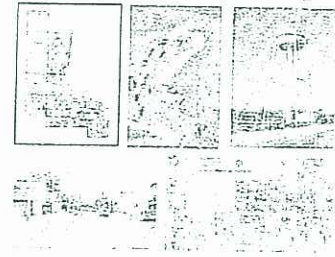


Appendix M

Bay County, Michigan



Build-Out Assessment
September 2000

County Executive
Thomas L. Hickner

*Director of Environmental Affairs
and Community Development*
Valerie Keib



This project has been made possible, in part, by a grant through the Saginaw Bay Watershed Initiative Network (WIN). WIN is a volunteer organization that includes more than 90 citizens and organizations and focuses on opportunities to better link the economic, social, and environmental well-being of Saginaw Bay communities in order to sustain and improve the region's quality of life.

Beckett and Raeder Inc.
Landscape Architects Planners and Engineers

TABLE OF CONTENTS

INTRODUCTION	1
Technical Specifications	1
Bay County Background Information	3
METHODOLOGY	5
The Assessment Process	5
THE ASSESSMENT PROCESS	7
Step 1: Conducting an Information Inventory	7
Step 2: Soliciting Comments, Suggestions and Verification of Data	9
Step 3: Designating Land Type Categories Unsuitable for Development	9
Developed Parcels	11
Tax-exempt Parcels	13
Wetlands	15
100-Year Floodplains	17
State-owned Lands	19
Lake Plain Prairies	21
Saginaw Bay Environmental Areas	23
Remnant Native Landscape Areas	25
Prime Agricultural Lands	27
Step 4: Designating Water and Sewer Service Areas	29
Water Service Area	29
Sewer Service Area	31
Step 5: Developing a Common Land Use Code	33
Step 6: Soliciting Verification of Gathered Geographic Information ..	33
Step 7: Assembling Verified Geographic Information	33
Step 8: "Subtracting" Land Type Categories Unsuitable for DevelopmentSubtraction Process Description	35
Subtraction Process Description	35
Subtraction Procedure	35
Notes and Comments	37
Step 9: Obtaining Population Projections	41
Step 10: Calculating Acreages and Maximum Potential Housing Unit Results for the Common Land Use Codes	45
DISCUSSION OF RESULTS	47
Zoning Ordinance Build-out	47
Zoning Build-Out Acreage and Housing Unit Results, Scenarios A through D	47
Zoning Build-Out Capacities Results, Scenarios A through D	47
Land Use Plan Build-out	49
Land Use Plan Build-Out Acreage and Housing Unit Results	49
Land use Plan Build-Out Capacities Results	51
SUGGESTED ALTERNATIVES	53
CONCLUSION	59



Table of Contents (Concluded)

Figures

Figure 1 Site Location Map 2

Figure 2 Bay County Municipality Location Map 8

Figure 3 Population Projections for Bay County 40

Figure 4 Housing Unit per Square Mile Bay County 44

Tables

Table 1 Common Land Use Coding Key 32

Table 2 Summary of Parcel Divisions Allowed
the Michigan Land Division Act (PA 591 of 1996) 34

Table 3 Summary of Build-Out Scenarios 36

Table 4 Population Projections for Bay County 42

Table 5 Zoning Build-Out Analysis Summary 46

Table 6 Capacity Summary for Zoning Build-Out Analyses 46

Table 7 Land Use Plan Build-Out Analysis Summary 48

Table 8 Comparison of Scenario A Zoning
and Land Use Analyses 48

Table 9 Capacity Summary for Land Use Plan
Build-Out Analyses 50

Attachments (end of report)

Attachment A Wetland Priority System for Bay County Report
by Northern Ecological Services Inc.

Attachment B Build-out Assessment Results

Attachment C Alternative Growth Strategy Results

INTRODUCTION

Land development can impact a region in several ways: it can change an area's landscape, introduce increased demands on natural resources and government services, and modify natural processes associated with the local environment. To help minimize adverse effects such as these, and to promote the health, safety and general welfare of local residents, many municipalities have adopted land use plans and zoning ordinances. These regulations control the types of land uses as well as the densities of development in an area.

Zoning ordinances typically divide a municipality's land area into several zoning districts, each with its own permitted land uses (e.g. commercial, industrial, residential, etc.) and building density restrictions. The densities associated with residential districts determine the maximum number of housing units that can be constructed. In turn, the district's approximate population can be calculated by multiplying the total number of housing units by the district's average number of persons per household as determined by the United States Census. The sum of all district populations and housing units in a municipality yields the total housing units and population for that municipality.

This document presents a build-out assessment for Bay County, Michigan. The purpose of the assessment is to examine the housing unit density provisions of the zoning ordinances and land use plans in the municipalities of Bay County. Information can be used to explore the impacts these requirements have on the county's landscape when development has been allowed to reach its maximum potential (i.e., "build-out" state).

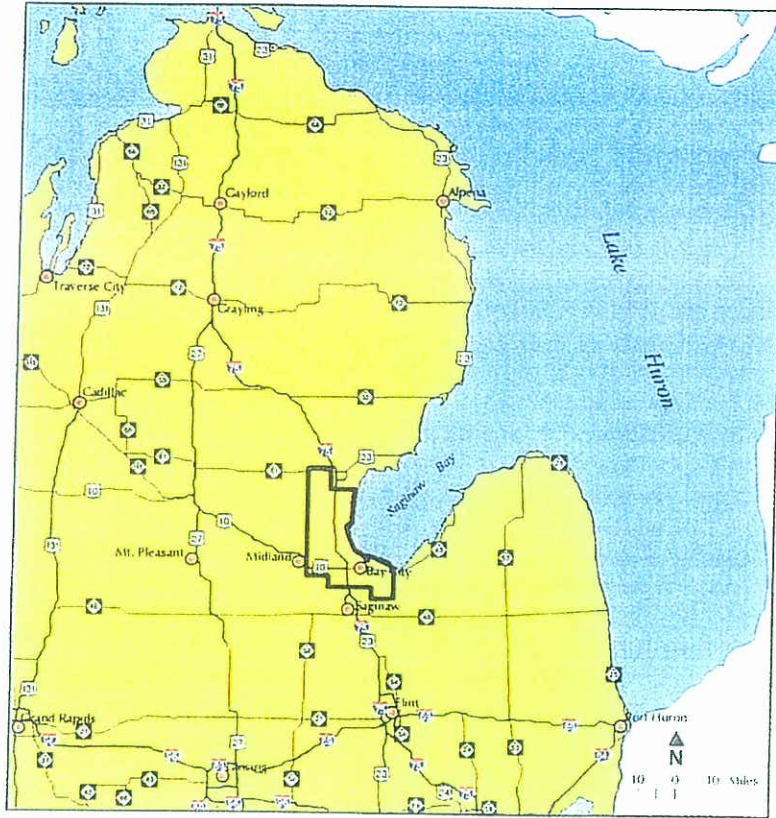
This assessment utilizes a traditional urban planning approach for analysis, including inventorying available geographic information from various sources, soliciting suggestions and concerns from government officials and community group leaders, determining possible future impacts of present land use regulations, and making recommendations for changes to policies to reduce negative consequences of those impacts. Helping Bay County governments to maintain a high quality of life for residents is the ultimate goal of this analysis.

Technical Specifications

ArcInfo 8.0 and ArcView 3.1 geographic information system software packages were used to perform the mapping as well as the analytical calculations for this assessment. These packages are created by the Environmental Systems Research Institute of Redlands, California.

State Plane 1927 NAD27 Feet was chosen as the projection standard for all maps in this assessment.

Figure 1: Site Location Map



Bay County Background Information

Bay County is located in the east-central lower peninsula of Michigan, along the western shoreline of Lake Huron (Figure 1). The Saginaw River—a major shipping artery serving the cities of Saginaw and Bay City in decades past—winds through the southern part of the county and enters Lake Huron northeast of Bay City and Essexville via Saginaw Bay. Much of the county's landscape consists of flat, low-lying swampy soils that have been artificially drained for agricultural purposes. Agriculture is the primary economic activity in rural areas while industrialization is prevalent in cities along the Saginaw River. Much of the county is rural, with most urban development located in the southern part. Since the end of World War II, sporadic residential growth has occurred to the north and west of Bay City, particularly along M-13. The central and northern portions of the county are characterized by farmland dotted with small cities and villages such as Pinconning, Linwood and Crump.

A 1999 study by the Metropolitan Area Research Corporation (MARC), entitled *Saginaw Metropolitcs: A Regional Agenda for Community and Stability*, classified the municipalities of Bay County into three economic statuses. *Low capacity, stressed* communities are fully developed, and have a declining or low tax base and severe social problems. Bay City, the City of Pinconning, and the townships of Gibson, Mount Forest, Pinconning, and Portsmouth are characterized as low capacity, stressed areas.

Low capacity communities are either completely developed or undergoing rapid development. Infrastructure and/or service demands in these communities typically outpace tax revenues; consequently, municipal facilities and services have become overburdened. Serious social problems requiring funding from other government sources usually are minimal. The MARC study classifies the townships of Bangor, Beaver, Fraser, Garfield, and Kawkawlin into this category.

High capacity communities are often newly developed suburbs of older cities. Recently constructed residential subdivisions and office park developments generate high tax revenues, enabling the community to pay for infrastructure and needed services. No major social problems requiring government funding exist within these areas. The cities of Essexville and Auburn, along with the townships of Frankenlust, Hampton, Merritt, Monitor, and Williams, are classified as high capacity communities by the MARC study.

Bay County's future economic development will be highly influenced by the willingness of local governments to cooperate with other governments in neighboring counties. Currently, many municipal economic development programs focus on local success, treating municipalities as solitary economic units rather than as pieces of a regional whole. Conducted over time, this practice results in urban sprawl and inefficient use of regional resources.

The MARC study warns of future economic decay in some areas of Bay County if this current economic development practice continues. To develop a competitive edge over other regions in Michigan the study suggests forming a regional economic strategy to be marketed by the governments of Bay, Midland and Saginaw counties (collectively known as the "Tri-County" Region). Further information regarding the current and future economic position of the Tri-County region can be found in the MARC study report and the 1999 study by McKenna Associates of Farmington Hills, Michigan, entitled *Vision Tri-County, Economic Review and Appraisal*.

The Assessment Process

The build-out assessment employed an eleven-step process that entailed:

1. Conducting an inventory of existing baseline geographic information for Bay County from various government and private sources. Information on natural and man-made resources, as well as zoning ordinances and land use plans of local communities, was gathered and assessed.
2. Soliciting comments, suggestions and verification of gathered geographic information from municipal and county officials, in addition to leaders of local community groups and regional environmental coalitions.
3. Designating certain lands as unsuitable for development so as to preserve areas high in natural resource or cultural value.
4. Mapping water and sewer lines in the county and designating water- and sewer-service areas.
5. Developing a common key code through which the zones associated with municipal zoning maps and the categories associated with municipal land use plan maps may be easily compared.
6. Requesting verification and correction of information associated with the common key zoning and land use plan maps for a community by a government representative from that community.
7. Assembling the locally verified common-key zoning and land use plan maps of each municipality into county-wide composite zoning and land use plan maps using a geographic information system.
8. Overlaying the maps of land categories designated as unsuitable for development onto the county-wide composite zoning and land use plan maps and "subtracting" the geographic areas associated with these categories from the composite zoning and land use plan maps. The result is a zoning map and a land use plan map which contain only the geographic areas of Bay County that are available for development. The designated land categories include developed property parcels, tax-exempt property parcels, wetland areas, remnant native landscape areas, state-owned lands, 100-year floodplains and prime agricultural lands.

9. Determining the number of acres and calculating the number of allowable housing units in the zoning ordinance zones and land use plan categories associated with the land areas remaining. The number of housing units allowed is based on the density stipulations of the zoning ordinance or land use plan regulating a particular land parcel, and the Michigan Land Division Act (PA 591 of 1996). Whichever yielded the lowest number of dwelling units was used.
10. Calculating the probable number of persons generated in a community based on U.S. Census projections of household capacity and comparing results with population projections from various sources.
11. Assessing the results and analyzing their possible impacts on Bay County's future development, economic health and quality of life.

Each of the above steps are discussed in detail beginning on page 7 of this report.

THE ASSESSMENT PROCESS

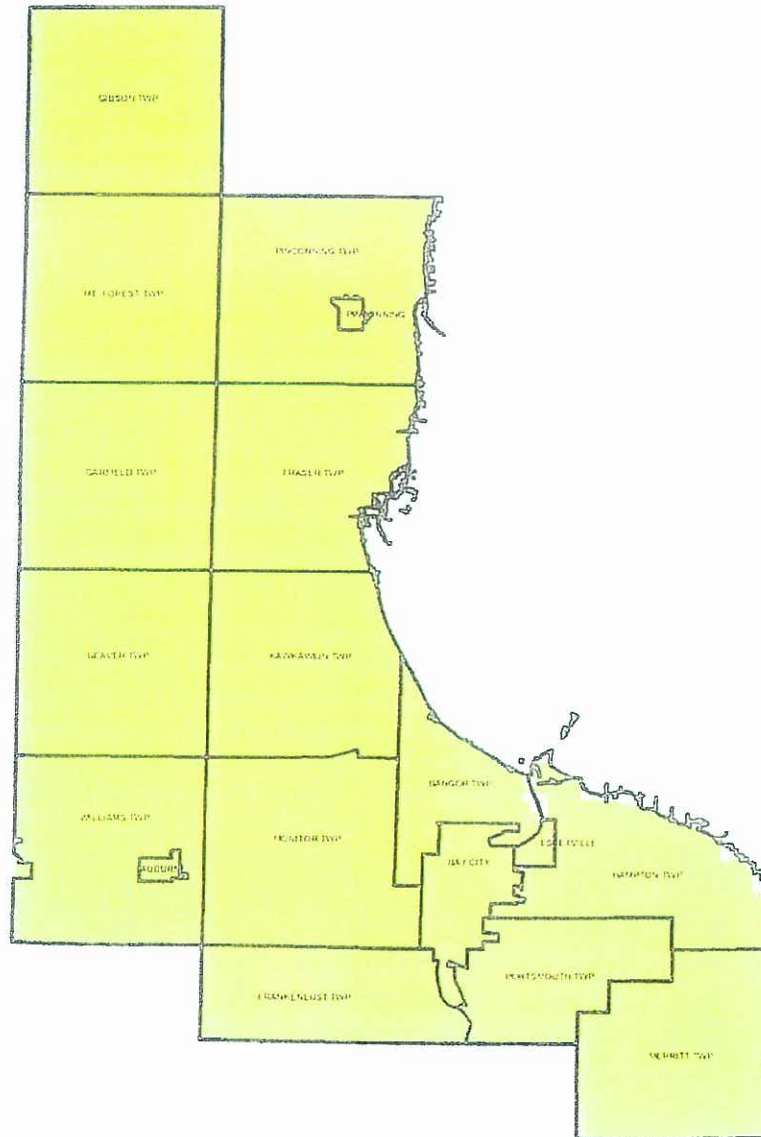
Step 1. Conducting an Information Inventory

An extensive collection of geographic information files for the Bay County region was utilized for this assessment. The files were compiled by the Bay County Department of Environmental Affairs and Community Development from a number of sources, including the Bay County Geographic Information System, the Michigan Resource Information System (MIRIS), the Michigan Department of Natural Resources, the Michigan Department of Environmental Quality, the Michigan Natural Features Inventory, the United States Census, the United States Geological Survey, the Federal Highway Administration, the United States Army Corps of Engineers, and the United States Environmental Protection Agency. These files contain information pertaining to most geographical aspects of Bay County's natural and man-made environments: rivers, floodplains, wetlands, forests, prairies, soils, remnant native landscape areas, erosion areas, environmental areas, political boundaries, property parcels, roads, and utility corridors.

In addition, zoning ordinance information was obtained for all municipalities in the county, either directly from municipalities themselves or indirectly through the county's Department of Environmental Affairs. Municipalities were also asked to provide for land use plans. Most responded, but some were unable to provide this information due to the absence of such information. Consequently, a build-out assessment of land use plans in the county could only be estimated.

As part of the information-gathering process for this assessment, services and additional data were requested from other consulting firms. In order to assess the extent and quality of wetlands in Bay County, Northern Ecological Services, Inc., of Reed City, Michigan, a subconsultant to Beckett and Raeder, devised a strategy for prioritizing wetlands in Bay County for planning purposes. Demographic estimates and projections for Bay County were acquired from the Claritas Corporation, a market research firm in Ithaca, New York. And two published reports regarding the economic status of the Tri-County area were reviewed: the Metropolitan Area Research Corporation's *Saginaw Metropolitics: A Regional Agenda for Community and Stability (1999)* and McKenna Associates' *Vision Tri-County: Economic Review & Appraisal (1999)*.

Figure 2: Bay County Municipality Location Map



Municipalities in Bay County

1 Inch Approximately Equals 3.2 Miles



Step 2. Soliciting Comments, Suggestions and Verification of Data

Several efforts to involve the Bay County community in this project and the data verification process were put forth, including:

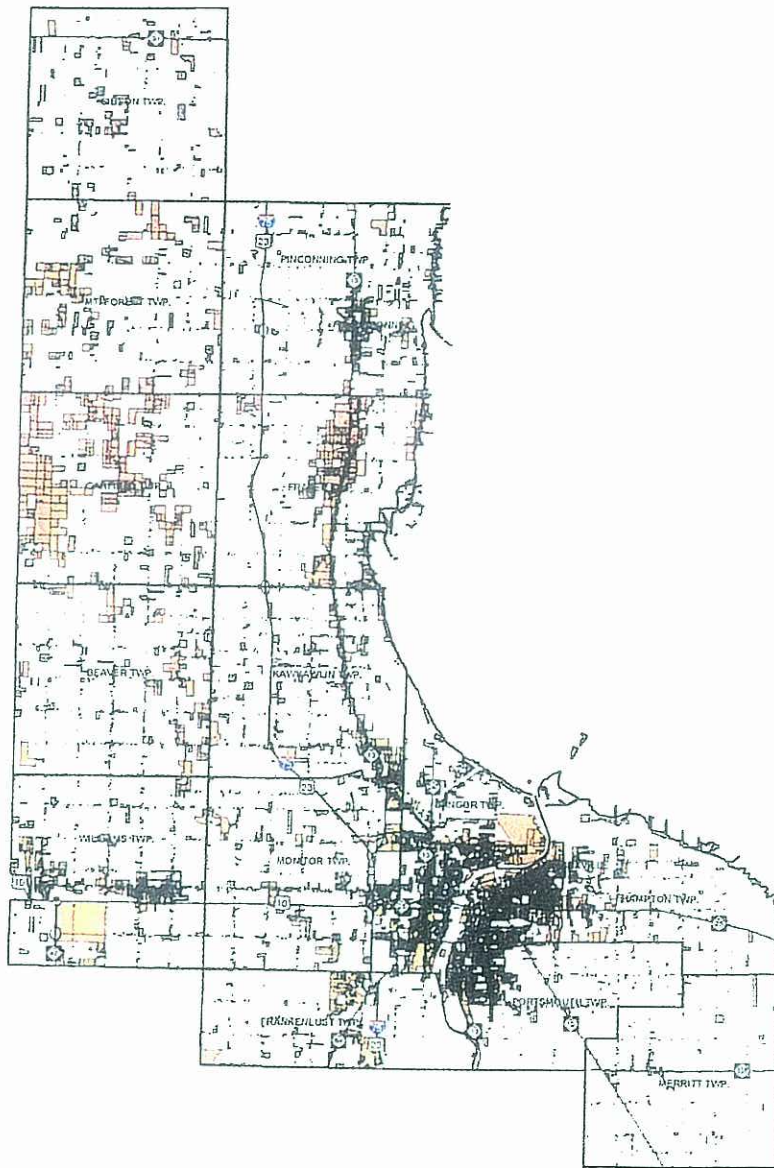
- Convening an informational breakfast meeting on April 14, 2000, in Bay City to discuss the purpose, procedures and benefits of the build-out assessment. Representatives from all Bay County municipalities, as well as several community groups, were invited to attend. At this meeting common key zoning and land use maps were distributed for review and comment.
- Mailing copies of municipal zoning and land use plan maps coded with the common key to municipal government officials for verification and corrections.

