounding area. The residential density of permitted uses shall not exceed one hundred and fifty percent (150%) of the maximum residential density that would otherwise be permitted by Section ____, without the transferred development rights.

D. **Permitted Uses.** Any use permitted by right or special land use approval in the underlying zoning district shall be permitted in the Receiving Area site, subject to compliance with the applicable regulations of this Ordinance.

Section 5. TDR/PUD Application

The TDR/PUD consists of two (2) parts a Sending Area site part and a Receiving Area site part. The owner of the Sending Area site part, that is the Transferor, and the owner of the Receiving Area site part, that is the Transferee, shall submit a joint application and a preliminary development plan, covering both parts of the TDR/PUD. The application shall be submitted to the [Community] who shall schedule a date and time for public hearing and Planning Commission review. Such application shall include the following:

A. A completed TDR/PUD application form, which includes a request for granting Development Rights to the Sending Area site and a request for transferring these rights as Development Credits to the Receiving Area site. The application shall be provided by the [Community].



- B. Payment of a fee, as established by the [Community] Legislative Body.
- C. A narrative statement of how the proposed TDR/PUD meets the goals of the [Community] Master Plan and the purposes of this Ordinance.
- D. Documents and narrative statements regarding the Sending Area site:
1. A metes and bounds description of the property from which Development Rights are to be transferred; a plot plan or survey showing total acreage of the property; easements in favor of governmental agencies, utilities, and non-profit organizations; land already restricted from development, easement or deed; location of existing dwellings on the property; and two (2) acres of the curtilage around existing dwelling(s).
 2. Evidence as to how the Sending Area site part of the TDR/PUD meets the qualifying conditions as described in Section 3A.
 3. A parallel plan indicating the number of dwelling units normally permitted if the property was to be developed under existing zoning requirements. The parallel plan shall exclude areas subject to easements, restrictions and existing dwellings, which shall be indicated on lots meeting the minimum lot area requirements of the underlying zoning district.
 4. If a transfer of Development Rights involves less than the entire number of development credits that may be attributed to a Sending Area site, the portion of the parcel from which the development rights are transferred shall be clearly identified on a plan showing the whole parcel. Such plan shall also include a notation of the number of Development Rights that are to be transferred and the number of Development Rights which will remain available with the Sending Area site after the proposed transfer.
5. A copy of a proposed Deed of Transferable Development Rights and a copy of the proposed Agricultural Conservation Easement to be placed on the Sending Area site upon approval of the TDR/PUD. The Agricultural Conservation easement shall comply with the following conditions:
- a. Transferor shall perpetually restrict the use of the parcel or portion thereof, from which Development Rights are conveyed by an Agricultural Conservation Easement.
 - b. The Agricultural Conservation Easement shall restrict the future land use of the property to agricultural uses, any accessory agricultural uses and open space uses.
 - c. The Agricultural Conservation Easement shall designate the [Community] as a third party beneficiary of the restrictions imposed upon the Transferor and his/her property. Such restrictions shall be made enforceable by the [Community] as such third party beneficiary.
 - d. Land from which Development Rights are severed and conveyed shall continue to be owned, subject to said restrictions, by the Transferor, his/her heirs, executors, administrators, successors and assigns.



- E. Documents and statements regarding the Receiving Area site
1. Evidence as to how the Receiving Area site part of the TDR/PUD meets the qualifying conditions as described in Section 3B.
 2. A narrative describing anticipated impact of development on surrounding properties and neighborhood and proposed methods of mitigating any negative impacts, if such are expected.
 3. An open space cluster development preliminary site plan. In addition the requirements of Section ____, the preliminary plan must indicate:
 - a. That Development Credits are to be used as to increase density permitted by the regulations applicable to the underlying zone.
 - b. A parallel plan indicating the number of dwelling units normally permitted by the underlying zoning.
 - c. The number of Development Credits that the Transferee requests to use in the development and the total number of dwellings proposed to be built.
 4. A title search of previously severed Development Rights, if the Transferee proposes to use such rights previously severed from the Sending Area site.
 5. An agreement for the transfer of Development Rights between Transferor and Transferee.

Section 6. [Community] Determination of Development Rights and Credits

- A. Upon receiving a complete application package, as required above, the [Community] shall determine the number of transferable Development Rights attributed to the Sending Area site and the number of Development Credits to be used in the Receiving Area site. The [Community] shall also determine with the advice of the [Community]'s Attorney or Engineer, the sufficiency of:
1. The plan indicating the portion of the Sending Area site parcel to be restricted from future development if the Development Rights from less than the entire parcel are transferred.
 2. The Deed for Transferable Development Rights.
 3. The Agricultural Conservation Easement.
- B. The [Community] shall inform the Transferor and the Transferee of their findings written form within sixty (60) day of receipt of the TDR/PUD application. Findings shall include the number of dwelling units that Transferee may construct on Receiving Area site after applying Development Credits to the base density of the underlying zoning district.
- C. Any appeals of the determinations of the [Community] shall be made in accordance with the provisions of Chapter 16, Zoning Board of Appeals.
- D. Upon final determination by the [Community] or the Zoning Board Appeals, the [Community] shall cause notice to be given in accordance with the provisions of the Zoning Enabling Act.

Section 7. Notice and Public Hearing for TDR/PUD



Notification of the public hearing shall be as that required in Section ____.

Section 8. Planning Commission Recommendation and Legislative Body Action

The application shall be reviewed following the procedures for preliminary and final approval under Section ____. In addition, the [Community] Legislative Body shall endorse the Deed for Transferable Development Rights and the Agricultural Conservation Easement with the preliminary site plan. Upon approval of the final TDR/PUD application, the Agricultural Conservation Easement and the Deed for Transfer of Development Rights shall be duly signed by all relevant parties and recorded with the Recorder of Deeds.

Section 9. Standards for Approval

A TDR/PUD shall be approved only if it complies with each of the following standards:

- A. The proposed TDR/PUD complies with all qualifying conditions noted above.
- B. The uses and densities to be conducted within the proposed TDR/PUD are consistent with the [Community] Master Plan.
- C. The proposed Receiving Area site part of the TDR/PUD is compatible with surrounding uses of land, the natural environment, and the capacities of public services and facilities affected by the development. The proposed Receiving Area site part of the TDR/PUD will not negatively affect surrounding uses of land and/or the natural environment. If any negative impacts related are anticipated, appropriate mitigating measures shall be proposed and taken.

- D. The proposed Receiving Area site part of the TDR/PUD will not contain uses or conditions of use that would be injurious to the public health, safety, or welfare of the community.
- E. The proposed project is consistent with the spirit and intent of the TDR/PUD District.
- F. The Planning Commission may require evidence that groundwater sources at the Receiving Area site will be protected and that environmental, traffic, or other concerns are met. Approval of the County Health Department, County Road Commission, or other agencies, while required to develop the site, shall not be the sole determining factor in this regard.
- G. The Planning Commission may require any additional information it deems necessary to ensure compliance with the review standards and other requirements of this Ordinance, including additional soil borings, soil reports, hydrological tests, traffic studies, or other such evidence which shall be submitted by the applicant prior to approval.

Section 10. TDR/PUD Agreement

Prior to issuance of any building permits or commencement of construction on any portion of the TDR/PUD, the Transferee shall enter into an Agreement with the [Community] in recordable form, setting forth his/her obligations with respect to the TDR/PUD. The Agreement shall meet all requirements of this Ordinance, and shall incorporate, by reference, the final development plan with all required revisions, and all conditions attached to the approval by the [Community] Legislative Body. The Agreement shall also establish the remedies of the [Community] in the event of default by the Transferee in carrying out the TDR/PUD, and shall be binding on all successors in interest to the Transferee. All documents shall be executed and recorded in the office of the Register of Deeds.



NATURAL FEATURES SETBACK

A minimum twenty five (25) foot natural feature setback shall be maintained in relation to the ordinary high water mark of any pond, river or channel, and to the edge of any drainageway or wetland. Only waterfront structures and appurtenances may be located within the natural feature setback. This setback may be reduced by the Planning Commission upon a determination that it is clearly in the public interest. In determining whether the setback reduction is in the public interest, the benefit which would reasonably be expected to accrue from the proposed development shall be balanced against the reasonably foreseeable detriments to the natural feature. The following general criteria shall be applied in undertaking this balancing test:

- A. The relative extent of the public and private need for the proposed activity.
- B. The availability of feasible and prudent alternative locations and methods to accomplish the expected benefits from the activity, including alternatives which are off-site or on other commercially available properties.
- C. The extent and permanence of the beneficial or detrimental effects which the proposed activity may have on the public and private use to which the area is suited, including the benefits the wetland provides.
- D. The probable impact of the proposal in relation to the cumulative effect created by other existing and anticipated activities in the watershed.
- E. The probable impact on recognized historic, cultural, scenic, ecological, or recreational values and on the public health or fish or wildlife.
- F. The size and quality of the wetland.
- G. Proximity to any waterway.
- H. Extent to which upland soil erosion adjacent to protected wetlands or drainageways is controlled.
- I. Economic value, both public and private, of the proposed land change to the general area.
- J. Findings of necessity for the proposed project which have been made by other state or local agencies.



SHORELINE PROTECTION OVERLAY ZONE

SECTION 1. INTENT

Those remaining natural areas along the [River] play a critical role in habitat for fish and wildlife, maintaining the water quality, and maintaining the aesthetic quality of the [River]. Because these natural areas are limited and adjacent development has the potential to adversely impact these areas, natural buffers must be maintained along these natural shoreline areas. Protecting natural buffers adjacent to the shoreline of the [River] provide numerous benefits including:

- A. Protecting, restoring and maintaining the chemical, physical and biological integrity of streams and their water resources;
- B. Removing pollutants delivered in stormwater runoff;
- C. Reducing erosion and controlling sedimentation;
- D. Protecting and stabilizing stream banks;
- E. Providing for infiltration of stormwater runoff;
- F. Contributing organic matter that is a source of food and energy for the aquatic ecosystem;
- G. Providing tree canopy to shade emergent shoreline and promote desirable aquatic habitat;
- H. Providing riparian wildlife habitat;
- I. Furnishing scenic value and recreational opportunity; and,
- J. Providing opportunities for the protection and restoration of green space.

SECTION 2. APPLICABILITY

This ordinance shall apply to all land development activity, including the subdividing of land, creation of a condominium, erection of structures, grading or clearing of vegetation on property that has a shoreline on the [River]. This ordinance shall not apply to the following lots, uses or activities:

- A. Work consisting of the repair or maintenance of any lawful use of land that is zoned and approved for such use on or before the effective date of this ordinance.
- B. Existing development, uses and on-going land disturbance activities including but not limited to existing waterfront residential uses, permitted waterfront accessory structures, landscaping, gardening and lawn maintenance, that was in existence on or before the effective date of this ordinance, including any maintenance, improvement or expansion of such uses.
- C. Any land development activity that is under construction, or has received a building, or grading permit from the [community] or an approved permit from the US Army Corps of Engineers or the Michigan Department of Environmental Quality as of the effective date of this ordinance.
- D. Any platted lot, developed or vacant, that has an existing seawall or riprap along at least seventy five percent (75%) of the lot's shoreline.
- E. Construction or maintenance of public bridges or utility structures.
- F. Activities to restore and enhance stream bank stability, vegetation, water quality and/or aquatic habitat, so long as native vegetation and bioengineering techniques are used.



SECTION 3. BUFFER DELINEATION

A shoreline buffer shall be required along the shoreline comprised of the following three (3) separate Buffer Zones for land subject to this ordinance under section 2 above. Any application for site plan, condominium or subdivision plat submitted for development along the regulated shoreline shall indicate the following zones.

- A. **Buffer Zone 1:** The landward area located between the shoreline’s ordinary high water mark and the largest combined width of all of the following:
 - 1. Twenty-five (25) feet, as measured directly perpendicular from the shoreline; and,
 - 2. Any adjoining regulated wetlands.