The locations of the 14 townships and four cities that comprise Bay County are shown on Figure 2, left.

Step 3. Designating Land Type Categories Unsuitable for Development

A build-out assessment must take into account areas of land that are unsuitable for development. In some cases, the reasons for unsuitability are obvious: development may already be present on a site, the site contains poorly drained soils, or law protects the site's preservation. In other cases, reasons for an unsuitability designation may be based on a cultural value, and are more subjective. For example, a value upholding the preservation of prime farmlands can make otherwise developable land parcels unavailable for urban expansion. The land categories, which are described in detail on the following pages, that were designated as unsuitable included:

- Developed Parcels
- Tax-Exempt Parcels
- Wetlands
- 100-Year Floodplains
- State-Owned Lands
- Lake Plain Prairies
- Saginaw Bay Environmental Areas
- Remnant Native Landscape Areas, and
- Prime Agricultural Lands.



Developed Parcels

Data Sources: 1998 Bay County Equalization Records
 1997 Hampton Twp. Assessment Records
 1998 Bay City Assessment Records



1 Inch Approximately Equals 5.19 Miles

-  Developed Parcel
-  Political Boundary
-  Highway

Developed Parcels

The developed parcels category consists of an aggregation of all tax parcels in Bay County classified as "200" (Commercial Real), "300" (Industrial Real), "400" (Residential Real), "401" (Residential Condominiums), or "600" (Exempt) by the county equalization office. Though from a land use perspective some of these parcels may not actually be "developed", their community's assessor has assessed them as having a taxable use. For the purposes of this build-out assessment, these parcels are considered to be unavailable for new development.

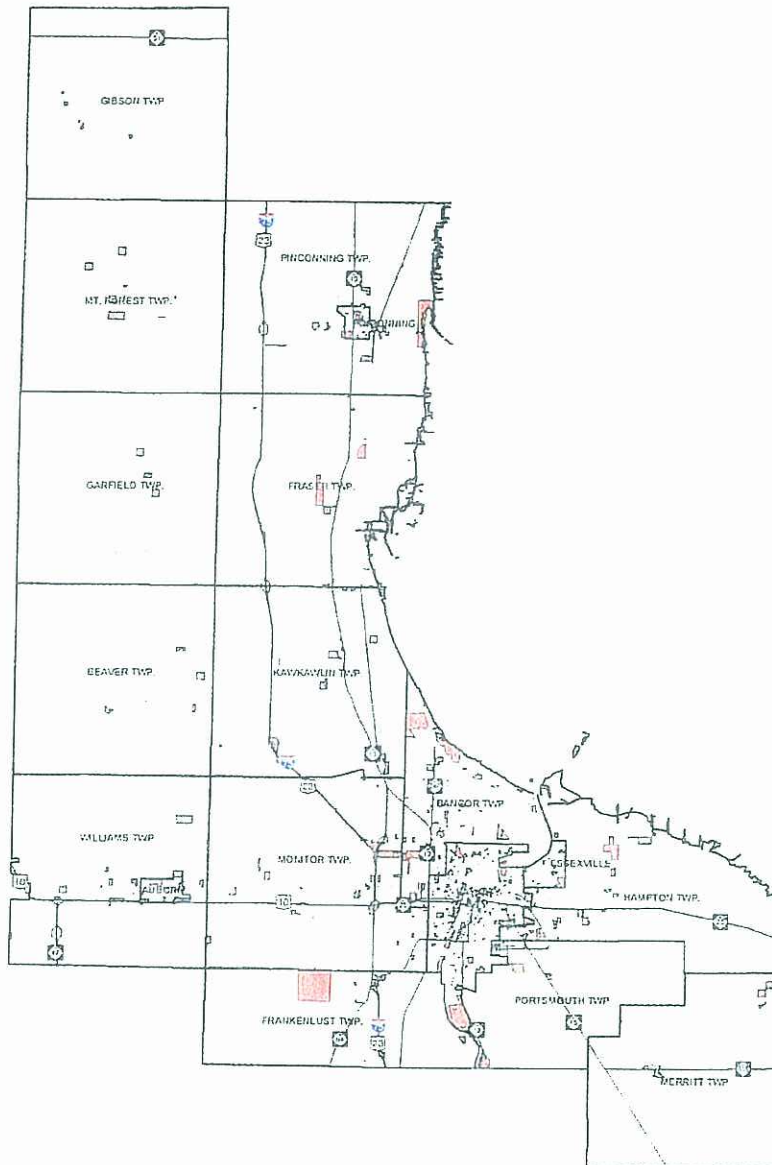
Bay City's tax classes are based on an assessing system different from that of the county's other 17 municipalities. Each tax class was converted into its most approximate Bay County Equalization Code equivalent. Bay City land parcels which were not assigned a tax class were counted as "unavailable for development" because they are either already developed or will not be available for future *residential* uses.

Facts at a Glance

- √ Approximately 54,920 acres, or 19 percent, of Bay County's land parcels are developed.
- √ Almost 58 percent of the developed parcels lies within the county's water service area.
- √ Approximately nine percent of the county's total developed parcels are located within cities, while 91 percent is in townships.

Sources




The developed parcel data was collected from 1998 Bay County Equalization Records (excluding Hampton Township and Bay City), 1997 Hampton Township Assessment Records, and 1998 Bay City Assessment Records.



Tax-Exempt Parcels

Data Sources: 1998 Bay County Equalization Records
 1997 Hampton Twp. Assessment Records
 1998 Bay City Assessment Records


 1 Inch Approximately Equals 5.19 Miles

-  Tax-Exempt Parcel
-  Political Boundary
-  Highway

Tax-exempt Parcels

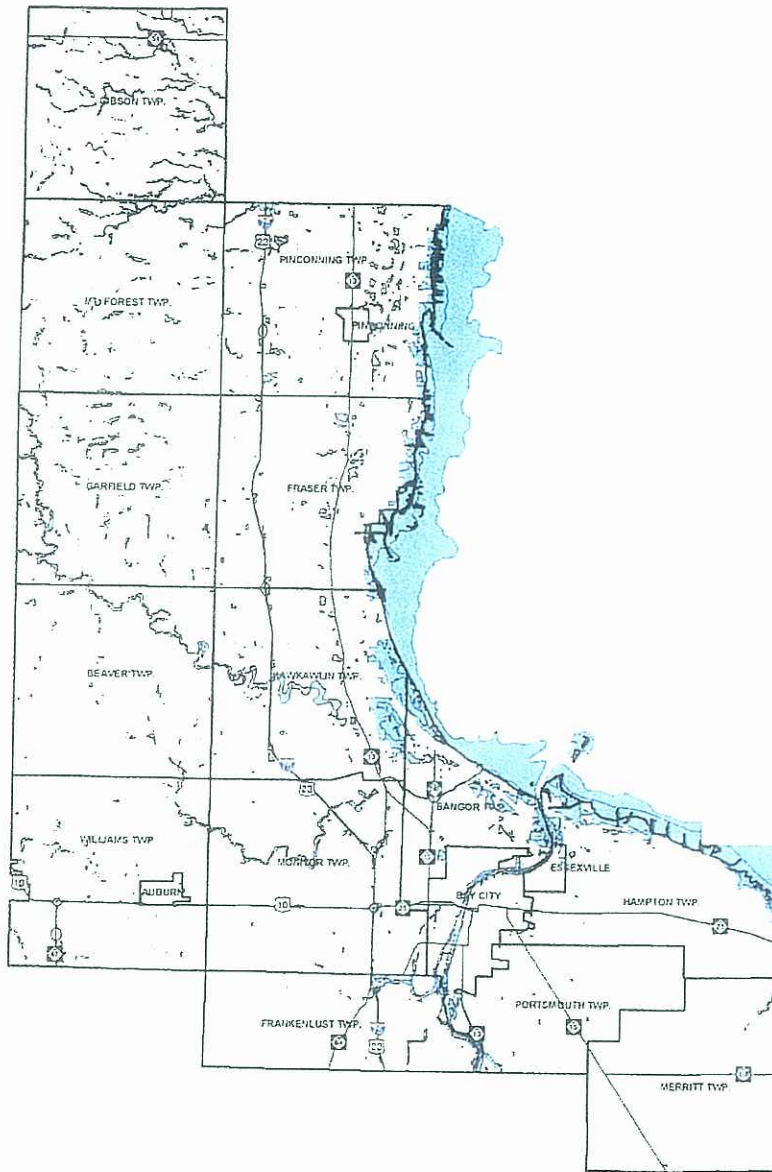
Tax-exempt parcels consist of all land parcels classified as "600" by the county equalization office. These include lands owned by federal, state and local governments as well as properties owned by churches and educational institutions.

Facts at a Glance

- √ Tax-exempt parcels comprise approximately 6,584 acres, or 2 percent, of the county's land acreage.

Sources

Tax-exempt properties were obtained from 1998 Bay County Equalization Records, 1997 Hampton Township Assessment Records, and 1998 Bay City Assessment Records.



Wetlands

Data Sources: MIRIS, Northern Ecological Services Inc.

-  Wetland
-  Political Boundary
-  Highway


 1 Inch Approximately Equals 5.19 Miles

Wetlands

The ecologies of wetlands are complex and sensitive to change. Northern Ecological Services, a firm specializing in wetland research and remediation, used geographic information system data from the U.S. Department of Interior, Fish and Wildlife Service's National Wetland Inventory database to develop a system for prioritizing Bay County's wetlands based upon their functional value. The Northern Ecological Services report is provided as Attachment A.

Wetlands designated as "Priority I" support waterfowl nesting and breeding, act as travel corridors and habitat connectivity for wildlife, mitigate shoreline erosion by absorbing wave energy, and support a complex food web having ecological health ramifications for Saginaw Bay and Lake Huron. They have the potential to store floodwater, retain sediments and process nutrients. The Priority I category consists of the following wetland types:

- All lacustrine¹ littoral wetlands in Saginaw Bay.
- All wetlands within five miles of Saginaw Bay.
- Palustrine² and riverine³ wetlands within 300 feet of a lake, stream, or river
- All Palustrine Emergent (Flooded) and Palustrine Aquatic Bed (Flooded) wetlands
- Wetlands of Crow Island State Game Area.

For this build-out assessment, Priority I wetlands were designated as areas unsuitable for development. Priorities II and III are considered to be less critical for preservation than Priority I because of their more distant position relative to streams, lakes or ponds. For this reason, they were not included as land subtraction categories in the assessment.

¹ Lacustrine: typically characterized by emergent and/or submerged aquatic vegetation, but may also include rock and unconsolidated mineral bottoms and shores.

² Palustrine: includes nontidal wetlands dominated by trees, shrubs, and persistent emergent vegetation.

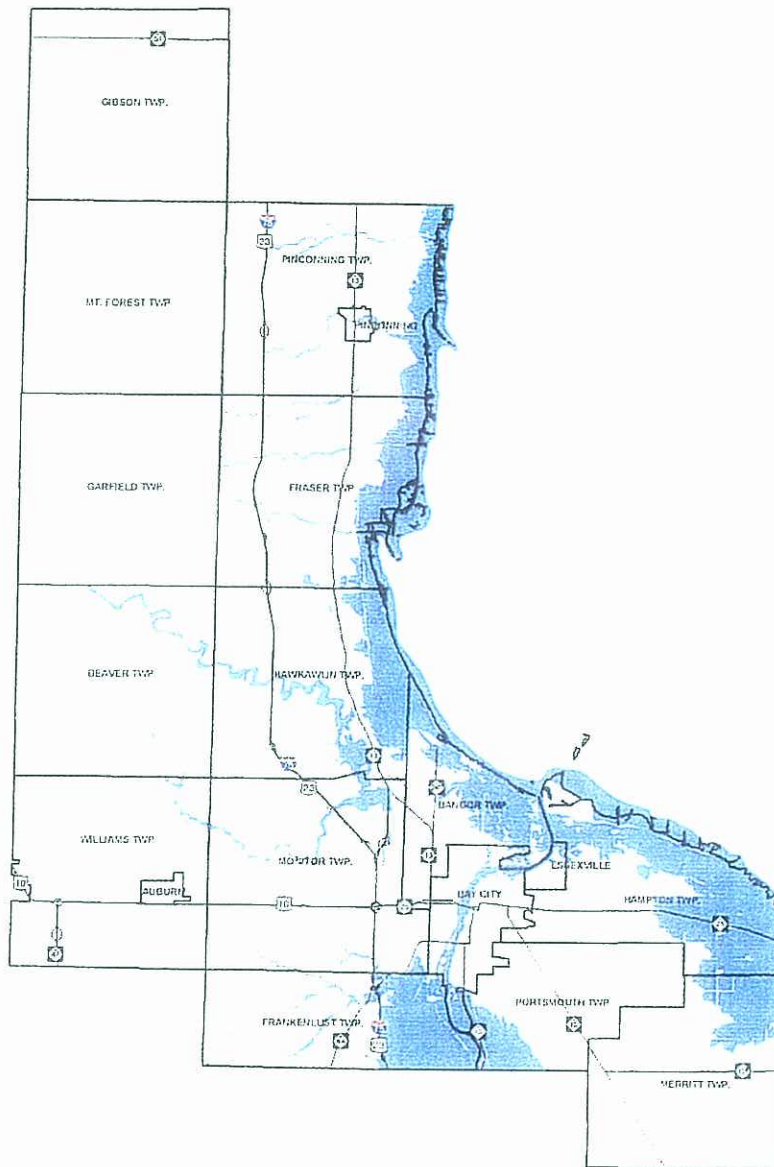
³ Riverine: includes all wetlands and deepwater habitats contained within a channel, except for wetlands dominated by trees, shrubs, or other persistent vegetation.

Facts at a Glance

- √ Nearly 12 percent, or 34,532 acres, of Bay County's land area consists of wetlands in the Priority I category.
- √ The majority of these wetlands are adjacent to the Saginaw Bay shoreline. The Saginaw and Kawkawlin river floodplains contain considerable wetland areas.

Source

Northern Ecological Services' report, *Proposed Wetland Priority System for Bay County, Michigan (May 15, 2000)*.



100-Year Floodplains

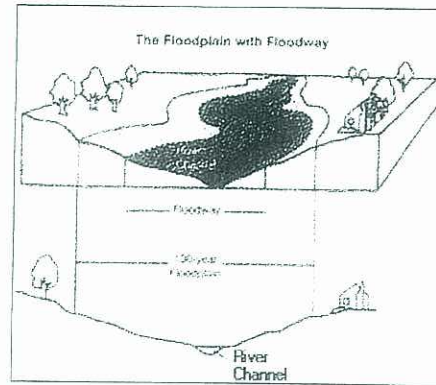
Data Source: MIRIS

- 100-Year Floodplain
- Political Boundary
- Highway


 1 Inch Approximately Equals 5.19 Miles

100-Year Floodplains

A 100-year floodplain is defined as the ground area prone to submergence by floodwaters along a watercourse during a 100-year flood event. A 100-year flood event does not necessarily refer to the length of time between successive floods; rather, it refers to the ground area in which a watercourse's floodwater elevation has a 1 percent chance of being equaled or exceeded in any given year. The 100-year floodplain is also the geographic standard used by the Federal Emergency Management Agency to determine eligibility for government-sponsored flood insurance programs. Communities enrolled in these programs enact floodplain management regulations to minimize property damage caused by flood events. Except for Garfield, Gibson and Mt. Forest Townships, all of Bay County's municipalities are enrolled in the National Flood Insurance Program.



www.friendsoftheriver.org/html/no5.html

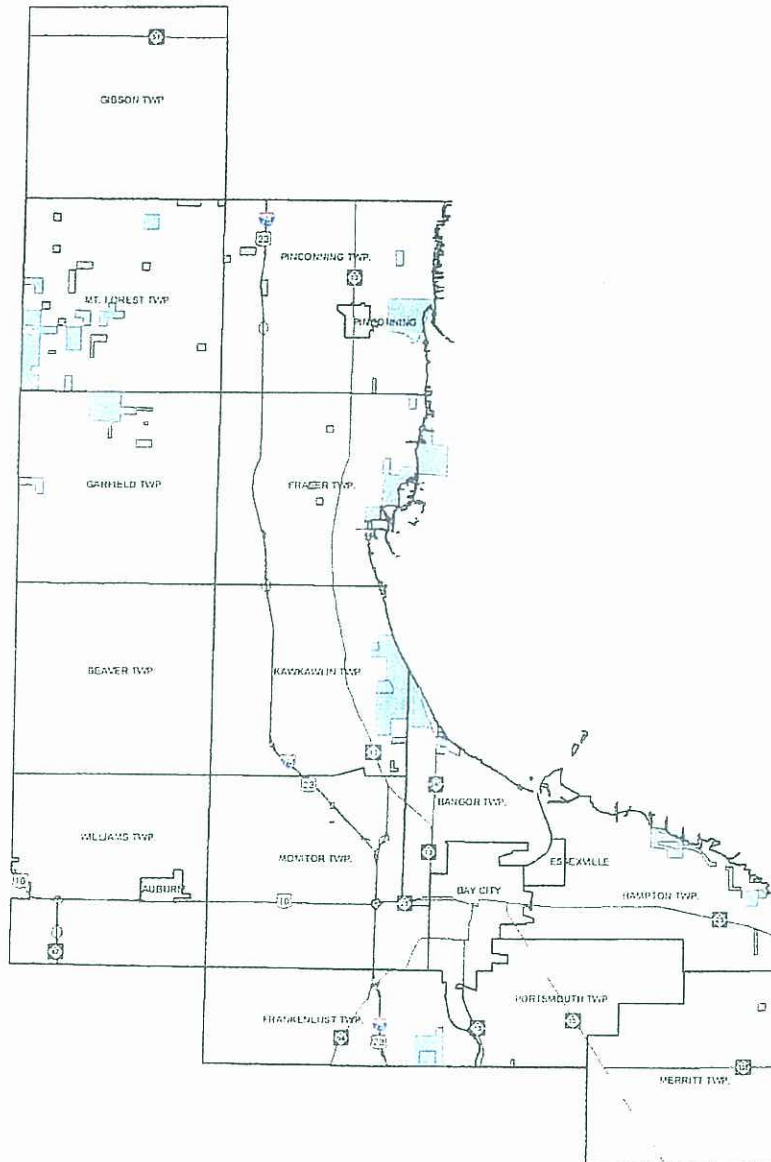
Land development is often permitted, with certain restrictions, to occur in 100-year floodplains. However, for this assessment, these lands were designated as unsuitable for development, primarily because their natural and scenic qualities make them better suited for recreational and open space land uses.