- B. **Buffer Zone 2:** The area beginning at the inland edge of the above-described Buffer Zone 1 and extending the largest combined width of all of the following:
 - 1. Fifty (50) feet, as measured directly perpendicular from the inland edge of the above-described Buffer Zone 1;
 - 2. Any land area located within the 100-year floodplain; and,
 - 3. Where there is any land within Buffer Zone 2 that exceeds slopes exceeding eighteen percent (18%), to the top any bluff being defined as the point at which the slope drops below eighteen percent (18%) for a distance of at least twenty (20) feet.

- C. **Buffer Zone 3:** The area beginning at the inland edge of the above-described Buffer Zone 2 and extending at least twenty-five (25) feet inland therefrom.

SECTION 4. BUFFER USE AND MAINTENANCE

Shoreline buffers must be generally undisturbed, except as provided for in this section. Buildings are not permitted in the buffer zones. The following lists permitted uses and requirements for preserving existing vegetation within each buffer zone must be complied with for any shoreline subject to the regulations of this Ordinance:

	Preservation of existing vegetation	Permitted structures and improvements
Buffer Zone 1	Existing natural vegetation shall remain as far as practical and when disturbance is necessary, it shall be replaced with native vegetation. Selective removal of up to 25% of the vegetation for access and views to water shall be permitted.	Man-made activities shall be limited to permitted waterfront structures and perpendicular walkways from Zone 2 to the shoreline. An access pathway or boardwalk up to 10-foot wide shall be allowed to access the shoreline. Waterfront structures such as docks are permitted as provided for in the Zoning Ordinance. Grading is not permitted.
Buffer Zone 2	Existing natural vegetation shall remain as far as practical. Landscaping improvements may be allowed to enhance the area, provided it is landscaping native to Michigan, including trees, shrubs, natural ground cover, but not including manicured grass lawns, provided native wild grass is permitted. Selective removal of up to 50% of the vegetation for access and views to water shall be permitted.	Unpaved pedestrian pathways are permitted. Grading is not permitted.



Buffer Zone 3	Ground must be covered with living plant material, which may include manicured lawns.	Decks are permitted. Grading is permitted, provided existing grade do not change by more than 2 feet. Architectural features are allowed to project in to Buffer Zone 3 in accordance with the Zoning Ordinance General Provisions.
----------------------	---	---

SECTION 5 ADDITIONAL INFORMATION REQUIREMENTS FOR DEVELOPMENT ON BUFFER ZONE PROPERTIES

Any site plan, condominium or subdivision plat application for property requiring a shoreline protection buffer zone must include the following information:

- A. The location of the shoreline;
- B. Limits of required shoreline protection buffer zones and setbacks on the property;
- C. Buffer zone topography with contour lines at no greater than two (2)-foot contour intervals;
- D. Delineation of forested and open areas in the buffer zone; and,
- E. Detailed plans of all proposed improvements within the buffer zones.

SECTION 14.6 APPEAL PROCEDURES

The shoreline buffer zone requirements of this Ordinance may be modified by the Planning Commission upon a determination that the need for the modification outweighs any adverse impact. The following general criteria shall be applied in undertaking this balancing test:

- A. Whether a property's shape, topography or other physical conditions prevents any reasonable use of the land unless a buffer modification is granted;
- B. Unusual circumstances where strict adherence to the minimal buffer requirements in the ordinance would create an extreme hardship;
- C. The location and extent of the proposed buffer or setback intrusion relative to the impact;
- D. Whether alternative designs are possible that would require less intrusion or no intrusion;
- E. The water-quality impacts, both long-term and as a result of construction;
- F. The impacts to the natural aesthetic quality of the waterfront; and
- G. Whether negative impacts of the modification can be mitigated.



WOODLANDS PROTECTION ORDINANCE

SECTION 1. PURPOSE

The [community] finds that rapid growth, the spread of development, and increasing impacts upon natural resources have had the effect of encroaching upon, despoiling, or eliminating many of the trees and other forms of vegetation and natural resources and processes associated therewith which if preserved, managed and maintained in a natural condition, constitutes important physical, aesthetic, recreational, and economic assets to existing and future residents of the [community].

This ordinance is intended to protect woodlands and significant individual indigenous trees, including trees and associated forms of vegetation, located on sites subject to development during the course of construction of improvements to benefit the development site and buildings on the site and the community through the following:

- A. Protection of woodlands as natural resources that contain elements of natural beauty, animal habitat and geological, hydrological, ecological and historical characteristics significant to the citizens of the [community].
- B. Protection, conservation, replacement, proper maintenance, management and use of woodlands in order to minimize disturbance and structural changes to the vegetative community, prevent damage from erosion, siltation, windthrow, disease, limit loss of animal habitat and vegetative cover, all of which, in the aggregate, result in the destruction of the woodland character.
- C. Protection of woodlands for their economic support of local property values, not only for residential areas and home sites, but also as settings for development in all zoning districts.
- D. Protection of the reproductive and regenerative capabilities of woodland areas; to maintain plant and tree diversity, to protect

groundwater recharge areas; to maintain visual screening, windbreak, dust collection and noise barrier characteristics exhibited by woodlands.

- E. Protection of woodlands (including trees and other forms of vegetation) for their significance as large specimens of their species and/or rare and endangered species.
- F. Protection of functional strips of vegetation (including fencerows, hedgerows, shrubby borders of streams and road rights-of-way) for their significance as travel lanes for animal-life, noise barrier, visual screens, aesthetically pleasing enclosures and vistas for pedestrian and vehicular traffic.
- G. Prohibiting the unregulated cutting of trees or harvesting of forest products within a woodland; to establishing a permit process which will regulate the manner and extent of tree cutting and harvesting of forest products from within these unique and valuable natural resources area; and to prescribing the review process for the issuance of tree cutting and harvesting permits.

SECTION 2. DEFINITION

Words and phrases used in this Ordinance shall have their usual and customary meaning, provided:

- A. **Canopy.** The outermost spreading vegetative layer of any woody plant(s) delineated by the drip-line.
- B. **Clearing.** The severing of woody plants (herein defined) above ground level leaving root system and stumps intact.
- C. **Commercial nursery or tree farm.** A licensed plant or tree nursery or farm in relation to those trees planted and growing on the premises of the licensee, which are planted and growing for



sale or intended sale to the general public in the ordinary course of said licensee's business.