Facts at a Glance

- ✓ 100-year floodplains occupy about 16 percent, or 46,962 acres, of the county's land area, primarily along the coast of Saginaw Bay and in eastern Frankenlust Township.
- ✓ Almost 46,962 acres of 100-year floodplain exist in Bay County. Of these, development has been constructed on approximately 5,888 acres.

Source

Definitions were derived from the website of the Federal Emergency Management Agency, www.fema.gov.




State-Owned Lands

Data Source: Michigan Dept. of Natural Resources
Michigan Dept. of Environmental Quality



1 Inch Approximately Equals 5.19 Miles

-  State-Owned Land
-  Political Boundary
-  Highway

State-owned Lands

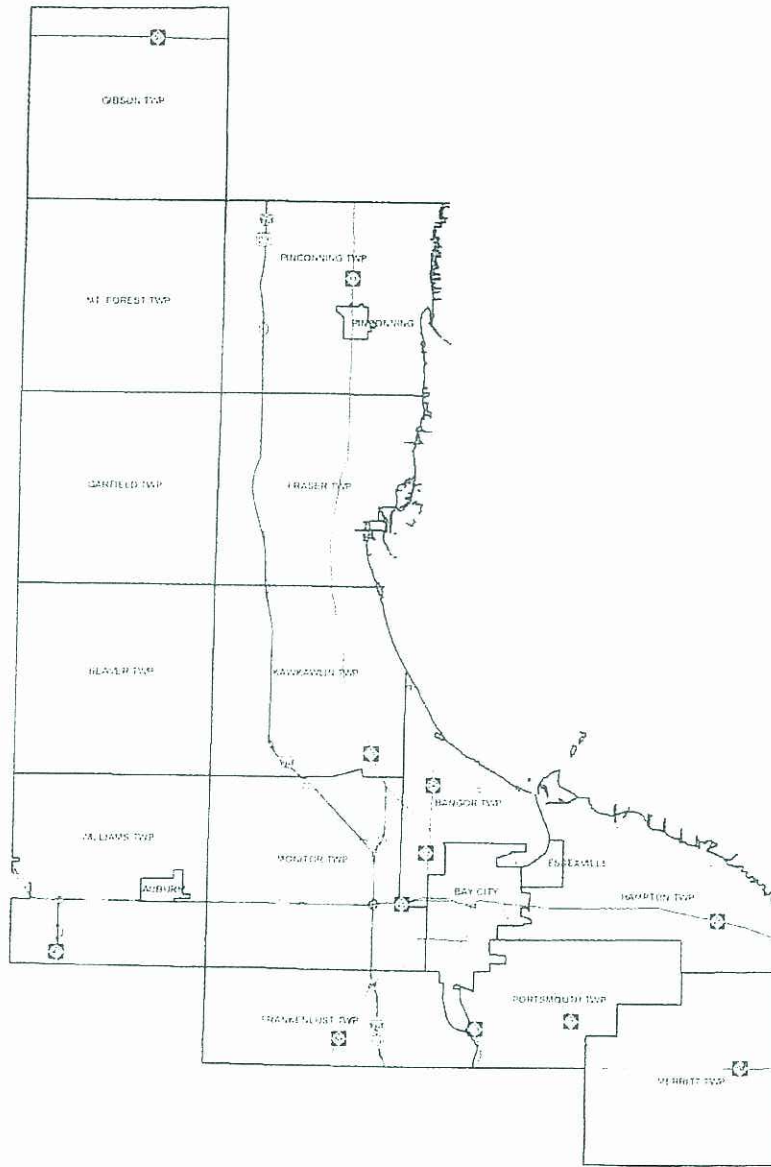
Lands owned by the State of Michigan include conservation, recreation, game, and mineral rights areas that are under the jurisdiction of the Department of Natural Resources, the Department of Environmental Quality, and other state agencies. Land properties recently conveyed to the state from settlement proceedings with the General Motors Corporation and Consumers Energy Company have also been included in this category. Private development is generally barred from state-owned lands, making them unavailable for development.

Facts at a Glance

- √ State-owned lands comprise approximately 10,334 acres, or 4 percent, of the county's land acreage.
- √ Nine hundred and fifty acres of these lands are former private properties conveyed to the state. The Department of Natural Resources owns mineral rights to 4,128 acres in the county or 1.4 percent of the county's total land area.
- √ Land areas owned by the Department of Natural Resources include the Nayanqing State Wildlife Refuge, the Quanicassee State Wildlife Area and the Bay City State Recreation Area.

Source

Michigan Information Resource System, Michigan Dept. of Natural Resources.






Lake Plain Prairie Sites

Data Source: Michigan Natural Features Inventory



1 Inch Approximately Equals 5.19 Miles

-  Lake Plain Prairie Site
-  Political Boundary
-  Highway

Lake Plain Prairies

Remnants of former lake plain prairie lands are scattered along the shore of Saginaw Bay. Formed as a result of glacial action, they consist of large clay deposits overlain in places by a two- to three-meter thick layer of sand. The sand deposits have, over time, been reworked by wave and wind action, creating a series of spits and small dunes with intervening depressions. The moisture content of soils varies widely within the lake plain prairie environment, creating areas of dryness and saturation. Growth of woody plants is inhibited due to these soil conditions. Grasses tend to be the dominant vegetation.

The majority of lake plain prairie lands which once existed in Michigan have been destroyed as conversion of the land to agricultural production began in the 1800s. Today, only remnants exist, and ever-increasing land-use pressures due to urbanization threaten their survival. For this assessment, these lands were protected from development.

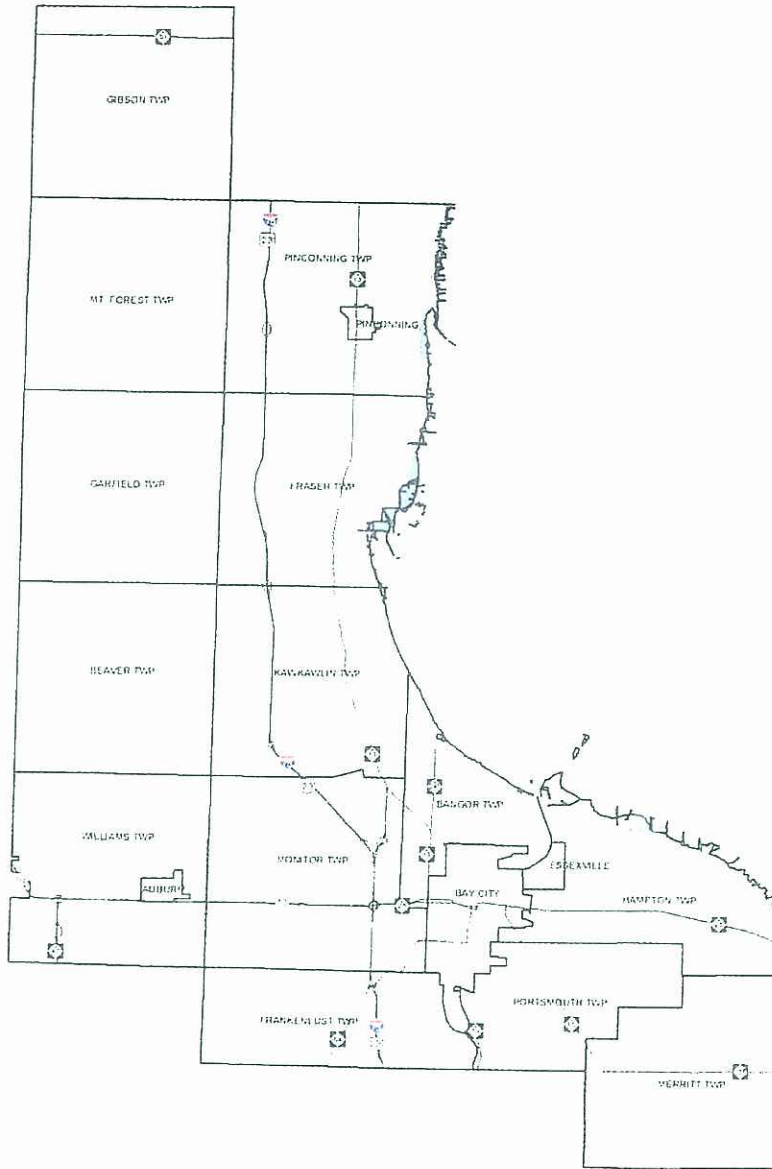
Facts at a Glance

- √ Lake plain prairie lands comprise approximately 68 acres, or 0.02 percent, of county land.

- √ Three lake plain prairie sites totaling 58 acres are located in Bangor Township. Six sites totaling 10 acres can be found in Hampton Township.

Source

Lake plain prairie information was obtained from the Michigan Natural Features Inventory.





Saginaw Bay Environmental Areas

Data Source: Michigan Dept. of Natural Resources



1 Inch Approximately Equals 5.19 Miles

-  Saginaw Bay Environmental Area
-  Political Boundary
-  Highway

Saginaw Bay Environmental Areas

Michigan's Department of Natural Resources has designated several land parcels along the Saginaw Bay shoreline as special environmental areas. These areas consist of wetlands as well as other environmentally sensitive habitats, and the plant species within them provide important nesting areas for local and migratory waterfowl. These parcels have been protected from development by state law.

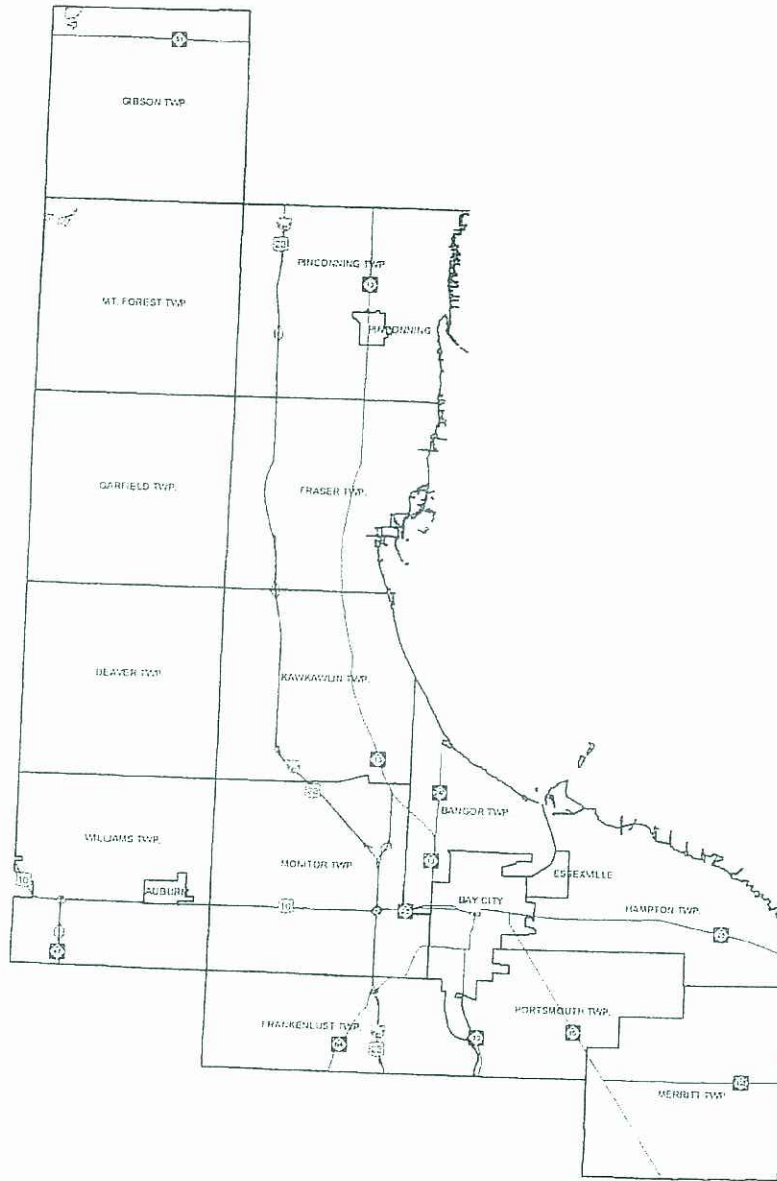
Facts at a Glance

- √ Environmental areas comprise approximately 1,340 acres, or 0.5 percent, of the county shoreline.

- √ Several of the environmental areas are located in proximity to state-owned recreation areas and protected wildlife refuges.




Source

Michigan Department of Natural Resources.



Remnant Native Landscape Sites

Data Source: Michigan Natural Features Inventory

-  Remnant Native Landscape Sites
-  Political Boundary
-  Highway



1 Inch Approximately Equals 5.19 Miles

Remnant Native Landscape Areas

The Michigan Natural Features Inventory has identified areas of vegetation thought to be indigenous to local ecosystems prior to the large-scale clearing of land in the state for agricultural purposes beginning in the 1800s. Three original cedar stands and two original tamarack stands have been found to still exist in Bay County. For this assessment, these lands are protected from development.

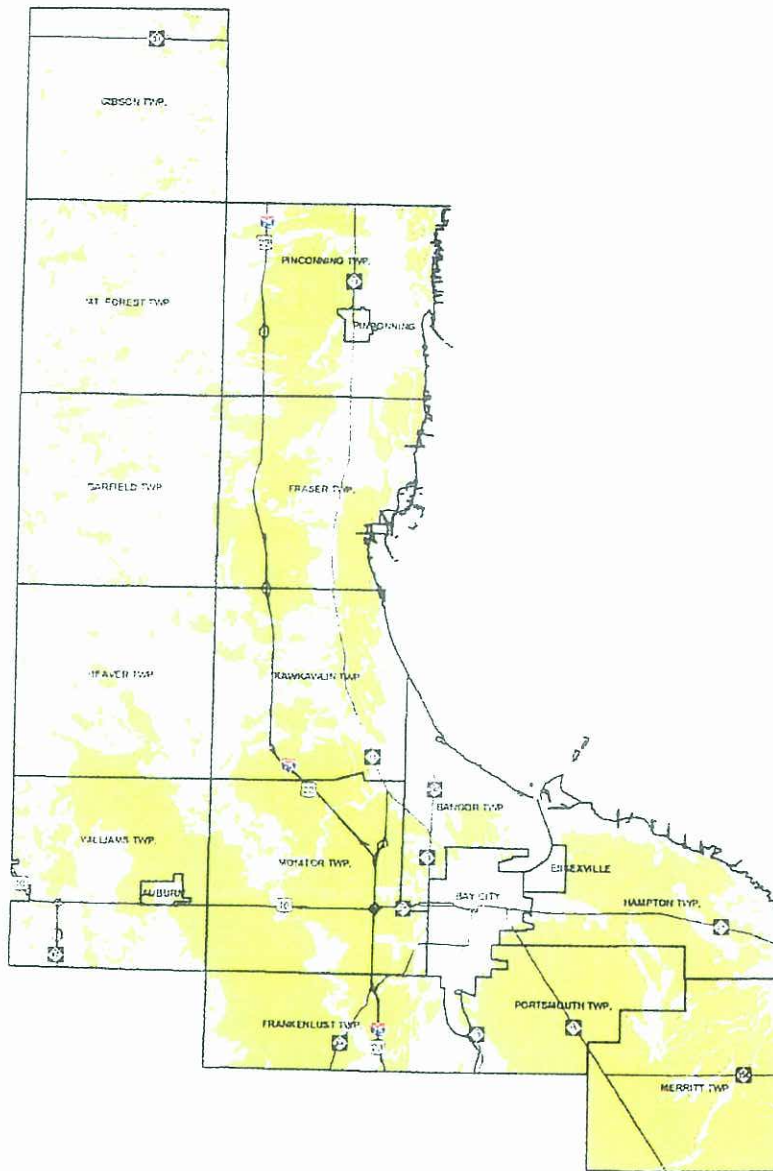
Facts at a Glance

- √ Remnants of Bay County's native landscape comprise approximately 0.07 percent, or 188 acres, of county's total land area.

- √ All of these areas are located in the northern part of the county, in the townships of Gibson and Mt. Forest.

Source

Michigan Natural Features Inventory.



Prime Agricultural Lands

Data Sources: Soil Survey for Bay County, Michigan (1977)
 Jim Burke (Bay County Agricultural & Natural Resources Agent)

- Prime Agricultural Land
- Political Boundary
- Highway



1/4 Inch Approximately Equals 5.19 Miles

Prime Agricultural Lands

Agriculture is an important component of the economy in the Bay County region, and the preservation of the county's most productive cropland is important to the county's future economic health. Although the prohibition of all development on prime agricultural lands may seem economically burdensome and unrealistic to some parties under present circumstances, the final scenario of this build-out assessment entertains this possibility in order to explore possible variations in the county's urban growth patterns as well as preservation of resources. Therefore, the county's best croplands have been designated as protected from development.

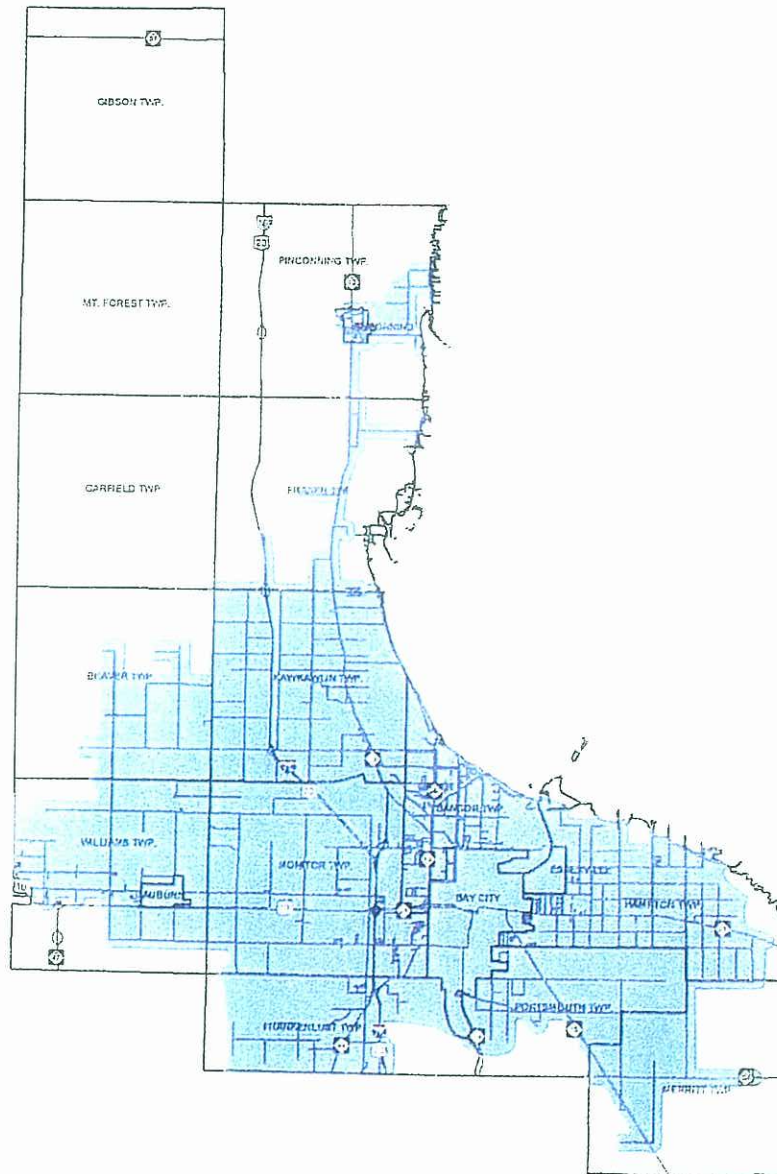
Lands considered best for agriculture have been determined based on their soil type's ability to support the growth of dry beans, a crop which is commonly grown throughout the county and which serves as the best indicator of agriculturally productive soils according to the Bay County Agricultural Extension Service. Those soil types yielding an average of 34 or more bushels per acre of dry beans in a growing season are considered the best soils for farming. The yield rating for dry beans by soil type is illustrated below.

Facts at a Glance

- √ Prime agricultural land occupies approximately 121,767 acres, or 43 percent, of Bay County's land area.
- √ Fifty-eight percent of prime agricultural acreage lies within the county's water service area. Availability of municipal water services increases the likelihood of development occurring on these lands.

Sources

Soil information is from the Michigan Resource Information System (MIRIS) Data for the Bay County Soil Survey (1977). Mr. Jim Burke, the Bay County Agricultural & Natural Resource Agent, provided information regarding dry bean production.



Water Service Area

Data Sources: West Bay County Water & Sewer System, Hampton Twp GIS Dept.,
 City of Pinckney Public Works Dept., Eugene Jankowski (Zoning Administrator for Beaver Twp),
 Donald Meyer (Supervisor for Merritt Twp.)



1 Inch Approximately Equals 5.19 Miles

-  Water Service Area
-  Water Line
-  Political Boundary
-  Highway

Step 4. Designating Water and Sewer Service Areas

Water Service Area

Bay County has over 214 square miles of land area currently served by installed water lines. Most of these lines are located in the southern half of the county, with lines also running along the M-13 corridor to Pinconning. Areas with water lines can generally accommodate higher density development patterns than those dependant upon wells, since the water lines enable development to be built in places where groundwater resources may be inadequate. Consequently, lands that might otherwise remain undeveloped have the potential to support new subdivisions, commercial buildings, or industry.

Currently, several water districts exist in Bay County, within and surrounding the communities of Auburn, Bay City, Essexville, the Village of Linwood and the City of Pinconning. Each district operates an independent water system.

The water service map (left) shows the water lines and associated service areas in Bay County. The water line network is a compilation of all installed water lines in the county. The water service area is an aggregate formed by creating a ¼ mile buffer around each water line.

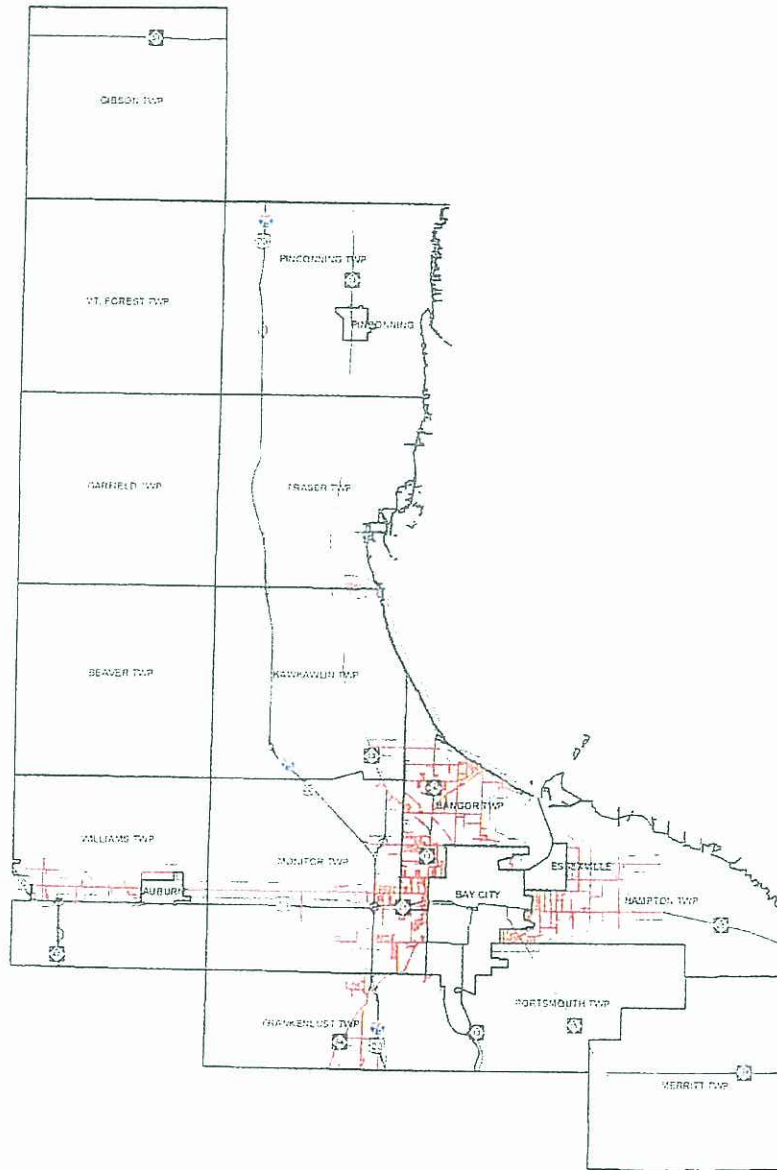
Facts at a Glance

- √ Approximately 48 percent, or 137,121 acres, of the county's land area is served by water lines.

- √ Almost 52 percent of the water service area is located in areas that are currently prime farming lands. Pressures to develop this farmland – for needed housing or as a means of paying for water system infrastructure – could mount in the future, placing valuable croplands at risk for permanent loss.

Sources

Water line data was provided by the West Bay County Water System and the Hampton Township GIS Department. The City of Pinconning Public Works Department; Mr. Eugene Jankowski, Zoning Administrator, Beaver Township; and Mr. Donald Meyer, Supervisor, Merritt Township, provided information updates.



Sewer Service Area

Data Sources: West Bay County Water & Sewer System
 Hampton Twp. GIS Dept.
 City of Pinconning Public Works Dept



Inch Approximately Equals 5.19 Miles

-  Sewer Service Area
-  Sewer Line
-  Political Boundary
-  Highway

Sewer Service Area

Sewer lines have been installed throughout the cities of Auburn, Bay City, Essexville and Pinconning. Much of Bangor Township, as well as the other townships in proximity to Bay City and Essexville, also have sewer service. As with water lines, sewer lines enable developments to be built at greater densities than would otherwise be possible, resulting in higher numbers of housing units and residents. The total area served by sewer lines in Bay County is approximately 59 square miles.

Facts at a Glance

- √ The sewer service area covers approximately 37,755 acres, or 13 percent, of Bay County's land area.
- √ Nearly all of the soil types found in Bay County are unsuitable for adequate septic system drainage, as shown on the map be-

Sources

Sewer line data was provided by the West Bay County Water System and the Hampton Township GIS Department. Soil information provided by the Soil Survey for Bay County (1977).

Table 1
Common Land Use Coding Key

Code	Map Color	Development Type	Dwelling Units Per Acre
1	Light Brown	Residential Rural	1 or less
2	Yellow	Residential Urban (Low Density)	2 – 3
3	Orange	Residential Urban (Moderate Density)	4 – 6
4	Dark Brown	Residential Urban (High Density)	7 or Greater
5	Red	Commercial/Office	(none)
6	Purple	Industrial	(none)
7	Grey	Transportation/Transitional	(none)
8	Green	Recreation/Institutional	(none)
9	Blue	Water	(none)

Step 5. Developing a Common Land Use Code

Each municipal zoning and land use plan codes are unique. Developing a common coding system through which the zoning and land use codes of all Bay County municipalities could be easily compared and evaluated was necessary. The common land use code key is shown in Table 1.

The classification of agricultural zones and categories was a special concern in the development of this common code system. Although the primary intention of these land use types is to permit farm-related activities, residential development is usually also allowed. Most zoning ordinances and land use plans simply specify minimum lot areas and other directions as criteria for these residential uses while failing to place restrictions on how much residential development can occur. In effect, the agricultural designation becomes a form of residential land use regulation. Therefore, agricultural zones/categories have been coded with the rural residential designation. For this assessment, the number of allowable housing units assigned to property parcels having this code was based on the density regulations of either the local zoning ordinance or the Michigan Land Division Act (PA 591 of 1996), whichever placed the greater restrictions.

Step 6: Soliciting Verification of Gathered Geographic Information

Once the common code had been assigned to the zoning and land use plan maps of all municipalities in Bay County, copies of each municipality's maps were printed and mailed for verification to the municipal government official in charge of planning duties. Officials were given a three-week time period in which to make revisions and return the maps.

Map corrections and updates were then transferred to the geographic information system coverages (computerized maps) of each municipality.

Step 7: Assembling Verified Geographic Information

Once all municipal zoning and land use plan coverages were free of errors, they were electronically "sewn together", through geoprocessing tools in ArcInfo and ArcView, to form coverages of the entire county. Because borders on municipal coverages did not always match exactly with those of neighboring municipal coverages, some digitizing was necessary to correct mismatched boundaries of property parcels. The finalized version of each coverage was then used to perform the build-out assessment.

Table 2
Summary of Parcel Divisions Allowed by
the Michigan Land Division Act (PA 591 of 1996)

Original Parcel Size (Acres)	Parcels Allowed
1	1
2	2
3	3
4 - 19.99	4
20 - 29.99	5
30 - 39.99	6
40 - 49.99	7
50 - 59.99	8
60 - 69.99	9
70 - 79.99	10
80 - 89.99	11
90 - 99.99	12
100 - 109.99	13
110 - 119.99	14
120 - 159.99	15
160 - 199.99	16
200 - 239.99	17
240 - 279.99	18
280 and above	19

Step 8: "Subtracting" Land Type Categories Unsuitable for Development

Subtraction Process Description

The subtraction process was organized according to a four-tier "pyramid" structure, with each subsequent scenario, or level, taking away additional land type categories from consideration for development. Each scenario produced two variables for analysis: the number of land acres available for residential development and the number of housing units that can theoretically occupy those acres.

Density requirements of land use ordinances, represented in this assessment by the common code values, stipulate the number of housing units which can be built upon an acre of land. The Michigan Land Division Act sets standards for the division of property parcels throughout the state (see Table 2). By regulating the maximum number of divisions allowed to a parcel over a 10-year period based on the parcel's size, this act indirectly regulates densities of housing units. Municipal zoning ordinances and land use plans can impose stricter density requirements. To calculate capacities, the set of density regulations resulting in the least number of potential housing units being generated in a municipality for each build-out scenario was applied.

The total number of potential housing units for each municipality was then compared to county population projections. The results indicate whether the county will have a housing shortage or surplus.

Subtraction Procedure

At the pyramid's base is the county-wide consolidated zoning coverage, in which all land in the county is considered available for development. Total acres and housing units are calculated for the entire land area of the county. The process is then repeated for the county-wide consolidated land use plan coverage. These coverages are referred to as the Consolidated Zoning Base Coverage and the Consolidated Land Use Map Plan scenarios.

Scenario A assumes that developed parcels, and those having tax-exempt status, are not available for development. Additionally, 10 percent of county land is identified as road right-of-ways and therefore subtracted from developable land. These categories are then removed from developmental consideration, and total acreage for the residential zones in the remaining land areas is calculated, along with the associated number of housing units. With the exception of subtracting out 10 percent of lands for road right-of-ways, this process is repeated for the land use plan data, using the consolidated land use plan map as a base. The scenarios are referred to as Zoning Scenario A and Land Use Map Plan Scenario A.

**Table 3
Summary of Build-Out Scenarios**

	Zoning Scenarios					Land Use Plan Scenarios	
	Base Coverage	Scenario A	Scenario B	Scenario C	Scenario D	Base Coverage	Scenario A
TOTAL ACREAGE	285,055	285,055	285,055	285,055	285,055	286,892	286,892
SUBTRACTION CATEGORIES							
Developed Parcels		Minus	Minus	Minus	Minus		Minus
Tax Exempt Parcels		Minus	Minus	Minus	Minus		Minus
Wetlands			Minus	Minus	Minus		
100-Year Floodplains				Minus	Minus		
State-Owned Lands				Minus	Minus		
Lake Plain Prairies				Minus	Minus		
Saginaw Bay Environmental Areas				Minus	Minus		
Remnant Native Landscape Areas				Minus	Minus		
Prime Agricultural Lands					Minus		
NET BUILDABLE RESIDENTIAL AREA (acres)	261,196	212,488	203,937	178,588	88,790	248,980	201,222
DWELLING UNITS	162,086	101,656	97,036	77,122	35,895	226,361	188,622

Scenario B uses the maps resulting from Scenario A's calculations as its basis for analysis. This time, in addition to developed and tax-exempt parcels, Priority I wetland areas are removed from consideration for development. With these three categories of land uses subtracted, total developmental acreage for the residential zones associated with the remaining land areas is again calculated. The associated number of housing units is also tallied.

Scenario C uses the maps resulting from Scenario B's calculations as a base. However, in addition to developed parcels, tax-exempt parcels and wetland areas, Scenario C removes the following categories from developmental consideration: remnant native landscape areas, state-owned lands, and 100-year floodplains. Again, the total developmental acreage and associated number of housing units for the residential zones associated with the remaining land areas are calculated.

Scenario D, uses the maps resulting from Scenario C's calculations as a base. This time, in addition to all the categories removed from developmental consideration during Scenario C, prime agricultural lands are subtracted. Total acres and housing units are then tallied for the remaining land areas.

Table 3, left, provides a summary of the scenarios and the land categories subtracted from each.

Notes and Comments

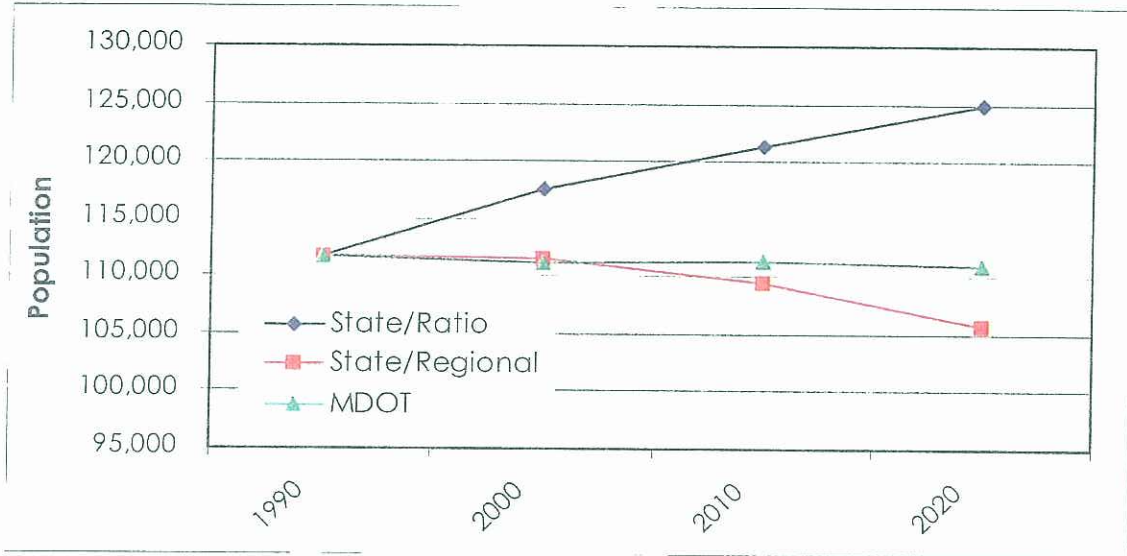
- Designation of developed and tax-exempt parcels as lands unsuitable for development was based on the assumption that development either actually exists or will definitely exist at some time in the future on these parcels based on tax classifications designated through the equalization process.
- Designation of wetland areas, remnant native landscape areas and 100-year floodplains as lands unsuitable for development was based on the natural resource value of these land types. Negative impacts associated with development in these environmentally sensitive areas were also considered.
- Designation of prime agricultural land as unsuitable for development was based on the belief that farmland, while developable under the right environmental and economic conditions, should be viewed as an economic resource and ought to be preserved. Prohibiting, or severely restricting, development on the soil types known to produce the best local crop yields ensures the future economic vitality of the county's farm industry as well as benefits to the county's environment associated with open spaces. Note that the Scenario D analysis was performed as a means of demonstrating the impacts associated with preserving – or choosing not to preserve – Bay County's most productive agricultural lands.



Environmentally sensitive areas provide habitats for wildlife and are important to preserve.

- Saginaw Bay Environmental Areas and lake-plain prairie remnants were considered as areas deserving of designation as lands unsuitable for development but were not incorporated into the analyses calculations due to geographic redundancy. This assumption does not intend to imply the environmental significance of these areas should be discounted. Rather, the locations of these categories simply coincided with the locations of one or more other land categories. Consequently, although these categories were not specifically integrated into the analysis, the lands they occupy were designated as unsuitable for development anyway.
- Attempts to gather land use plans from all municipalities resulted in an incomplete collection. For the City of Pinconning and the Townships of Gibson and Pinconning, county equalization records were substituted in lieu of land use data for the land use plan assessment.

Figure 3
Population Projections for Bay County
1990 through 2020



Source: Table 3 Population Projections

Note: MDOT 2000 and 2010 projections are estimated from MDOT 1990 and 2020 values

Step 9: Obtaining Population Projections of Bay County Municipalities

The subtraction process described in Step 8 calculates the maximum number of housing units that could be built in a municipality according to density requirements set forth in zoning ordinances and land use plans. This maximum number can also be thought of as a municipality's housing unit capacity.

Population projections, such as those based on the U.S. Census, forecast changes in municipal populations over time. Whereas the build-out assessment process can produce estimates of a municipality's maximum population based on calculated municipal housing unit capacities multiplied by a fixed average number of persons per household, population projections can more accurately estimate a municipality's population fluctuations over a specified period of time. A municipality's housing unit demand, which is the number of housing units required to meet the needs of the projected population, can be calculated by dividing the population total by an average number of persons per household.

For this assessment, Bay County's calculated municipal housing unit capacities from each of the build-out scenarios is compared to its projected municipal housing unit demands for the year 2020. If the anticipated number of planned-for housing units exceeds the number of units being demanded by the population, then unnecessary urban growth and excess pressure on installed infrastructure may result. Conversely, if the anticipated number of planned-for housing units is not enough to meet the needs of a growing population, then haphazard urban development may occur in various parts of the county, and environmental degradation may result. Ideally, capacities should closely resemble projected demand, since they are directly impacted by municipal planning efforts.

Population projections for Bay County municipalities were obtained from four sources. Each source uses its own methodology, providing a range of estimates for comparison purposes. Note that not all sources project through the year 2020. The sources include:

1. The Michigan Department of Transportation (MDOT). MDOT uses the Regional Economic Model Incorporated (REMI model), developed by the University of Michigan. The model accounts for births and deaths experienced by a regional population, as well as migration. The model uses U.S. Bureau of Economic Assessment socioeconomic forecasts, employment data and wage information and U.S. Census population estimates. REMI population projections were last performed in 1998. Populations are projected to 2020.