- D. **Critical Root Zone.** The circular area surrounding a tree which is considered to contain tree roots within 18 inches of the ground surface. The radius of the critical root zone is, in feet, the same numerical value as the tree's diameter at breast height (DBH) in inches, and is measured outward from the center of the tree. For example, the critical root zone of a 12 inch DBH tree has a radius of 12 feet.
- E. **Diameter at Breast Height (DBH).** The diameter of a tree measured four (4) feet above the existing grade.
- F. **Drip Line.** An imaginary vertical line that extends downward from the outermost tips of the tree branches to the ground.
- G. **Grubbing.** The effective removal of understory vegetation from a site which does not include the removal of any tree with a DBH of greater than three (3) inches.
- H. **Historic/Landmark Tree.** A tree which, pursuant to this ordinance, has been designated by the [community] Planning Commission to be of notable historic interest to the [community] because of age, type, size, or historic association.
- I. **Land Clearing.** Those operations where trees and vegetation are removed and which occur previous to construction of building (e.g. road right of way excavation, utility excavation, grubbing, and any other necessary clearing operation).
- J. **Linkage Vegetation.** Strips of vegetation including fencerows, hedgerows, shrubby stream banks, road edge, railroad edge, and public rights-of-way that function as travel lanes for animal-life, pedestrian and vehicular traffic, as passive and recreational green belts, and as visual screens, noise buffers, and weather control vegetation.
- K. **No tree Affidavit.** A signed, notarized statement by owner or agent stating that no tree exists upon the site of eight inch DBH or greater, or no linkage vegetation of significant value.
- L. **Protective Barrier.** A physical structure limiting access to a protected area, composed of wood high contrasting fencing or other suitable materials, which assures compliance with the intent of this ordinance. Variations of these methods may be permitted upon written request if they satisfy the intent of this ordinance.
- M. **Remove and Removal.** The cutting of trees and the injury and/or destruction of any form of vegetation, by whatever method, on any lands subject to this ordinance.
- N. **Significant Individual Trees.** Deciduous hardwood or evergreen trees existing in a healthful condition with DBH in excess of eight (8) inches.
- O. **Specimen Tree.** Any tree of twenty four (24) inch DBH or greater, or that is of a type and DBH equal to or greater than shown on the Specimen Tree List, and that has a health and condition standard factor of over fifty percent (50%) based on the Standards established by the International Society of Arboriculture. These standards consider the soundness of the trunk, the growth rate, the structure of the tree, the presence of insects or disease, the crown development, and the life expectancy. The definition of a specimen tree does not include any tree identified as an invasive species on the [community]'s Invasive Species List.



- P. **Transplant.** The digging up by a property owner of a tree from one place on a property and the planting of the same tree in another place on the same property.
- Q. **Tree.** A woody plant with an erect perennial, which at maturity is thirteen (13) feet or more in height, which has a more or less definite crown of foliage.
- R. **Woodland.** A forested area of one-half (2) acre or more with a gross basal area (GBA) of thirty (30) square feet per one-half (2) acre, containing twenty (20) trees per one-half (2) acre greater than eight (8) inches in diameter at breast height (DBH), or a plantation of one-half (2) acre or more with a minimum average DBH of ten (10) inches. The critical root zone of all trees on the perimeter of the forested area or plantation defines the area of a woodland.
- S. **Woody Plants.** Trees two (2) inches or greater in diameter measured four (4) feet above the existing grade, shrubs two (2) inches or greater in diameter measured at the existing grade (ground level), or trees and shrubs ten (10) feet or greater in height.

SECTION 3. APPLICABILITY

- A. **Woodland Use Permit Required.** Except for those activities expressly permitted by subsection B. below, it is unlawful for any person to conduct any activity within a regulated woodlands area without first obtaining a woodland use permit upon proper application, including but not limited to the following:
 - 1. Remove, damage, or destroy any tree with a DBH of eight (8) inches or more;
 - 2. Remove, damage or destroy any tree or similar woody vegetation of any DBH in a woodlands area that is also

within a wetland or watercourse regulated by the wetlands protection act MCL 324.30301 et seq.;

- 3. Remove, damage, or destroy any historic or specimen tree;
 - 4. Remove, damage, or destroy any vegetation within a linkage strip designated by the Planning Commission;
 - 5. Land clearing or grubbing; and,
 - 6. The cutting of trees or harvesting of forest products within a woodland.
- B. **Activities Not Requiring a Permit.** Notwithstanding the prohibition of subsection A., the following activities are permitted within woodlands areas without a woodlands use permit:
 - 1. The removal of trees on a single family residential lot where a valid building permit has been issued for a single family residence and the trees are within fifteen (15) feet of the building footprint, driveway or other construction shown on the approved plan;
 - 2. The removal or trimming of dead, diseased, or damaged trees or other woody vegetation provided that the damage resulted from an accident or nonhuman cause and provided further that the removal is accomplished through the use of standard forestry practices and techniques;
 - 3. The regular trimming, pruning and maintenance of trees, or the trimming trees which might reasonably be expected to cause injury to persons or property or cause damage to an essential service utility if left unattended;



4. Farming, gardening, raising of small animals, harvesting of crops and nursery practices, where otherwise legally permitted, and where compatible with the individual woodland ecology, provided that a forest management use permit is obtained pursuant to section 7 for forestry activities within a woodlands area; and
 5. Actions which are made necessary by an emergency, such as tornado, windstorm, flood, freeze, dangerous and infectious insect infestation or disease, or other disaster, in order to prevent injury or damage to persons or property, and where deferring such action in order to obtain authorization under this section would jeopardize persons or property, such actions may be taken without authorization under this section to the limited degree necessary. A person taking such emergency action shall, within fourteen (14) days of such action, provide a report to the [community], describing the actions taken, the nature of the emergency necessitating the action, and the extent of the cutting or removal of, or damage to, any trees or area protected by this section. Such report shall be reviewed by the [community] to determine whether the action taken was reasonably necessitated by an emergency situation as described above. To the extent actions were taken that exceeded those reasonably necessitated by the emergency, the person in question shall be required to provide replacement trees and take other restorative action as determined necessary by the Planning Commission under all of the circumstances.
- D. **Development Proposal.** Prior to the approval of any site plan or tentative preliminary plat, approval shall be obtained under the provisions of this ordinance for any site determined to be a regulated woodland or contain regulated

historic/landmark/specimen trees or linkage strips, as provided for herein.

- E. **No Tree Affidavit.** Where the proposed activity is located on a site with no trees of eight (8) inch DBH, or greater, and no linkage strips, the applicant shall so indicate on the application, and submit a no tree affidavit. In such case, the [community] shall conduct an inspection of the site. If the site inspection confirms the applicant's documentation, the applicant shall be relieved of the necessity of providing unnecessary information. However, where these are trees less than eight (8) inches DBH that are otherwise potentially good specimens of that particular woodlot or linkage strip, additional information will be required, such as quality, size species, health, and such additional information as the [community] request.
- F. **Areas Not To Be Disturbed.** In those instances where areas of woodlands or linkage strips on a site are not to be disturbed, the site plan shall designate such areas as "not to be disturbed" and shall not be required to identify, except for general information as to species, number and size of protected trees and shall further be required to protect such areas from encroachment during construction activities.

SECTION 4. DETERMINATION OF REGULATORY STATUS.

This Ordinance shall apply to the following:

- A. **Regulated Woodland.** A regulated woodland shall constitute a forested area of one-half (½) acre or more with one or more of the following:
 1. A gross basal area of thirty (30) square feet per one-half (2) acre, or



2. Containing twenty (20) trees per one half (½) acre greater than eight (8) inches DBH
- B. **Linkage Strips.** All vegetation within a linkage strips.
- C. **Along Roads.** All trees, eight (8) inch DBH or greater, within twenty (20) feet of a county primary road right-of-way.
- D. **Individual Landmark Trees.** Any significant individual tree with DBH of twenty four (24) inches or greater.
- E. **Historic or Specimen Tree.** A person may nominate a tree within the [community] for designation as a historic tree, or specimen tree based upon its age, type, size, historic, or cultural associations. Such a nomination shall be made upon that form provided by the Planning Commission. Where the nomination is not made by the owner of the property where the tree is located, the owner shall be notified in writing at least fifteen (15) days in advance of the time, date, and place that the Planning Commission will consider the designation. The notice shall advise the owner that the designation of the tree as a linkage strip or historic or specimen tree will make it unlawful to remove, damage, or destroy the vegetation absent the granting of a woodlands use permit by the [community].
1. The Planning Commission may designate a tree upon finding that, because of one or more of the following unique characteristics, the tree should be preserved as a historic tree:
 - a. The tree is associated with a notable person or historic figure;
 - b. The tree is associated with the history or development of the nation, the state, or the [community];
 - c. The tree is associated with an outstanding person or institution;
 - d. The tree is associated with early forestry or conservation; or
 - e. The tree is associated with American Indian history, legend or lore.
 2. The Planning Commission may designate a tree as a specimen tree upon a finding that, because of one or more of the following unique characteristics, the tree should be preserved as a specimen tree:
 - a. The tree is the predominant tree within a distinct, scenic or aesthetically valued setting;
 - b. The tree is of unusual age or size for that species and this climatic and geographic location. Examples include trees listed on the American Associate Social Register of Big Trees or the Michigan Botanical Club as a large tree; or
 - c. The tree has gained prominence due to unusual form or botanical characteristics.

SECTION 5. APPLICATION AND WOODLAND INVENTORY.

- A. A woodland permit applicant shall submit the following materials to the Community and Economic Development Department:
1. A completed use permit application which includes the following:



- a. The name, address, and telephone number of the owner of the property, the applicant and of the applicant's agent. Where the applicant is not the owner of the property, a written authorization from the owner permitting the proposed activity;
 - b. The project location, including, as applicable, the street, road, or highway, section number, name of subdivision, and name of any watercourse which will or may be impacted; and
 - c. A detailed description and statement of purpose of the proposed activity.
2. A use permit application fee in an amount as set by resolution of the [community]; and,
 3. A site plan or survey that includes the following information:
 - a. The shape and dimensions of the lot or parcel, together with the existing and proposed locations of structure and improvements, if any;
 - b. Locations, based upon actual field survey, identifying by number all existing trees of eight (8) inch DBH or greater and all other trees to be protected. All such trees proposed to remain, to be transplanted or to be removed shall be so designated. The plan shall be accompanied by a separate key identifying the trees numbered by size, common and genus name, (e.g.: maple/acer) condition, density and spacing. All such trees shall be tagged in the field with their identification numbers. A tree survey shall not be required for a woodland area to be left undisturbed by development activity, provided the site plan clearly indicates the area to be left in a natural state and the protection measures of Section 8 are completed.
 - c. Location, based upon actual field survey, of all linkage strips on the site as well as descriptions of the dominant shrubs and, if present, trees within the association;
 - d. A statement showing how trees not proposed for removal are to be protected during land clearing, construction, and on a permanent basis, including the proposed use of protective barriers, tree wells, tunneling or retaining walls (see section 8, Tree Protection During Construction);
 - e. Location and dimensions of all setbacks, easements, and existing and proposed public and private utilities;
 - f. Statements as to grade changes proposed and proposed drainage pattern changes for the lot or parcel and how such changes will affect regulated trees;
 - g. The number of trees to be cut which have a DBH of eight (8) inches or more or the number of shrubs to be cut in a linkage strip, with a plan and cost estimate for their replacement.
- B. **Land clearing or grubbing.** Where the proposed activity is land clearing or grubbing only (no tree equal to or over eight (8) inch caliper being removed) the preparation of a site plan which depicts the location of all trees shall not be required. However, the applicant shall provide the limits of activity and general



information as to the number, species, and size of the protected trees on the property before a use permit for the clearing or grubbing may be granted.

SECTION 6. WOODLAND PERMITS FOR SITE PLANS AND SUBDIVISION PLATS.