TABLE 4. POPULATION PROJECTIONS FOR BAY COUNTY

	U.S. Census		State/Region		MDOT		Clartias, Inc.			State/Ratio			
	1990	2000	2010	2020	1995	2020	Change (1990-2020)	1990	1999	2004	Change (1990-2004)	2010 (8.9% Increase)	2020 (12% Increase)
Townships													
Bangor	16,038	16,486	16,394	15,725	16,301	16,410	2.36%	16,590	16,335	16,354	-1.42%	17,454	17,351
Beaver	2,774	3,076	2,995	2,775	2,799	2,834	2.16%	2,810	2,951	3,036	9.04%	3,021	3,107
Frankenlust	2,281	2,562	2,492	2,388	2,276	2,333	2.26%	2,281	2,516	2,628	15.21%	2,484	2,555
Fraser	3,660	3,894	3,774	3,700	3,695	3,706	0.71%	4,070	4,153	4,208	3.99%	4,008	4,122
Garfield	1,736	1,931	1,885	1,807	1,784	1,835	5.70%	1,346	1,492	1,577	17.16%	1,891	1,944
Gibson	1,080	1,172	1,145	1,097	1,091	1,112	2.02%	1,193	1,300	1,354	13.50%	1,187	1,221
Hampton	9,520	9,776	9,494	9,100	9,311	9,315	-2.15%	9,520	9,522	9,611	0.96%	10,367	10,652
Kawkawich	4,888	5,154	4,983	4,776	4,812	4,855	-0.68%	4,852	5,029	5,140	5.94%	5,323	5,475
Merritt	1,510	1,517	1,482	1,423	1,576	1,572	4.11%	2,177	2,158	2,177	0.00%	1,644	1,691
Mt. Forest	1,457	1,655	1,616	1,549	1,486	1,522	4.48%	1,354	1,463	1,518	12.11%	1,587	1,632
Pincunung	2,647	2,828	2,761	2,646	2,445	2,479	-6.35%	3,601	3,935	4,099	13.83%	2,883	2,965
Portsmouth	3,918	4,046	3,905	3,743	3,698	3,697	-0.54%	3,258	3,259	3,279	0.64%	4,267	4,388
Williams	4,278	4,642	4,511	4,324	4,517	4,587	7.22%	5,309	5,618	5,837	9.95%	4,659	4,791
Subtotal	65,282	68,980	67,335	64,540	65,708	66,209	1.42%	67,873	69,606	70,994	4.60%	71,092	73,116
Percent of Total	59%	62%	62%	61%	59%	60%		61%	64%	65%		59%	59%
Cities													
Auburn	1,855	1,920	1,980	2,010	2,003	2,015	8.69%	1,058	1,076	1,086	2.65%	2,020	2,078
Bay City	38,936	35,400	34,985	34,300	38,116	37,190	-4.48%	38,367	34,688	33,247	-13.34%	42,401	43,608
Essexville	4,088	3,800	3,600	3,500	4,176	4,104	0.39%	4,088	3,800	3,690	-9.74%	4,452	4,579
Pincunung	1,291	1,400	1,500	1,450	1,395	1,419	9.91%	337	383	406	20.47%	1,406	1,446
Midland	271												
Subtotal	46,441	42,520	42,065	41,260	45,690	44,728	-3.68%	43,850	39,947	38,429	-12.30%	50,279	51,710
Percent of Total	42%	38%	39%	39%	41%	40%		39%	36%	35%		41%	41%
BAY COUNTY	111,723	111,500	109,400	105,800	111,398	110,937	-0.70%	111,723	109,633	109,423	-2.06%	121,371	124,826

Sources:

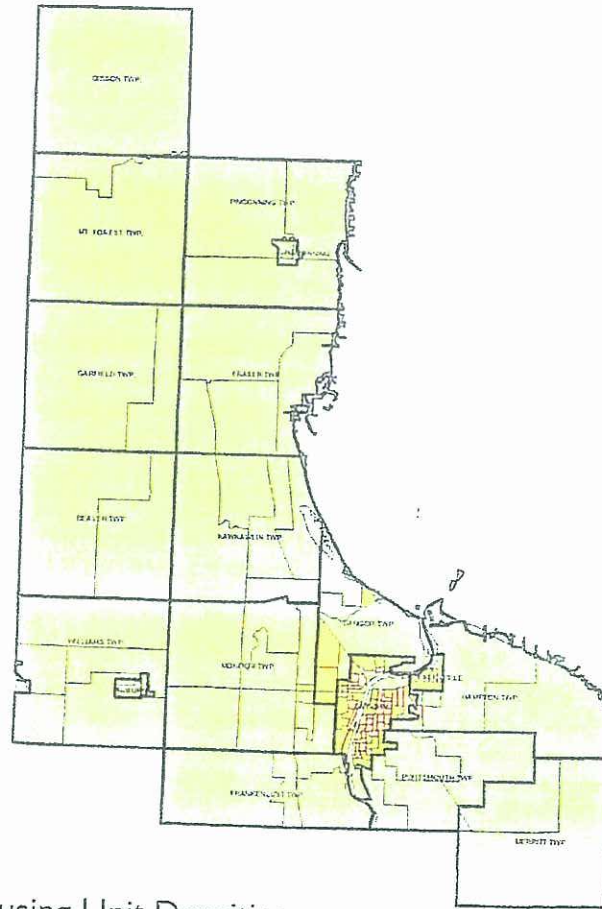
- U.S. Census: US Census Bureau STF3A Files (1990)
- State/Region: Office of State Demographer, Department of Management and Budget and the Eastern Central Michigan Planning and Development Regional Commission (2000-2020)
- MDOT: Michigan Department of Transportation - Planning Division
- University of Michigan REMI Model (1995-2020)
- Clartias, Inc. of Ithaca, New York (1990-2004)
- State/Ratio: Office of State Demographer, Department of Management and Budget (2010 and 2020)

2. Michigan Department of Management and Budget, Office of the State Demographer and East Central Michigan Regional Planning Commission (State/Region). The East Central Michigan Regional Planning Commission distributes the county population forecasted by the Office of the State Demographer to each municipality. The State/Region source uses the U.S. Census data to determine projections. Populations are projected to 2010.
3. The Michigan Department of Management and Budget, Office of the State Demographer (State/Ratio). The State/Ratio uses U.S. 1990 Census data and projected populations for the State of Michigan. The percent increases in the state's population for 2010 and 2020 are then applied to Bay County municipalities. Michigan's population increase between 1990 and 2010 was 8.9 percent, and between 1990 and 2020, 12 percent.
4. Claritas, Inc (Claritas). Claritas is a private company that uses U.S. Census data and population data from private marketing firms. The company works with local government agencies estimate future populations. Claritas projections extend to 2004.

The population projections of all sources are provided in Table 4. With the exception of the State/Ratio method, all projections indicate a decline in Bay County's population by 2020. Figure 2 depicts the ranges of population projections from the MDOT, State/Regional and State/Ratio methods. Claritas was not included, since it projects only to the year 2004. The translation of the county population into housing units per square mile is shown on page 44.

While Bay County's overall population is expected to decrease from its 1990 count, certain municipalities within the county can expect population increases. In general, townships, which contain approximately 60 percent of the county's population, are expected to have relatively minor population fluxes (-1.14 percent to 1.42 percent), as compared to the cities (-11.16 percent to -3.69 percent), which all indicate continued decline.

Figure 4
Housing Units per Square Mile for
Bay County



1999 Housing Unit Densities
by Census Block Group

Data Sources: US Census, Claritas Corp.

1 Inch Approximately Equals 3.2 Miles

- Rural Residential (Less than 1 Dwelling Unit per Acre)
- Urban Residential - Low Density (2 - 3 Dwelling Units per Acre)
- Urban Residential - Moderate Density (4 - 6 Dwelling Units per Acre)
- Urban Residential - High Density (More than 6 Dwelling Units per Acre)
- Political Boundary
- Census Block Group Boundary

Step 10: Calculating Acreages and Maximum Potential Housing Unit Results for the Common Land Use Codes

Attachment B contains result data for all the scenarios analyzed in this assessment. Included for each scenario are:

- A map of Bay County highlighting the areas of land available for development.
- A table displaying the number of developable acres in each common key category as well as the number of potential housing units for each residential category.
- A table comparing the housing unit capacity calculations with housing unit demands in the year 2020 as forecasted by the MDOT and State/Ratio models. Shortages (under capacity) or surpluses (excess capacity) of housing units are determined by subtracting dwelling unit need (Dwelling Unit) from dwelling unit supply (Build-out Potentials). Negative values indicate a surplus of dwelling units for a municipality. Positive values indicate a shortage of dwelling units.

**Table 5
Zoning Build-Out Analysis Summary**

	RESIDENTIAL								Total (Residential)			
	Rural		Low Density		Medium Density		High Density		Acres	Percent Change	Dwelling Units	Percent Change
	Acres	Percent Change	Acres	Percent Change	Acres	Percent Change	Acres	Percent Change				
Base Coverage	202,721		36,552		18,060		3,864		261,197		162,086	
Scenario A	172,433	-15%	29,790	-18%	9,503	-47%	761	-80%	212,487	-19%	101,656	-37%
Scenario B	165,615	-18%	29,045	-21%	8,635	-52%	642	-83%	203,937	-22%	97,036	-40%
Scenario C	149,609	-26%	22,437	-39%	6,114	-66%	427	-89%	178,587	-32%	77,122	-52%
Scenario D	76,904	-62%	9,768	-73%	1,930	-89%	189	-95%	88,791	-66%	35,895	-78%

**Table 5
(Concluded)**

	Commercial		Industrial		Transportation		Recreation/ Insttutional		Water		Total (All Categories)	
	Acres	Percent Change	Acres	Percent Change	Acres	Percent Change	Acres	Percent Change	Acres	Percent Change	Acres	Percent Change
Base Coverage	7,247		5,839		9,173		1,114		485		285,055	
Scenario A	3,442	-53%	1,931	-67%	8,909	-3%	28	-97%	485	0%	227,285	-20%
Scenario B	3,280	-55%	1,239	-79%	8,775	-4%	27	-98%	160	-67%	217,418	-24%
Scenario C	2,922	-60%	420	-93%	7,809	-15%	3	-100%	21	-96%	189,762	-33%
Scenario D	1,949	-73%	226	-96%	4,193	-54%	3	-100%	14	-97%	95,176	-67%

**Table 6
Capacity Summary for Zoning Build-Out Analyses**

	Dwelling Units Allowed	Dwelling Unit Demand 2020 (State/Ratio)	2020 Capacity (-Over Capacity)
Base Coverage	162,086	5,227	-156,859
Scenario A	101,656	5,227	-96,429
Scenario B	97,036	5,227	-91,809
Scenario C	77,122	5,227	-71,895
Scenario D	35,895	5,227	-30,668

DISCUSSION OF RESULTS

Zoning Ordinance Build-out

Zoning Build-Out Acreage and Housing Unit Results, Scenarios A through D

Table 5 (left) summarizes the build-out analyses results for the five zoning scenarios. The table shows the number of developable acres in each common code category, along with the percentage decrease in developable acres as compared to the base coverage. Scenario D, for example, has 76,904 acres of land classified as rural residential available for development after all land areas designated as unsuitable for development have been removed from consideration. This indicates a 62 percent reduction in the number of developable rural residential acres for this scenario.

The percentage change value is the difference between what the zoning base coverage allows—the coverage with no lands subtracted—and the scenario coverage. For example, of the total residential land reductions, most occur from high and moderate density designations. This demonstrates that most of the higher density lands are already developed. Stated another way, since approximately 80 percent of zoning-allowed high-density residential developments are already constructed, they would have been subtracted during the first build-out assessment (Scenario A). Similarly, approximately 97 percent of the recreational or institutional lands are tax exempt and also were subtracted during Scenario A.

Zoning Build-Out Capacities Results, Scenarios A through D

All scenario housing unit capacity estimates far exceed the 2020 projected demand. The baseline county build-out capacity allows for approximately 162,086 dwelling units. This number, when compared to most generous projected 2020 population, overestimates capacity by approximately 156,859 dwelling units. Although the capacities decrease with each scenario, the provision of housing units for the county as a whole does not approach the projected demand for housing. The lowest difference occurs with Scenario D at 35,895 dwelling units. Table 6, left, presents a summary of the build-out capacities by scenario and the associated excesses. Data in the table is compiled from the scenario tables presented in Attachment B.

While the capacity of the county as a whole exceeds projected values, some variation among townships and cities exists. None of the townships approach the projected demands. Cities, being largely built out, are closer to meeting demands and, in some cases, fall short of housing demands. Unfortunately, city under-capacities do not balance township excess-capacities. For example, under Scenario A, townships exceed capacity by over nearly 97,400 dwelling units, whereas the cities could expect a housing shortage of approximately 963 dwelling units (see Attachment B, page 9). The magnitude of the differences negates any positive effect the housing shortages offer.

**Table 7
Land Use Plan Built-Out Analysis Summary**

	Residential								Total (Residential)			
	Rural		Low Density		Medium Density		High Density		Acres	Percent Change	Dwelling Units	Percent Change
	Acres	Percent Change	Acres	Percent Change	Acres	Percent Change	Acres	Percent Change				
Land Use Plan Base Coverage	212,704		20,567		10,540		5,169		248,980		226,361	
Land Use Plan Scenario A	179,828	-15%	13,984	-32%	6,084	-42%	1,326	-74%	201,222	-19%	188,622	-17%

**Table 7
(Concluded)**

	Office/ Commercial		Industrial		Transportation		Recreation/ Instiutional		Water		Total (All Categories)	
	Acres	Percent Change	Acres	Percent Change	Acres	Percent Change	Acres	Percent Change	Acres	Percent Change	Acres	Percent Change
Land Use Plan Base Coverage	10,072		6,106		4,020		14,606		3,108		286,892	
Land Use Plan Scenario A	4,850	-52%	2,479	-59%	3,562	-11%	8,727	-40%	3,028	-3%	223,869	-22%

**Table 8
Comparison of Scenario A Zoning and Land Use Analyses**

	Rural Residential				Low-Density Residential				Moderate-Density Residential				High-Density Residential			
	Acres	Percent Change	Dwelling Units	Percent Change	Acres	Percent Change	Dwelling Units	Percent Change	Acres	Percent Change	Dwelling Units	Percent Change	Acres	Percent Change	Dwelling Units	Percent Change
Zoning Scenario A	172,433		29,668		29,790		41,706		9,503		26,610		761		3,671	
Land Use Plan Scenario A	179,828	4%	179,828	506%	13,984	-53%	7,083	-83%	6,084	-36%	1,521	-94%	1,326	74%	189	-95%

**Table 8
(Concluded)**

	Total				Office/ Commercial		Industrial	
	Acres	Percent Change	Units	Percent Change	Acres	Percent Change	Acres	Percent Change
Zoning Scenario A	212,487		101,655		3,442		1,931	
Land Use Plan Scenario A	201,222	-5%	188,622	86%	4,850	41%	2,479	28%

Land Use Plan Build-Out

Land Use Plan Build-Out Acreage and Housing Unit Results

A land use plan is a community's future land policy statement. Land use plans represent a community's vision for development and are the result of a collaborative, extensive planning process. Zoning is considered the implementation tool of the land use plan and assigns current land uses. Variations will exist between the two maps, however the zoning map should resemble the land use plan map.

Table 7 summarizes the assessment results for Land Use Plan build-out scenarios for Bay County. Table 8 presents a comparison of the Zoning Build-out Scenario A and the Land Use Plan Build-Out Scenario A. A discussion of build-out analyses under *Zoning Ordinance Build-Out* provides an explanation of table values.

Part of the reason for the categorical differences shown in Table 8 is that similar maps are not being compared. Land use plan maps assigned land uses to general areas, and when land use plans were not available, equalization records were substituted. In contrast, the zoning coverage was based on zoning maps that are parcel-specific, assigning a land-use code to all property parcels in a municipality. This enables a more precise representation of the mapped zoning codes. So, when comparing categories, a certain amount of error is given to the difference in land-designation techniques. Also, zoning maps do not zone parcels for water or transportation land uses. For this reason, transportation and water categories are not represented in the summary table. Although caution is given to making cold comparisons between the two maps, this level of analysis is sufficient to demonstrate general discrepancies between the land use and the zoning maps.

One of the most alarming figures in the table is the large variation between the total dwelling units in the Rural Residential category of both scenarios. Since the land use plan maps are generalized in that land uses are not tied to property parcel polygons, the most conservative definition of Rural Residential—one dwelling unit per acre—was applied. The zoning maps displayed land use by property parcel, such that the Land Division Act could be applied. Parcels zoned rural residential were assigned a density not based on the code, but based on the maximum density allowed for that particular parcel according to the act. So while the acreages are fairly similar, the land use plan analysis allows for approximately 150,000 more dwelling units than its zoning counterpart.

Acreages appear fairly similar at the county level. However, a review of the data on the municipal level indicates major discrepancies (Attachment B). For example, according to Williams Township's land use plan, an estimated 12,683 acres are earmarked for rural residential development, 1,111 acres for low-density, 160 acres for moderate density, and 32 acres

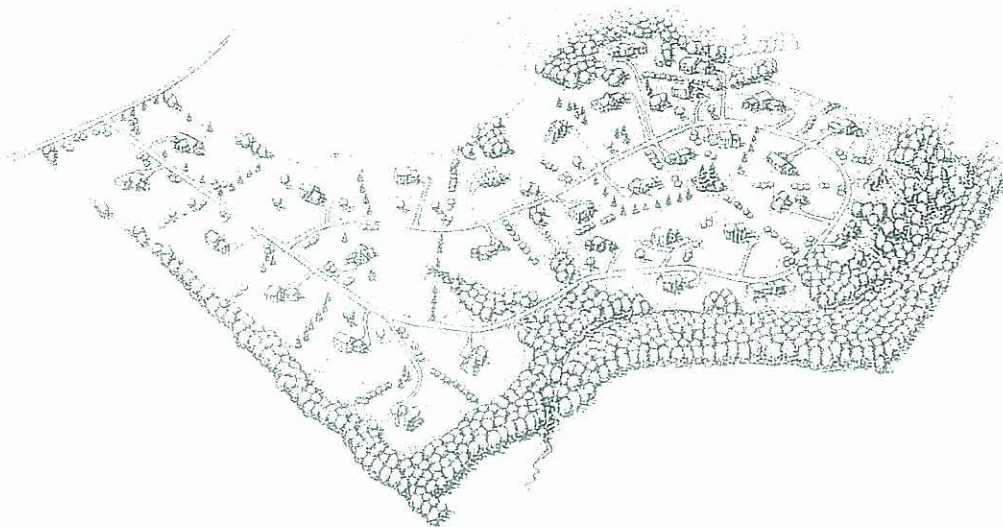
Table 9
Capacity Summary for Land Use Plan Build-Out Analyses

	Dwelling Units Allowed	Dwelling Unit Demand 2020 (State/Ratio)	2020 Capacity (-Over Capacity)
Land Use Build-out Base Coverage	226,361	5,227	-221,134
Land Use Build-out Scenario A	188,622	5,227	-183,395
Zoning Build-out Scenario A	101,656	5,227	-96,429

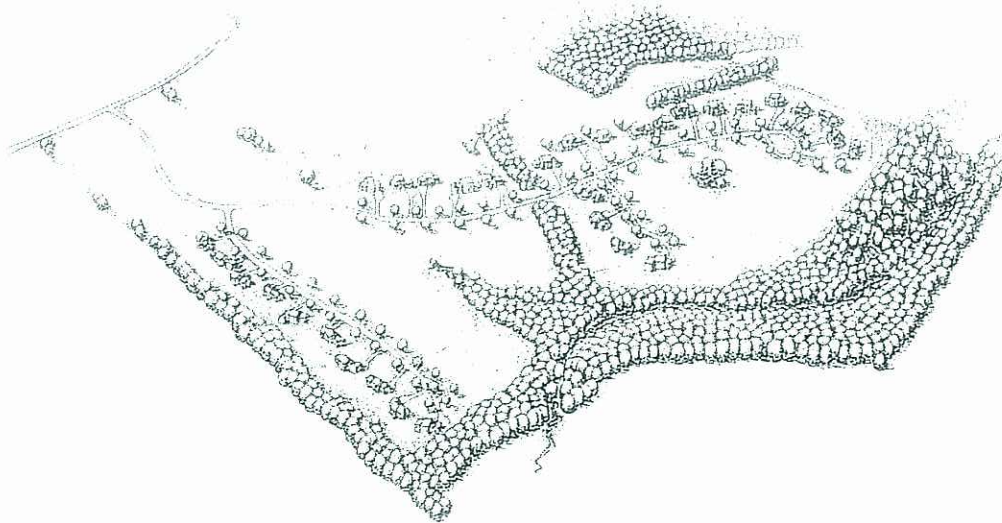
for high density. According to Williams Township's zoning code, zero acres are designated as rural residential, while 15,908 acres are designated for low density, 81 for moderate, and zero acres for high density. This means that approximately 9,200 more homes are allowed under the zoning code than intended per the land use plan. Interestingly, just as Williams Township has exceeded its land use plan housing provision, other municipalities, such as Beaver and Bangor Townships, have fallen short of intended housing provisions. As previously stated, zoning and land use maps have different purposes and as such, a certain amount of discrepancy is expected. These examples highlight the impact of the differences.

Land Use Plan Build-Out Capacities Results

The land use plan capacity results are even higher than those estimated by the zoning scenarios. This may be due, in part, to assigning the Rural Residential category a density of one dwelling unit per acre, when in fact the density may be higher (see discussion in above section). However, this explains only some of the difference; in general, more acres of higher density residential development are allocated in land use plans than in their zoning counterparts. Table 9 summarizes the build-out capacity results at the county-level. The discussion of build-out capacity results under the *Zoning Build-out Capacities Results* provides an explanation of table values.



Examples of a conventional subdivision (above) and a conservation subdivision (below). Conservation designs group homes smaller lots, preserving the remaining land.



Source: *Designing Open Space Subdivisions, A Practical Step-By-Step Approach*. National Lands Trust: Randall Arendt, MRTIP Vice President, Conservation Planning, and site plans and perspective sketches by Holly Harper, Stephen Kuter, and Nicole Keegan. September 1994. The document was funded with grants from the W. Alton Jones Foundation and the United State Environmental Protection Agency.

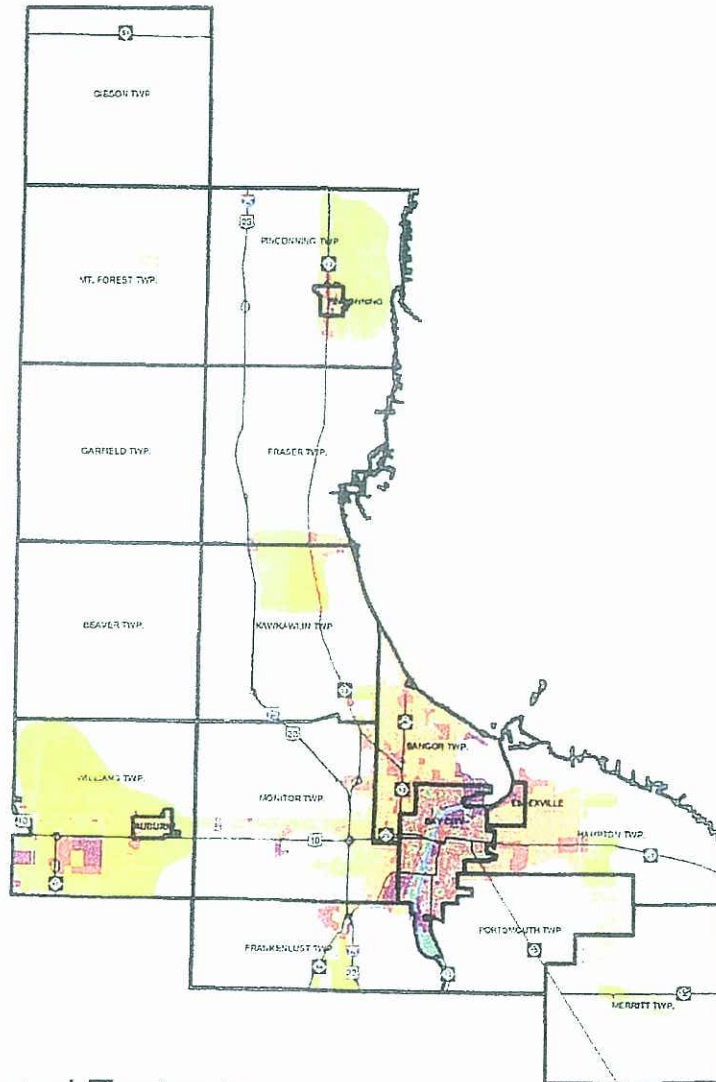
SUGGESTED ALTERNATIVES

The State of Michigan's land use planning laws are based on the original planning enabling legislation enacted in the 1920s. At that time, local governments zoned land to separate incompatible uses, and zoning categories were generally limited to residential, commercial and industrial. This is the model that most of America continues to practice. However, communities that use this model tend to plan as individual entities and not as a region. Each community plans for its own interests, competing with neighboring cities. The result is sprawl--vacant downtown areas and generic suburbs that erode natural resources, open space and agricultural land. According to the build-out assessment, and to no fault of county municipalities, this appears to be the direction in which Bay County is heading.

Development patterns have changed since the 1920s, and the currently desired community is one that is compact, livable, and rich in character. Achieving this type of community requires planning as a region and expanding zoning categories to reflect the preservation goals of the community. One alternative is for Bay County municipalities to adopt and implement a growth management plan for the county. Planning with a regional perspective and adopting flexible planning techniques is part of the Smart Growth agenda championed by the American Planning Association.

There is not a specific formula for developing a regional growth management strategy. A good first step toward realizing a county plan is to formulate a coordinating committee, comprised of public and private representatives from each municipality. The committee could then be responsible for preparing and implementing a regional growth management plan. Areas to consider or focus on are:

- Identifying an urban growth boundary, which consists of land—both developed and undeveloped—necessary to sustain development in a twenty-year period. Minimum densities within the boundary could also be specified.
- Identifying lands to be preserved and lands that are appropriate for development. Lands to be conserved could be those listed in this report (e.g. Saginaw Bay environmental areas, remnant landscapes), along with other citizen-identified land or recreational land. Conservation designed subdivisions, like the example shown to the left, can be used to preserve lands. A regional open-space network could also be a part of the conservation design program.
- Preserving agricultural lands through farm linkages (connecting farm sellers with farm buyers), agricultural zoning, development right programs or conservation easements. Preserving agricultural land is often a function of preserving the rural character that many communities seek to maintain while they grow.



Consolidated Zoning in Alternative Growth Strategy Areas

▲
N
1 Inch Approximately Equals 3.2 Miles

- Rural Residential (Less than 1 Dwelling Unit per Acre)
- Urban Residential - Low Density (2 - 3 Dwelling Units per Acre)
- Urban Residential - Moderate Density (4 - 6 Dwelling Units per Acre)
- Urban Residential - High Density (More than 6 Dwelling Units per Acre)
- Commercial
- Industrial
- Transportation/Transitional
- Recreation/Institutional
- Water

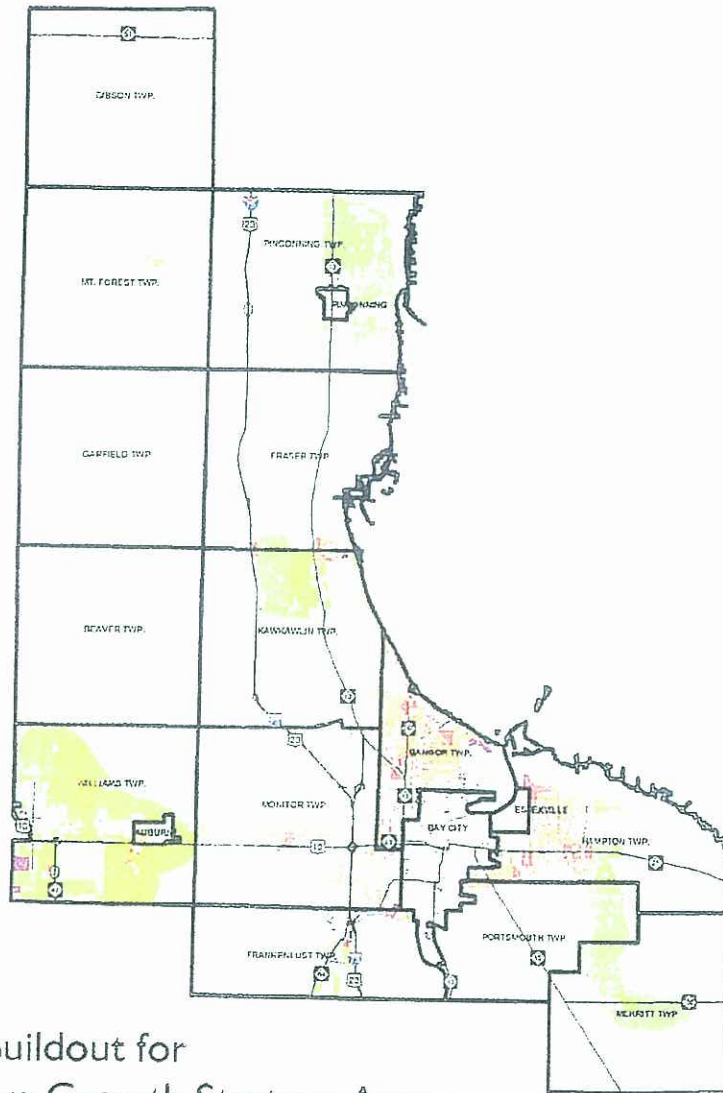
Political Boundary
 Highway

- Protecting the environment while developing. Lands to be protected could include wetlands, forested areas, or critical habitats and watersheds.
- Reinvesting in downtown centers by redeveloping brownfields or by financially supporting developments that are within sewer and water service areas. Concurrently, growth in rural villages could be restricted to projects that maintain the character of the community but do not increase capacity. Encouraging development in urban centers, such as Bay City, also reduces sprawl.
- Providing housing at reasonable cost for elderly, disabled and low-income citizens.
- Ensuring the availability of alternative modes of transportation. Railroad, highway, bus, bike and walkers should all be taken into consideration.

Additionally, the committee could establish common county goals that all municipal master plans must address as elements. Potential elements may include land use, transportation, community facilities, mineral resources, sensitive areas (including streams, buffers, critical habitats, 100-year floodplains, threatened and endangered species habitat and steep slopes), affordable housing, transportation, and economic development. To ensure that the master plan elements are followed, the county could also enact a policy that local master plans be consistent with regional growth management plan.

An example strategy that is consistent with Smart Growth principles is shown to the left. This concept of Alternative Growth Strategy Areas preserves Bay County's natural resources, and maximizes the benefits of already installed and publicly funded infrastructure. These designated areas of land have been determined through the results of this build-out assessment to be the best suited areas for development in Bay County by virtue of their proximity to installed water and sewer lines, their location near existing development, and their scarcity of valuable resources. Conceptually, there are four major development zones within Bay County under this scenario, which include:

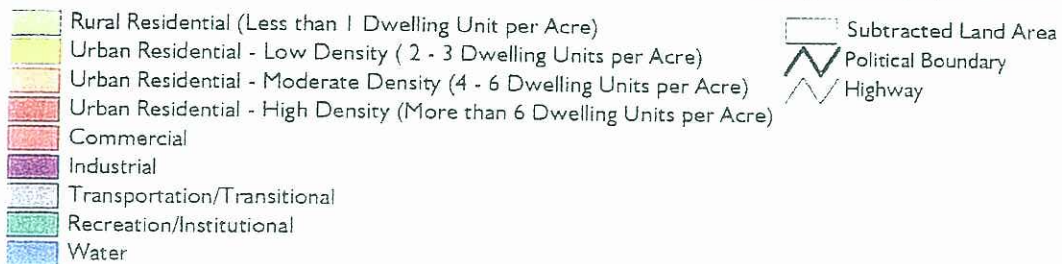
- The Greater Bay City Area (Bay City, Essexville, Hampton Township, the southern portion of Bangor Township, and the southeast quadrant of Monitor Township)
- The Williams Township/US-10 Corridor
- The northern portion of Kawkawlin Township, between I-75/US-23 and M-13, and
- The City of Pinconning and Pinconning Township.



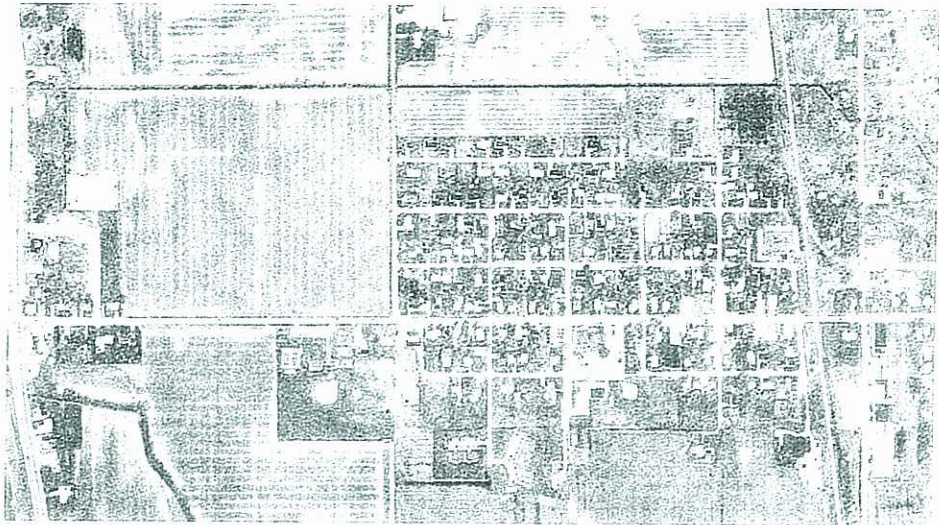
Zoning Buildout for Alternative Growth Strategy Areas

Based on Consolidated Zoning minus Developed Parcels &
Tax-Exempt Parcels

1 Inch Approximately Equals 3.2 Miles



The map of Alternative Growth Strategy Areas, with developed properties and tax-exempt parcels subtracted, is shown to the left; the build-out assessment results, are displayed in Attachment C. Slightly more than 11,000 potential housing units could be built in these regions, according to the provisions set forth in current zoning regulations. According to the results of the Scenario A Build-out Assessment for the entire county, the State/ Ratio model predicts that Bay County will need only 5,227 additional housing units by the year 2020. And the MDOT model predicts that the county will actually have a surplus of 329 housing units by 2020. The number of housing units that could be built in the suggested Alternative Growth Strategy Areas, then, is more than enough to meet the anticipated housing needs of Bay County. As a result, prime agricultural land now found in the townships of Merritt, Portsmouth, Monitor, Frankenlust, Hampton, and along the I-75/US-23 corridor would be protected from urban development. The rural character and quality of life deemed by many Bay County municipal master plans as a viable and important asset requiring protection would be enhanced. And, the need to extend more water and sanitary sewer services could be curtailed, thus maximizing the current investment in public utility systems.



Example of residential development encroaching on agricultural areas in Bay County.

CONCLUSION

The Bay County Department of Environmental Affairs & Community Development retained Beckett and Raeder, Inc. of Ann Arbor Michigan to perform a build-out assessment of Bay County. The assessment determined the capacity of the county when it reached its built-out state under seven scenarios. Five scenarios were based on municipal zoning maps, and each scenario had successive restrictions placed on the amount of land that could be developed. Two scenarios were based on municipal land use plans and served to highlight general land use consistencies or inconsistencies between land use plans and zoning ordinances.

The build-out results for the zoning scenarios indicate that the housing capacity of Bay County far exceeds 2020 projected population need. In general, Bay County cities are largely developed and therefore either meet or fall short of projected population demands. Townships designate far too much land for residential development. Unfortunately, city shortages do not balance township excesses, suggesting that a reorientation of land uses on a county-wide basis may be necessary.

The build-out capacity results of Land Use Plan Scenario A allows for even more residential development than the least-restrictive zoning scenario. However, given the general classification of lands in future land use maps, the land use plan build-out results should not be held to the same standard of accuracy as the zoning build-out analyses. Rather, the land use plan scenario is intended only to demonstrate the level of consistency between municipality land use plans and zoning maps. While some municipal zoning maps are fairly consistent with the intent of their land use plan maps, others show wide disparities between the two.

The build-out assessment results suggest that changes are required if the county is to develop according to population projections. With the assessment completed, now is an ideal opportunity for municipalities to reconsider their planning priorities. This assessment does not intend to direct the county's plan for development, but only to provide the information necessary for citizens to plan future land uses and development patterns. A good approach would be to plan first on a county level, and have individual municipal plans be consistent with the county plan. Topics to be considered when discussing future planning goals may include: preserving cultural and natural resource features; determining residential, commercial and industrial development and placing associated infrastructure appropriately; and reducing sprawl and encouraging development in the county's low capacity, stressed or low capacity communities.

The results of this build-out assessment provide a mental picture of the impacts that current municipal land use policies can have on the future quality of life in Bay County. Traditionally, the county's municipalities have embraced the "home rule" philosophy of Michigan government, focusing planning efforts on localized needs and desires. This has effectively turned

Bay County into a patchwork of individual entities whose development plans may be in conflict with each other.

The American Planning Association, the Urban Land Institute and other anti-sprawl advocates stress that sustained social, environmental and economic vitality is contingent upon regional cooperation. With this in mind, it is suggested that the municipalities of Bay County unite into an alliance of neighboring communities supporting common development goals. A shared development vision is a key factor in reducing waste and creating efficient county-wide land use patterns that preserve natural resources and contribute to a high quality of life for residents.

ATTACHMENT A

Proposed Wetland Priority System for Bay County

A report prepared for Beckett and Raeder Inc. by Northern Ecological Services, Inc.