A. **Woodland permit required.** There shall be no cutting of trees or harvesting of forest products within a woodland for the purpose of developing a site plan, condominium or subdivision plat without first obtaining a woodland permit by the [community]. It shall be the responsibility of the developer to notify the individual builders or owners of all restrictions pertaining to the preservation of woodlands pursuant to the approved woodland permit.

B. **Parcels containing woodlands.** Development of platted or unplatted parcels containing woodlands shall be subject to the woodland review and approval procedures if the site plan proposes encroachment into the woodland. This woodland acreage is independent of property lines and may incorporate contiguous woodlands on adjacent property.

C. **Maximum woodland disturbance.**

1. The site plan or plat shall identify the boundary of the woodland as it exists, and a proposed woodland disturbance configuration which shall delineate the specific boundary of the area of the woodland requested to be disturbed. The woodland disturbance configuration shall be determined based upon the following:

a. Conservation of the separate identified tree stands within the woodland;

- b. Soil type (permeability, fertility, structure), considering the likelihood of survival following development;
- c. Reproductive capacity;
- d. Vegetative species diversity;
- e. Vegetative density;
- f. Basal area;
- g. Animal habitat; and
- h. Other factors deemed relevant to preservation of the woodland based upon particular characteristics.

2. There shall be an entitlement to a woodland disturbance in connection with the development and use of a site plan or plat equal to fifty percent (50%) of each tree stand within the woodland area on the property in question, with the specific disturbance area to be determined as provided in this ordinance. The balance, or fifty percent (50%) of the area of each tree stand on the property, shall be preserved from disturbance.

3. Based upon a review of the particular woodland, the Planning Commission may establish an adjustment maintaining the overall woodland disturbance at fifty percent (50%), but specifying greater disturbance than fifty percent (50%) of one (1) tree stand coupled with a corresponding decrease in disturbance of one (1) or more other tree stands on the property in question. Such adjustment shall be established based upon a consideration of the relative quality rating of the



respective tree stand, using the following quality rating criteria: species; likelihood of survival following development; tree stand size tree stand density; habitat potential; animal-life observation; scenic quality; and general health of tree stand.

4. The Planning Commission shall permit a disturbance level greater than fifty percent (50%) where more than fifty percent (50%) of the site to be developed consists of woodlands. The extent of greater disturbance permitted shall be the minimum necessary, as determined by the Planning Commission, and based upon the analysis of alternative development plans.
5. The site plan or plat shall reflect the conservation of the woodland by either:
 - a. Selective clearing within the woodland to create wooded sites; or
 - b. Creation of private woodland park areas within which no development or clearing shall take place. Utilities, roads or similar infrastructure may be permitted within such woodland park areas if and to the extent the disturbance of such improvements would not result in the maximum disturbance area being exceeded.
 - c. Siting requirements for woodland construction envelopes and other disturbances within the property under review shall take into consideration the following criteria: maintenance of proper distance between disturbances to sustain shade tolerant species, prevent windthrow, reduce soil erosion,

preservation of water infiltration rates to sustain soil moisture regimes and localized groundwater flow, preservation of sensitive or critical plant species, and preservation of animal habitat.

- d. The removal or relocation of trees shall be limited to those instances when necessary for the location of structures or site improvements and when no feasible and prudent alternative location for the structures or improvements can be accomplished without causing undue hardship.

D. Replacement Trees. A replacement tree or a combination of trees of a species native to Michigan shall be provided to equal a minimum of fifty percent (50%) of the original DBH for each historic/landmark/specimen tree, or woodland tree eight (8) inches or larger, that is removed. Replacement trees shall be non-sterile varieties. A range of size for replacement trees shall be provided with the minimum size of a deciduous replacement tree being one (1) inch caliper and the average size two (2) inch caliper. The minimum size of an evergreen replacement tree shall be five (5) feet in height. If more than twenty (20) replacement trees are required, a mixture of three (3) or more species must be used.

E. Woodland permit for site plan or plat.

1. For those developments and operations where the Planning Commission is the final approval authorized as defined in this ordinance, the Planning Commission may authorize the issuance or denial of a woodland development permit.
2. For those plats, condominiums and uses where the [community legislative body] is the final approval



authority, the recommendation of the Planning Commission shall be referred to the [community legislative body] along with a separate recommendation for the disposition of the plat, condominium or use. The [community legislative body] may authorize the issuance of a woodland development permit with or without specific conditions attached or deny the issuance of the woodland development permit.

3. Upon approval of a woodland permit, a letter of credit or escrow account shall be posted with the [community] as a condition of site plan approval by the petitioner to guarantee compliance with the disturbance conditions stipulated in the site plan. The amount of the financial instrument shall be no less than ten (10) percent of the total inventory of median size trees and larger to be preserved on the site as calculated by the total undisturbed land area times the field tree density times six hundred dollars (\$600.00). A financial instrument shall be structured in such a manner that if the total disturbed land area, either directly or indirectly, exceeds the number allowed on the approved site plan, this account shall provide for replacement landscaping at the rate of six hundred dollars (\$600.00) per removed tree in excess of approved allowance. The [community] shall authorize such replacement landscaping as soon as practical. The letter of credit or escrow account shall be maintained until the development is completed or final certificates of occupancy are issued, although reductions in the amount of the instrument are allowed as portions of the site are completed and final certificates of occupancy are issued.
4. The issuance of building permits shall be contingent upon compliance with the approved clearing schedule and inspections by the [community]. Through the

process of periodic site inspections by the [community] a tally of both direct and indirect tree removal will be maintained by the [community]. There shall be a final inspection made by the [community] for compliance with these woodland provisions or respective lots upon completion of the development and prior to release of final certificates of occupancy and letters of credit or escrow accounts on deposit with the [community].

5. On single family lots within a woodland, the application for a building permit shall be accompanied by a grading plan. In addition to the minimum requirements, the grading plan shall include the size, location and species of all trees six (6) inches and larger on the subject property, and specify which trees are proposed to be removed.
6. The petitioner shall stake, paint or otherwise delineate the location of all disturbances proposed in the woodland, including roadways, structures, utilities, storm water retention basins, etc., prior to the issuance of the building permit for any construction. The [community] shall inspect the site for compliance with the approved plan. Protective fencing may be required around any trees to be preserved. Unless otherwise specified, all trees within the woodland preservation area, regardless of size, shall be protected during construction.
7. The [community] may approve minor adjustments to the location of a building, road, drive, utility or other improvement where it can be shown that additional trees, healthier trees or trees with a higher value rating will be preserved as a result of the adjustment, provided the total percentage of trees six (6) inches and larger to be removed and the area of land to be disturbed is not



increased and all other codes and ordinances are met. Such changes shall be verified in the field and documented with revised site plans.

SECTION 7. WOODLAND PERMIT FOR HARVESTING.

- A. There shall be no cutting of trees or harvesting of forest products lying either wholly or partially within a woodland without first obtaining a woodland permit from the [community].
- B. A harvest plan for the woodland shall be prepared and signed by a forester licensed and registered in the state and submitted with the application. The harvest plan shall incorporate the following information and standards in addition to a complete description of the products to be harvested:
1. A present description of the woodland specifying basal area, tree species mixture, a sampling of tree size and the notation of unusual, scarce or endangered trees.
 2. A tally of trees to be harvested stating the species, size and quantity. This tally shall include those trees removed which are diseased, damaged or in an otherwise unhealthy condition.
 3. A general description of the woodland after the proposed harvest specifying basal area and tree species mixture. A basal area which provides canopy cover, reproductive capacity, understory structure, and animal habitat sufficient to maintain the function performed by the particular forested area disturbed shall be maintained within the woodland after harvesting. This basal area will be determined based upon the application of principles of forestry science, as proposed by the applicant and approved in the reasonable discretion of the [community] forester.
4. A list of equipment to be used in the harvest process in order to estimate the amount of damage which can be expected to nonharvested trees within the woodland.
 5. The diversity of tree species shall be maintained within the woodland at generally the same ratio both before and after the harvest, except to the extent the applicant demonstrates and the [community]'s forester reasonably finds and explains that maintenance of such diversity will serve no purpose, or is inconsistent with standards customarily applied in the forestry industry.
 6. The perimeter of the woodland shall not be disturbed and shall be maintained at a width of at least one hundred (100) feet, except for ingress and egress points as indicated on the approved woodland permit. If a petitioner demonstrates unnecessary hardship as a result of this requirement, the [community] shall grant relief to the extent necessary to remove the unnecessary hardship.
 7. A time schedule for the start and completion of all work within the woodland.
 8. The estimated value of the harvest based on the sale of the forest products, not the fee paid to the landowner, shall be included as part of the harvest plan.
- C. A restoration program and time schedule shall be included and provide for the following:
1. Grading and seeding all areas disturbed as a result of the harvest activity, including wheel ruts, log yards, aprons and concentrated work areas.
 2. Tree stumps shall be cut flush with the ground.



3. For all trunks and branches four (4) inches or greater in diameter, crowns of fallen trees shall be reduced to firewood length and stacked unless they are to be removed from the site as they are cut. Trunks and branches less than four (4) inches in diameter shall be reduced to woodchips and left on the site.

D. The [community] shall review the woodland permit application for both completeness and adherence to ordinance standards. A site inspection of the subject woodland shall be made by the [community].

E. **Woodland permit for harvesting.**

1. Upon approval of a woodland permit, the petitioner shall be required to post a letter of credit or establish an escrow account with the [community] in the amount of at least ten (10) percent of the estimated value of the proposed harvest. The permit shall only be issued following the posting of the required assurances. The escrow amount shall be returned to the petitioner upon completion and inspection by the [community] of the restoration work required by the approved woodland permit.
2. In the event of nonperformance of work required as part of the permit within the time limit established by the woodland permit, the escrow account shall be forfeited to the [community].
3. A woodland permit, having been approved, shall be valid for a period not exceeding one (1) year from the date of issuance. All restoration work prescribed as part of the woodland permit must be completed within six (6) months from the start of work within the woodland.

Extension of the six (6) month limit may be granted by the [community] up to an additional six (6) months, providing it is requested in writing by the permit holder(s), the conditions which existed at the date the permit was granted remain unchanged, and the reasons necessitating the extension are provided.

F. **Creation of new unregulated woodland.**

1. Subject to the conditions set forth below, a person may plant trees so as to create a new area which would otherwise be or become a woodland, as defined in this section, but which shall not be considered a regulated woodland.
2. An area of newly planted trees shall not be considered a regulated woodland if all of the following conditions are met prior to the planting of any new trees:
 - a. No part of the area on which the trees are to be planted shall be within an existing woodland.
 - b. The owner of the property shall submit to the [Community] a plan prepared by a State of Michigan registered forester, outlining and describing the plan for the planting, maintenance and removal of the new trees. The plan shall be subject to approval by the [community]'s forester for the purpose of confirming that the plan is designed to achieve sound forestry management objectives.
3. There shall be ongoing conformance with the approved forestry management plan.



3. The [Community] shall maintain the forestry management plan on file at the [community] unless and until the plan has been carried out to completion.

SECTION 8. TREE PROTECTION DURING CONSTRUCTION.

- A. Before development, land clearing, grading or land alteration for which a use permit is required by this ordinance commences, the developer shall be required to erect for the protection of remaining plants, barriers as approved by the [community]. Barrier fencing shall be installed at the limits of soil disturbance adjacent to any woodlands to be protected and at the perimeter of the critical root zone of historic/landmark/specimen trees which are located within a disturbance area. No filling, excavating or storage of materials, debris or equipment shall take place within the fenced area.
- B. Barrier fencing shall be a minimum of four (4) feet in height and shall remain in place in good condition. Protection shall remain in its approved location until such time as it is authorized to be removed by the [community], or issuance of a final certificate of occupancy. During construction, no attachments or wires shall be attached to any protected trees. Wood, metal, or other substantial material shall be utilized in the construction of barriers.

SECTION 9. APPEAL OF WOODLAND PERMIT DECISION.