Proposed Wetland Priority System for Bay County, Michigan

May 15, 2000

Prepared for:

Beckett and Raeder, Inc.
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Prepared by:

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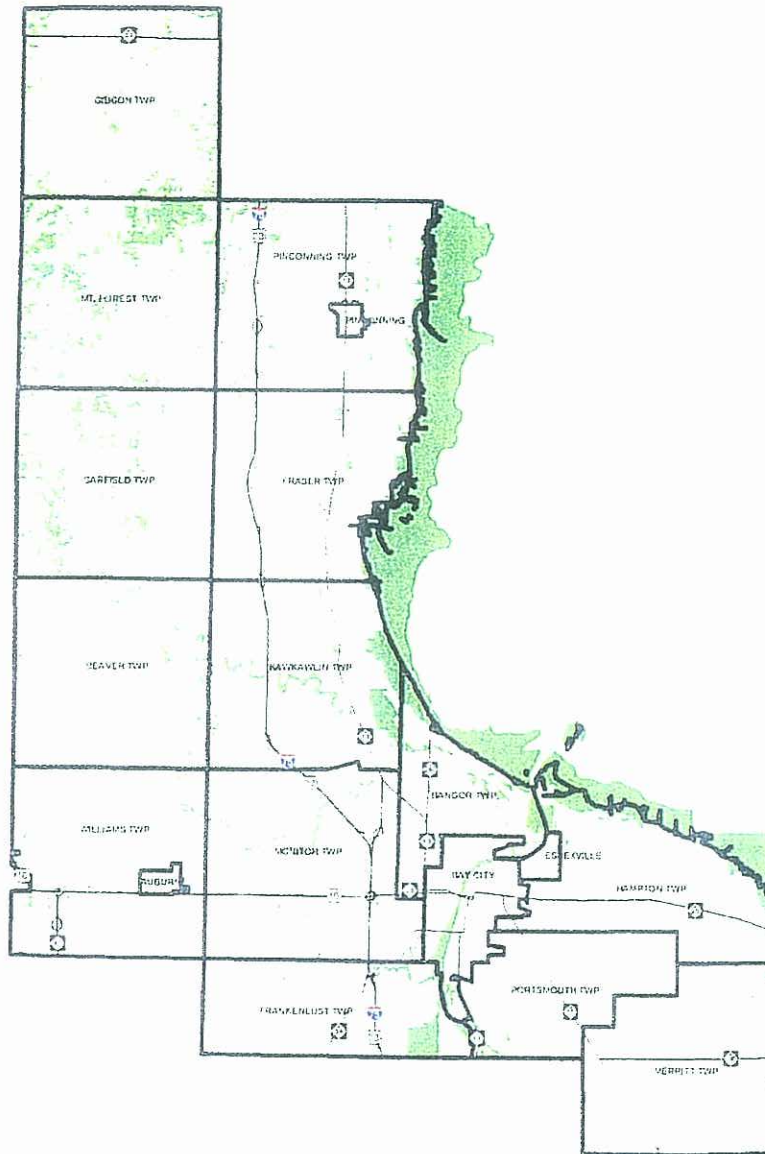
INTRODUCTION

Northern Ecological Services, Inc. has been contracted by Beckett and Raeder to provide a strategy for prioritizing wetlands for planning purposes for Bay County, Michigan. Conceivably, prioritization of wetlands would ensure an improved accounting of Bay County's wetland resources and a higher regard for their respective functions such as flood peak flow desynchronization, water quality protection, plant community and wildlife habitat. The wetland priority system presented here is based on computerized geographic information system (GIS) data available on the U.S. Department of Interior, Fish and Wildlife Service National Wetland Inventory (NWI) database and has limitations due to its broad-scale scope and lack of complete on-site field data. According to McAllister et al. (2000), searching for individual wetlands that have the highest or least flood mitigation benefit requires site-specific approaches, i.e., on-site analysis of wetland basin size, morphology, vegetation, and local water budget would be needed. Therefore, this GIS-based approach should be considered a guide for identifying groups of wetlands that, on average, meet their assigned levels of priority.

Prioritizing Wetlands

Prior attempts aimed at prioritizing wetlands have addressed functional values. For example, the Environmental Protection Agency (EPA) established a Landscape Function Project to develop a method for assessing and prioritizing wetland restoration efforts to optimize flood attenuation in the Prairie Pothole Region in the Upper Midwest (McAllister et al 2000). This project, along with other research from state and federal agencies has recognized that wetlands associated with rivers, lakes and streams provide a vital function in retaining flood and storm water storage as well as improving water quality through filtration of nutrients and sediments. These wetland functions and values become especially important in the lower part of watersheds (Johnston et al., 1990; Ogawa and Male, 1986), where there tends to be little relief and the rivers have broad flood plains.

According to Johnston (1994), the location of wetlands within a watershed influences their function in preserving surface water quality. Lower order streams are generally smaller tributaries located higher in the watershed, while the high order streams are main stream trunks formed from conjoining tributaries, carry greater flow volumes, and are typically found lower in the watershed. Watersheds having more wetlands adjacent to the larger higher order streams, e.g., third or fourth order, were found to have higher water quality (lower concentrations of suspended solids, fecal coliform, nitrate, ammonium, and phosphorus) than watersheds having more wetlands near lower order streams (Johnston et al., 1990). Location of wetlands within the watershed has also been linked to flood peak flows (Ogawa and Male, 1986). Reduction of flood plain wetland areas in upstream positions caused increased local flood peaks, which dissipated farther down stream. Increases in peak flows due to reduction of flood plain wetlands in down stream locations were not dissipated, however.



Wetlands

(Data Source: MIRIS)

-  Wetland
-  Political Boundary
-  Highway



1 Inch Approximately Equals 3.1 Miles

These studies suggest that the wetlands closest to the larger and higher order streams and rivers are the most important to preserve.

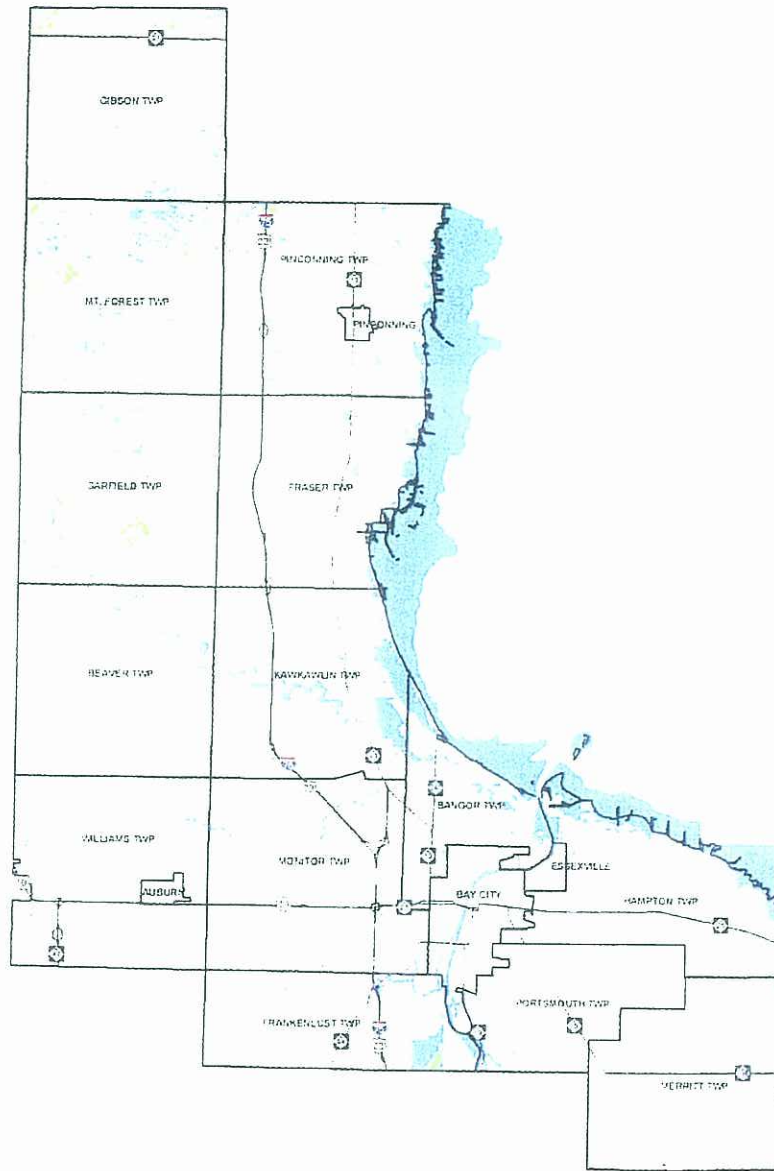
Researchers in Wisconsin and Minnesota have found that approximately 10 percent of the watershed area needs to be covered by wetland and/or lake to maintain flood storage and sediment filtration capacities and maintain favorable stream and river water quality (Johnston et al., 1990; Novitski 1979; Oberts, 1981). Therefore, overall abundance, as well as location of wetlands is an important consideration when managing wetlands for water quality.

The forested, emergent and scrub-shrub wetlands of Bay County are positioned in the Saginaw Bay lowlands, where there is little topographic relief and many of the natural stream courses have been modified to accommodate both agricultural and urban development. Many of the wetlands associated with the drains, streams and rivers act as a sponge to hold water for slow release, creating a stable water supply. Vegetation retards runoff and increases the rate at which water infiltrates the soil. These processes allow flood water to spread horizontally, infiltrate soils, and release slowly, thus buffering the energy and volume of flood water runoff during significant rain and meltwater events.

In addition to the flood water storage function, wetlands also filter nutrients and sediments from surface water run-off. For flood plain wetlands, the amount of material trapped in the riparian zone can be substantial. For example, the riparian forest of the Little River in Georgia trapped nearly all of the annual sediment yield from an agricultural watershed (Lowrance et al. 1985). The filtration efficiency can vary with the degree of the surrounding slope, the type and density of vegetation of the wetland, basin morphometry, and particular hydrological, chemical and biological characteristics of the wetland.

The trapping of sediments can also remove a substantial amount of nutrients from surface water run-off. Dissolved nutrients in both surface water run-off and soil water can be removed by plant uptake in forested wetlands. Karr and Schlosser (1977) found that vegetation and soil can filter as much as 99 percent of total phosphorus mass and 10-60 percent of total nitrogen. Thus, the combination of the storage and filtering capacities of wetlands adjacent to surface water features make them extremely valuable in maintaining water quality. Leaving vegetated wetland buffers around drains, streams and rivers ensures that these functions are part of the system.

It is with the previous subsequent discussion in mind that NES proposes the following system of wetland prioritization.



Wetland Priority System for Bay County

Defined by Northern Ecological Services Inc., Reed City, Michigan



1 Inch Approximately Equals 5.19 Miles

- Priority 1
- Priority 2
- Priority 3
- Political Boundary
- Highway

PROPOSED BAY COUNTY WETLAND PRIORITY GROUPS

Priority I (Highest)

- All lacustrine littoral wetlands in Saginaw Bay.
- All wetlands within five miles of Saginaw Bay.
- Palustrine and riverine wetlands within 300 feet of a lake, stream, or river
- All Palustrine Emergent (Flooded) and Palustrine Aquatic Bed (Flooded) wetlands
- Wetlands of Crow Island State Game Area.

Priority II (Moderate)

- Wetlands within 500 feet of a lake, stream or river.
- Wetlands more than 500 feet away from a lake, stream and river, but contiguous to wetlands within 500 feet of a lake, stream, or river.

Priority III (Lower priority, but not unimportant)

- Isolated wetlands that are more than 500 feet from a lake, stream, or river, and is not contiguous to a wetland within 500 feet of a lake, stream, or river.

The number and acreage of wetlands in each priority group are shown in Table 1. Table 1 also shows the proportions of wetland area represented by each of the three priority groups and wetland classes within each group. Regarding wetland classes, lacustrine (littoral subsystem) wetlands are those found along the near shore zone in Saginaw Bay. They are typically characterized by emergent and/or submerged aquatic vegetation, but may also include rock and unconsolidated mineral bottoms and shores. Riverine wetlands include all wetlands and deepwater habitats contained within a channel, except for wetlands dominated by trees, shrubs, or other persistent vegetation. All riverine wetlands are included in the **Priority I** group. Priority II and III wetlands are all palustrine wetlands, which include nontidal wetlands dominated by trees, shrubs, and persistent emergent vegetation. Details concerning wetland classification are found in *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. (1979).

Table 1 shows that about 41 percent of the total wetland area of Bay County is comprised of lacustrine wetland found in Saginaw Bay. Considering that chances of development of these lacustrine wetlands are probably slim compared to inland palustrine and riverine wetlands, wetland areas were compared to subset of non-lacustrine wetlands. Compared to the total acreage of non-lacustrine wetlands, 51.9 percent of the wetlands were selected for the **Priority I** group, 29.4 percent for the **Priority II** group, and 18.7 percent for the **Priority III** group. All wetlands in Bay County are shown on the figure on page 6. Wetlands are differentiated by priority group on the figure on page 8.

Table 1. Area and proportion of wetlands by priority group and wetland systems.

Priority Group	Wetland Systems	Number of Wetlands	Acreage	Percentage of Total Wetland Area	Percentage of Non-Lucustrine Wetland Area
I	Lacustrine (Littoral Subsystem)	15	19,647	40.6	Not Applicable
	Riverine	9	2,329	4.8	8.1
	Palustrine	2,118	12,556	26.0	43.8
	Total Group	2,142	34,532	71.4	Not Applicable
II	Palustrine ¹	1,617	8,445	17.5	29.4
III	Palustrine	2,564	5,363	11.1	18.7
Total	All	6323	48,340	100.0	100.0

¹Includes two Ariverine wetlands of a combined 131 acres that are shown in the NWI database, but that NES believes are actually palustrine wetlands.

DISCUSSION

Priority I Wetlands

The lacustrine wetlands of Saginaw Bay were considered among the *Priority I* wetlands because they are important waterfowl production areas and have a key role in the overall ecology of Saginaw Bay. The lacustrine wetlands mitigate shoreline erosion by absorbing wave energy. The submerged and emergent vegetation in the lacustrine wetlands support a complex food web that has ecological health ramifications for Saginaw Bay and Lake Huron.

Palustrine emergent (flooded) and aquatic bed (flooded) wetlands (Cowardin et al., 1979) were considered appropriate for the *Priority I* group because of their substantial function in waterfowl production. Waterfowl frequently use these wetlands for breeding, feeding, and rearing young. Other kinds of wetlands that are connected to these wetlands to form diverse habitat complexes are valuable waterfowl habitat and are included in the *Priority I* group. Crow Island State Game Area was also selected for this group due to its size and complexity, making it a major natural resource for Bay County.

All inland wetlands within five miles of Saginaw Bay were chosen for the *Priority I* group because of their scarcity and their role in mitigating agricultural impacts. Historic attitudes underestimating the value of wetlands contributed to extensive wetland losses by draining and filling to enhance farming operations near Saginaw Bay. Clearly, Bay County has lost extensive wetland resources by agricultural drainage, particularly for areas of low elevation within five miles of Saginaw Bay. As previously discussed, maintaining wetland area low in the watershed has been identified as an important water quality management strategy. In view of the extensive agricultural land use, restoration of additional wetlands within this zone would be desirable.

All wetlands within 300 feet of a lake river or stream were considered deserving of the *Priority I* designation because of their close proximity surface water features and their potential benefit in flood water storage, sediment retention, and nutrient processing. They are also important to maintain wildlife travel corridors and habitat connectivity within the landscape. The 300-foot buffer must be recognized as being somewhat arbitrary; perhaps too wide in some cases, not wide enough in others, depending on site-specific conditions. However, research has shown this buffer width to be a valid choice for controlling sedimentation along streams found in low-relief coastal plain settings in Maryland and North Carolina (Lowrance et al., 1988; Cooper et al., 1987). The 300-foot zone would also prioritize the wetlands closest to lakes, rivers, and streams in a manner keeping with the research done in Minnesota by Johnston and colleagues and previously discussed in this report.

Priority II Wetlands

These wetlands include those currently regulated by the State of Michigan under Section 303 of P.A. 451, i.e., those within 500 feet of a stream, lake, or pond, or wetlands that are more distant but contiguous to those regulated wetlands. ***Priority II*** wetlands are considered somewhat less critical than Priority I wetlands because of their more distant position relative to streams, lakes or ponds. However, their importance should not be underestimated as they provide similar functions as the Priority I inland wetlands. The distinction between Priority I and II inland wetlands is based on a matter of degree, not kind, of wetland functional value.

Priority III Wetlands

These wetlands are considered important, yet not as critical as the other categories. Wetlands in this group are more than 500 feet of a stream, lake or river and are relatively isolated. It should be noted, however, that in individual cases, these wetlands potentially provide important flood storage and sediment filtering functions. Therefore, it is recommended that onsite assessments of these and other wetlands be made prior to proposed impacts.

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ATTACHMENT B

Build-Out Assessment Results

Zoning Consolidated Coverage
Build-Out Map
Build-Out Analysis Table
Build-Out Capacity Table

Zoning Scenario A
Build-Out Map
Build-Out Analysis Table
Build-Out Capacity Table

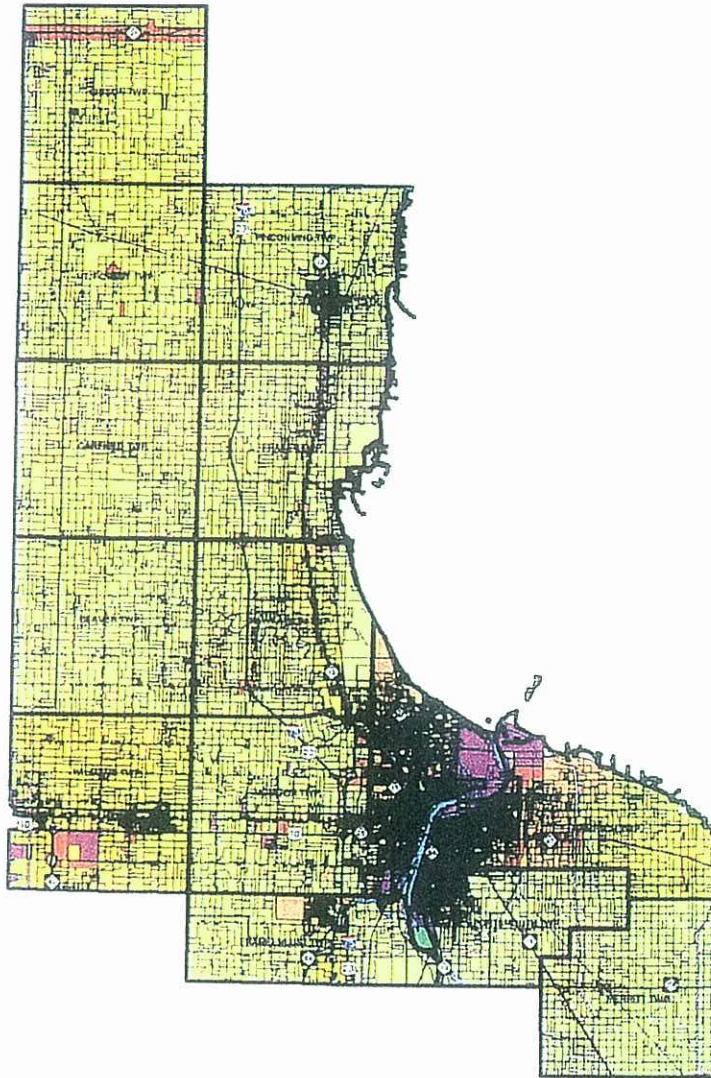
Zoning Scenario B
Build-Out Map
Build-Out Analysis Table
Build-Out Capacity Table

Zoning Scenario C
Build-Out Map
Build-Out Analysis Table
Build-Out Capacity Table

Zoning Scenario D
Build-Out Map
Build-Out Analysis Table
Build-Out Capacity Table

Land Use Plan Consolidated Coverage
Build-Out Map
Build-Out Analysis Table
Build-Out Capacity Table










Land Use Plan Scenario A
Build-Out Map
Build-Out Analysis Table
Build-Out Capacity Table



Consolidated Zoning

Based on Common Key Zoning Methodology

1 Inch Approximately Equals 5.5 Miles 

-  Rural Residential (Less Than 1 Dwelling Unit per Acre)
-  Urban Residential - Low Density (2 - 3 Dwelling Units per Acre)
-  Urban Residential - Moderate Density (4 - 6 Dwelling Units per Acre)
-  Urban Residential - High Density (More Than 6 Dwelling Units per Acre)
-  Commercial
-  Industrial
-  Transportation/Transitional
-  Recreation/Institutional
-  Water