- A. An appeal may be made by any person from a decision of the [community]. Such an appeal shall be made to the [community legislative body] which shall have the authority to approve, reverse or modify any such recommendation.
- B. Any appeal to the [community legislative body] must be received in writing by the [community] clerk within twenty one (21) days of the woodland permit decision.

- C. A public hearing shall be held by the [community legislative body] to consider the appeal. Notice of the public hearing shall be sent not less than fifteen (15) nor more than thirty (30) days prior to the hearing date by first class mail to the property owners and occupants within three hundred (300) feet of the subject property. The notice shall indicate that an appeal has been requested, the nature of the appeal, the petitioner's name and address, and the time, date and location of the hearing. The notice shall also be published in one (1) of the legally approved newspapers of general circulation in the [community].
- D. The [community legislative body] shall be the only body empowered to reverse or modify a decision under the woodlands regulations.

SECTION 10. ENFORCEMENT AND PENALTIES.

- A. **Civil Infraction.** Any person violating any of the provisions of this ordinance shall be guilty of a municipal civil infraction, and upon conviction thereof shall be fined not more than \$500.00 for each such violation. Each day upon which such violation occurs shall constitute a separate offense.
- B. **Nuisance.** Any use or activity in violation of the terms of this ordinance is declared to be a nuisance per se, and may be abated by order of any court of competent jurisdiction. The [community] in addition to other remedies, may institute any appropriate action or proceeding to prevent, abate, or restrain the violation. All cost, fees, and expenses in connection with such action shall be assessed as damages against the violator(s).
- C. **Woodland Replacement.** In addition to the penalties provided in this Ordinance, any person who violates any provision of the woodlands protection provisions of this Ordinance shall forfeit and pay to the [community] a civil penalty equal to the total



value of those trees illegally removed or damaged, as computed from the International Society of Arboriculture shade tree value formula. Such fines shall accrue to the [community] and may be recovered in a civil action brought by the [community]. Said fines so collected shall be placed in the [community] tree fund. Replacement of illegally removed trees may be required as restoration in lieu of money. This replacement will be computed on an inch for inch ratio based on the total diameter measured at DBH in inches of the illegally removed trees. If, because of destruction of the removed trees, exact inch to inch measurements cannot be obtained, the [community] may use other means to estimate the tree loss. A combination of money and tree replacement may be required.



References

Costs of Sprawl - 2000, Center For Urban Policy Research, Rutgers, the State University of New Jersey, The Brookings Institution, Parsons Brinckerhoff Quade and Douglas, Inc., Econorthwest, Research Sponsored By The Federal Transit Administration In Cooperation with the Transit Development Corporation, Transportation Research Board, National Research Council, National Academy Press, Washington, D.C. 2002.

Does Sprawl Cost Us All? Isolating the Effects of Housing Patterns on Public Water and Sewer Costs, Cameron Speir and Kurt Stephenson, American Planning association Journal, Chicago, IL 2002.

Estimating Costs For Wastewater Collection and Treatment Under Various Growth Scenarios, James Reilly, New Jersey Office of State Planning, Paul Gottlieb, Princeton University, 1993.

Getting to Smart Growth, Smart Growth Network, International City/County Management Association,

Growing Toward More Efficient Water Use: Linking Development, Infrastructure, and Drinking Water Policies, United States Environmental Protection Agency, Washington, DC, 2006.

How Much Development is Too Much? A Guidebook on Using Impervious Surface and Gravel Road Capacity Analysis to Manage Growth in Rural and Suburban Communities, Mark Wyckoff and Michele Manning, Planning & Zoning Center, Inc., Lansing, MI, Kris Olsson and Elizabeth Riggs, Huron River Watershed Council, Ann Arbor, MI, 2003

Investing in Southeast Michigan's Quality of Life: Sewer Infrastructure Needs, Southeast Michigan Council of Governments, Detroit, MI, 2001.

Land Use Tools and Techniques, A Handbook for Local Communities, Southeast Michigan Council of Governments, Detroit, MI, 2003.

Linking Science and Policy For Urban Nonpoint Source Pollution un the Great Lakes Region, International Association for Great Lakes Research, Stephen Bocking, Environmental and Resource Studies Program, Trent University, 2002.

Low-Impact Development Design Strategies - An Integrated Design Approach, Prince George's County, Maryland, Department of Environmental Resources, Programs and Planning Division, 1999.

Opportunities for Water Resource Protection in Local Plans, Ordinances, and Programs - A Workbook for Local Governments, Southeast Michigan Council of Governments, Detroit, MI, 2002.

Options for Local Government Funding of Water Quality Activities, Southeast Michigan Council of Governments, Detroit, MI, 2003.

Protecting Water Resources with Smart Growth, United States Environmental Protection Agency, Washington, DC, 2004.

Putting Southeast Michigan's Water Quality Plan Into Action: Tools for Local Governments, Southeast Michigan Council of Governments, Detroit, MI, 2000.



The Costs of Sprawl—Revisited, Center for Urban Policy Research, Rutgers University, The Brookings Institution, Parsons Brinckerhoff Quade and Douglas, Inc., ECONorthwest, Research Sponsored By The Federal Transit Administration In Cooperation With The Transit Development Corporation, Transportation Research Board, National Research Council, National Academy Press, Washington, D.C. 1998.

The Fiscal Cost of Sprawl - How Sprawl Contributes to Local Governments' Budget Woes, Environment Colorado Research and Policy Center, 2003.

Urban Growth Boundaries - A Policy Brief for the Michigan Legislature, Urban and Regional Planning Program, Department of Geography, Michigan State University, East Lansing, MI 2000.

Water and Sewer Rate Analysis, Southeast Michigan Consortium for Water Quality, Plante & Moran, PLLC, 2004.

Water Quality Management Plan for Southeast Michigan, Southeast Michigan Council of Governments, Detroit, MI, 1999

Watershed Planning: Determining Impervious Surface Capacity to Better Manage Growth at the Rural/Urban Fringe, Huron River Watershed Council, W.K. Kellogg Foundation, Livingston and Washtenaw County Road Commissions, Planning & Zoning Center, Inc., 2004.