 Political Boundary
 Highway

ZONING BASE COVERAGE BUILD-OUT ANALYSIS

Based on consolidated zoning maps with no land categories subtracted

	Common 1		Common 2		Common 3		Common 4		TOTAL Residential Codes Only		Common 7 (Transp.) Acres	Common 8 (Rec./Ind.) Acres	Common 9 (Water) Acres	TOTAL Non-Res. Codes Only Acres	TOTAL ALL Codes Acres
	(Rural Res.)		(Urban Res. - Low Density)		(Urban Res. - Med Density)		(Urban Res. - High Density)		Residential Codes Only						
	Acres	House/Units	Acres	House/Units	Acres	House/Units	Acres	House/Units	Acres	House/Units					
TOWNSHIPS															
Beaumont	0	0	0	0	5,551	15,342	51.5	2,525	6,066	18,567	774	1,707	70	3,280	9,346
Brewer	22,418	4,615	0	0	0	0	0	0	22,418	4,615	0	0	0	738	22,646
Franklin	11,794	2,251	1,096	3,858	1,021	3,858	604	2,961	13,835	9,591	0	0	110	789	14,564
Fraser	19,433	4,499	0	0	349	973	37	81	19,819	5,656	403	111	0	1,024	20,841
Garfield	22,662	4,873	0	0	0	0	0	0	22,662	4,873	10	0	0	193	22,855
Green	20,604	3,627	0	0	0	0	0	0	20,604	3,627	1,958	0	0	2,164	22,748
Hampton	231	57	8,564	11,970	5,678	13,899	0	0	14,278	27,945	591	655	0	2,756	17,253
Kawka	12,586	2,524	7,224	10,114	381	1,066	121	593	20,372	14,397	369	151	0	1,135	21,417
Merrill	18,733	3,493	754	1,056	0	0	0	0	19,487	4,549	16	16	159	774	20,267
Monitor	18,705	4,125	21	29	2,592	7,236	0	0	21,317	11,460	559	645	40	2,345	23,654
Mt. Forest	22,422	4,321	0	0	0	0	0	0	22,422	4,321	215	92	0	568	23,990
Pacemans	22,868	5,137	0	0	0	0	0	0	22,868	5,137	507	19	3	770	23,636
Parkmead	10,902	2,318	0	0	1,101	3,082	24	114	12,027	5,518	77	130	0	81	12,888
Williams	0	0	18,902	22,463	239	668	0	0	19,141	27,131	759	856	0	2,502	21,643
CITIES															
Auburn	0	0	0	0	409	1,145	0	0	409	1,145	0	0	0	210	619
Bay City	0	0	0	0	39	110	2,523	12,363	2,562	12,473	450	838	0	3,645	6,428
Essexville	0	0	0	0	146	1,249	0	0	446	1,349	74	74	0	243	659
Pineconing	32	21	0	0	255	715	40	195	327	931	0	66	0	229	556
DAY COUNTY	202,771	41,411	36,352	51,172	18,040	50,567	3,864	18,935	261,176	162,086	7,247	5,039	465	21,849	285,055

Summary of Build-Out Scenarios

	Zoning Scenarios					Land Use Plan Scenarios	
	Base Coverage	Scenario A	Scenario B	Scenario C	Scenario D	Base Coverage	Scenario A
	291,055	285,705	285,055	285,055	285,055	286,892	286,892
TOTAL ACREAGE							
SUBTRACTION CATEGORIES							
Developed Parcels		Minus	Minus	Minus	Minus		Minus
For-Beamp Parcels		Minus	Minus	Minus	Minus		Minus
Wetlands			Minus				
100-Year Floodplain							
State-Owned Lands							
Lake Front Parcels							
Saginaw Bay Environmental Areas							
Remnant Native Landscape Areas							
Prime Agricultural Lands							
NET BUILDABLE RESIDENTIAL AREA (Dwells)	281,154	272,488	273,937	273,937	273,937	280,905	280,905
DWELLING UNITS	167,955	161,656	97,036	77,122	25,895	276,361	188,622

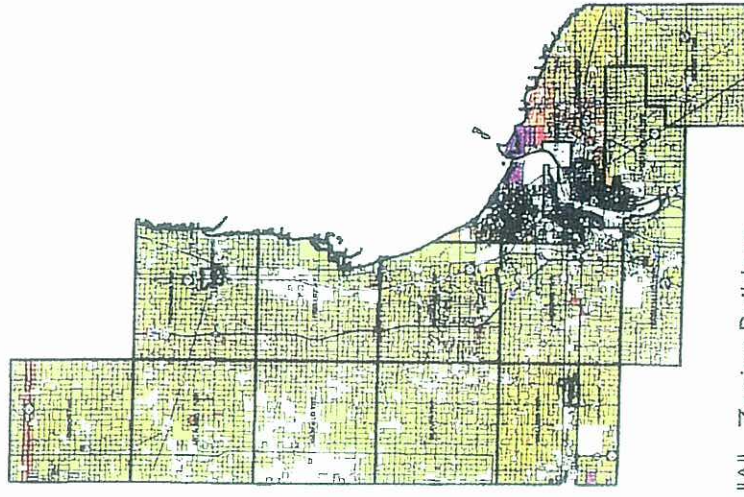
ZONING BASE COVERAGE BUILD-OUT CAPACITY

Based on consolidated zoning maps with no land categories subtracted

	Population										Population Change				Dwelling Units (2.5s persons/unit)			Dwelling Units (2.50 persons/unit) 2020		Buildout Potentials (Dwelling Units)		2020 Capacity		
	1990		1999		2010		2020		2010		2020		2010		2020		2010		2020		2020			
	US Census	Claritas	State/Region	State/Ratio	MDOT/REMI	State/Ratio	MDOT/REMI	State/Ratio	State/Region	State/Ratio	MDOT	State/Ratio	MDOT	State/Region	State/Ratio	MDOT	State/Ratio	MDOT	State/Ratio	MDOT	State/Ratio	MDOT	State/Ratio	
TOWNSHIPS																								
Bangor	16,028	16,335	16,394	17,454	16,410	17,951	59	1,119	75	1,616	23	437	30	647	18,067	-18,037	-17,421							
Beaver	2,774	2,951	2,995	3,021	2,834	3,107	221	247	60	333	86	96	24	133	4,615	-4,591	-4,482							
Frankenlust	2,281	2,158	2,492	2,464	2,333	2,555	211	203	52	274	82	79	21	109	9,591	-9,570	-9,482							
Fraser	3,680	4,153	3,774	4,008	3,716	4,122	94	328	26	442	37	128	10	177	5,656	-5,646	-5,479							
Garfield	1,736	1,492	1,885	1,891	1,835	1,944	149	155	99	208	58	60	40	83	4,373	-4,333	-4,290							
Gibson	1,090	1,300	1,145	1,187	1,112	1,221	55	97	22	131	21	38	9	32	3,627	-3,618	-3,575							
Hampton	9,520	9,522	9,494	10,367	9,315	10,662	-26	847	-205	1,142	-10	331	-82	457	27,945	-28,027	-27,468							
Kowawelin	4,888	5,029	4,983	5,323	4,855	5,475	95	435	-33	587	37	170	-13	235	14,297	-14,310	-14,062							
Merritt	1,510	2,158	1,482	1,644	1,572	1,691	-28	134	62	181	-11	52	25	72	4,549	-4,524	-4,477							
Monitor	9,475	9,925	9,898	10,318	9,752	10,612	423	843	277	1,137	165	329	111	455	11,460	-11,349	-11,005							
ML Forest	1,457	1,463	1,616	1,587	1,522	1,632	159	130	65	175	62	51	26	70	4,321	-4,295	-4,251							
Pincanning	2,647	3,935	2,761	2,883	2,479	2,965	114	236	168	318	45	92	-67	127	5,137	-5,204	-5,010							
Portsmouth	3,918	3,259	3,905	4,267	3,897	4,388	-13	349	-21	470	-5	136	-8	188	5,518	-5,526	-5,330							
Williams	4,278	4,837	4,511	4,659	4,587	4,791	233	381	309	513	91	149	124	205	27,131	-27,007	-26,926							
Subtotal	65,282	66,517	67,335	71,092	66,209	73,116	1,746	5,303	620	7,527	682	2,150	248	3,011	146,289	-146,040	-143,277							
Percent of Total	59%	62%	62%	59%	60%	59%									99%									
CITIES																								
Auburn	1,855	1,887	1,980	2,020	2,015	2,078	125	165	160	223	49	64	64	89	1,145	-1,081	-1,056							
Bay City	38,936	34,688	34,985	42,401	37,190	43,608	-3,951	3,465	-1,746	4,672	1,543	1,354	-698	1,869	12,473	-13,171	-10,604							
Essesville	4,088	3,800	3,600	4,452	4,104	4,579	-488	364	16	491	-191	142	6	196	1,249	-1,243	-1,053							
Pincanning	1,291	1,465	1,500	1,406	1,419	1,446	209	115	128	155	82	45	51	62	931	-880	-869							
Subtotal	46,170	41,840	42,065	50,279	44,728	51,710	-4,105	4,109	-1,442	5,540	-1,604	1,605	-577	2,218	15,798	-16,375	-13,582							
Percent of Total	41%	38%	38%	41%	40%	41%									10%									
BAY COUNTY																								
	111,462	110,367	109,400	121,371	110,937	124,826	-2,359	9,612	-822	13,067	-921	3,755	-329	5,227	162,086	-162,414	-156,859							

Sources:

- 1990: U.S. Census Bureau
- 1999: Claritas, Inc. of Ithaca, New York
- 2010: Office of State Demographer; Department of Management and Budget
Eastern Central Michigan Planning and Development Regional Commission (State and Region)
- 2010: State/Ratio estimate from State of Michigan 8.89% projected population increase from 1990 to 2010.
- 2020: Michigan Department of Transportation - Planning Division (MDOT)
University of Michigan, REMI Model
- 2020: State/Ratio estimate from State of Michigan 12% projected population increase from 1990 to 2020.



Scenario "A" - Zoning Buildout

Based on Consolidated Zoning minus Developed Parcels & Tax-Exempt Parcels

- Rural Residential (Less Than 1 Dwelling Unit per Acre)
- Urban Residential - Low Density (2 - 3 Dwelling Units per Acre)
- Urban Residential - Moderate Density (4 - 6 Dwelling Units per Acre)
- Urban Residential - High Density (More Than 6 Dwelling Units per Acre)
- Commercial
- Industrial
- Transportation/Transitional
- Recreation/Institutional
- Water

1 Inch Approximately Equals 3.5 Miles

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Subtracted Land Area

Political Boundary

Highway

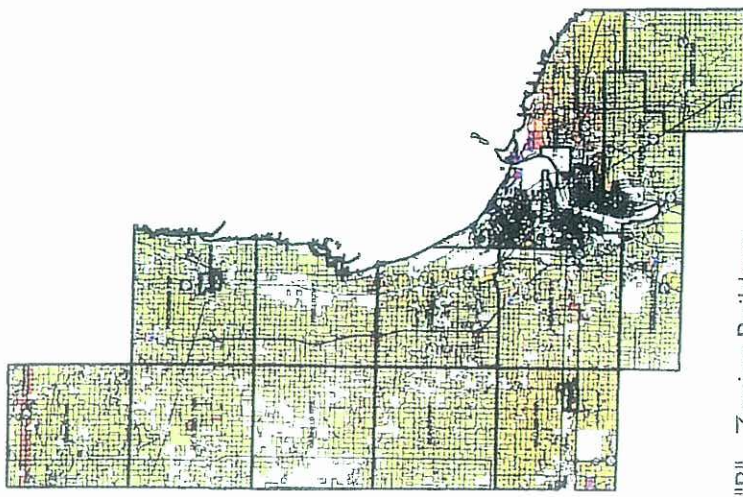
ZONING SCENARIO A BUILD-OUT ANALYSIS

Based on consolidated zoning maps minus developed parcels and tax-exempt parcels

	Common 1 (Rural Res.)		Common 2 (Urban Res.-Low Density)		Common 3 (Urban Res.-Med Density)		Common 4 (Urban Res.-High Density)		TOTAL Residential Codes		Common 5 (Office/ Comm.)	Common 6 (Industrial)	Common 7 (Transp.)	Common 8 (Rec./ Inst.)	Common 9 (Water)	TOTAL Non-Res. Codes Only	TOTAL ALL Codes	
	Acres	House/Units	Acres	House/Units	Acres	House/Units	Acres	House/Units	Acres	House/Units								Acres
TOWNSHIPS																		
Beauper	0	0	0	0	3,679	10,302	294	1,139	3,973	11,742	221	412	723	0	79	1,427	5,400	
Beaver	18,883	2,872	0	0	0	0	0	0	18,883	2,872	0	0	278	0	0	278	19,161	
Frankford	10,054	1,513	650	910	207	562	218	1,068	11,123	4,053	0	72	533	0	110	646	11,789	
France	13,276	1,327	0	0	115	322	29	80	13,420	1,729	129	5	310	0	0	646	16,085	
Garfield	14,669	2,145	0	0	0	0	0	0	14,669	2,145	0	0	183	0	0	183	14,852	
Gibson	18,891	2,805	0	0	0	0	0	0	18,891	2,805	1,681	0	266	0	0	1,887	20,778	
Hampton	205	38	741.5	10,380	3,649	10,217	0	0	11,268	20,635	727	991	511	0	0	2,229	13,497	
Kawickawin	11,614	5,091	5,246	7,344	180	505	52	254	17,672	13,194	134	31	393	0	159	718	17,910	
Maunil	16,742	3,153	0	0	0	0	0	0	16,742	3,954	6	0	710	0	23	738	17,482	
Monter	16,594	2,794	0	0	774	2,167	0	0	17,378	4,961	106	132	1,088	0	40	1,367	18,645	
PAI Parcel	18,002	2,699	0	0	0	0	0	0	18,002	2,699	205	16	261	0	0	485	18,487	
Pinecunning	19,972	3,428	0	0	0	0	0	0	19,972	3,428	49	0	463	0	3	515	20,487	
Portsmouth	10,221	1,803	0	0	673	1,895	0	0	10,895	3,698	4	0	541	0	81	627	11,522	
Williams	0	0	15,908	22,271	81	226	0	0	15,989	22,497	146	260	887	0	0	1,293	17,282	
CHIEFS																		
Auburn	0	0	0	0	123	345	0	0	123	345	0	0	98	0	0	98	221	
Bay City	0	0	0	0	73	63	159	830	92	893	32	55	484	29	0	1,602	1,794	
Essexville	0	0	0	0	5	14	0	0	5	14	2	0	2	0	0	4	9	
Princeton	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
DAY COUNTY	172,433	29,668	29,790	41,736	9,583	36,516	661	3,671	272,418	107,656	3,442	783	8,907	28	483	85	227,284	

Summary of Build-Out Scenarios

	Zoning Scenarios					Land Use Plan Scenarios	
	Base Coverage	Scenario A	Scenario B	Scenario C	Scenario D	Base Coverage	Scenario A
	285,053	285,053	285,053	285,053	285,053	286,897	286,877
<p>TOHA: ACCEASE</p> <p>SUBTRACTION CATEGORIES</p> <p>Developed Parcels</p> <p>Tox Example Parcels</p> <p>Wetlands</p> <p>100-Year Floodplains</p> <p>State-Owned Lands</p> <p>Lake Park Properties</p> <p>Sagraw Bay Environmental Assets</p> <p>Remnant Native Landscape Areas</p> <p>Prime Agricultural Lands</p>							
NET BUILDABLE RESIDENTIAL AREA (Dwors)	281,174	212,595	203,937	178,588	88,790	249,989	201,722
DWELLING UNITS	162,286	107,656	97,036	77,122	35,895	226,381	188,472



Scenario "B" - Zoning Buildout

Based on Consolidated Zoning minus Developed Parcels,
Tax-Exempt Parcels & Wetlands

- Rural Residential (Less Than 1 Dwelling Unit per Acre)
- Urban Residential - Low Density (2 - 3 Dwelling Units per Acre)
- Urban Residential - Moderate Density (4 - 6 Dwelling Units per Acre)
- Urban Residential - High Density (More Than 6 Dwelling Units per Acre)
- Commercial
- Industrial
- Transportation/Transitional
- Recreation/Institutional
- Water

1 Inch Approximately Equals 0.5 Miles

Subtracted Land Area
Political Boundary
Highway

ZONING SCENARIO B BUILD-OUT ANALYSIS

Based on consolidated zoning maps minus developed parcels, tax-exempt parcels and wetlands

	Common 1 (Rural Res.)		Common 2 (Urban Res.-Low Density)		Common 3 (Urban Res.-Med Density)		Common 4 (Urban Res.-High Density)		TOTAL Residential Codes Only		Common 5 (Office/ Comm.)		Common 6 (Industrial)		Common 7 (Transp.)		Common 8 (Rec./ Inst.)		Common 9 (Water)		TOTAL Non-Res. Codes Only	TOTAL ALL Codes
	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits
Adams	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Barnes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Beverly	18,477	2,871	0	0	3,138	5,785	199	976	3,337	9,761	185	294	693	21	1,123	4,520	0	0	0	0	1,123	4,520
Franklin	9,866	1,467	653	910	1,68	471	20	984	18,497	2,571	0	0	222	0	297	18,724	0	0	0	0	297	18,724
Fraser	14,655	1,293	0	0	115	322	29	140	14,809	3,632	0	21	572	0	568	11,454	0	0	0	0	568	11,454
Georgetown	14,369	2,139	0	0	0	0	0	0	14,369	1,755	129	4	304	0	638	15,447	0	0	0	0	638	15,447
Gibson	17,974	2,864	0	0	0	0	0	0	17,974	2,139	0	0	176	0	176	15,545	0	0	0	0	176	15,545
Hampton	205	38	7,022	9,830	3,366	9,424	0	0	10,592	19,292	689	46	303	0	1,807	9,780	0	0	0	0	1,807	9,780
Kovakovon	5,442	4,648	5,071	7,099	174	486	45	222	14,931	12,454	333	25	309	0	1,658	7,250	0	0	0	0	1,658	7,250
Merrill	10,046	3,134	572	801	0	0	0	0	18,418	3,235	6	0	768	0	620	5,551	0	0	0	0	620	5,551
Wentler	16,119	2,772	0	0	272	2,163	0	0	16,892	4,923	0	0	1,074	0	754	9,342	0	0	0	0	754	9,342
Mill Forest	17,424	2,684	0	0	0	0	0	0	17,424	2,684	106	18	230	0	1,327	3,218	0	0	0	0	1,327	3,218
Pinecreek	18,609	3,337	0	0	0	0	0	0	18,609	3,337	49	0	438	0	474	17,888	0	0	0	0	474	17,888
Portsmouth	10,200	1,801	0	0	671	1,979	0	0	10,871	3,460	4	0	521	0	521	11,423	0	0	0	0	521	11,423
Williams	0	0	15,731	22,023	81	226	0	0	15,812	22,249	140	250	886	0	1,274	17,088	0	0	0	0	1,274	17,088
CHILES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Auburn	0	0	0	0	123	345	0	0	123	345	0	0	98	0	98	221	0	0	0	0	98	221
Bay City	0	0	0	0	33	63	168	804	191	887	29	45	1,400	0	1,578	1,769	0	0	0	0	1,578	1,769
Exeter	0	0	0	0	5	14	0	0	5	14	2	0	2	0	4	9	0	0	0	0	4	9
Pinecreek	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RAY COUNTY	145,615	29,059	29,045	40,663	8,635	24,179	942	3,146	201,937	97,636	3,293	1,239	8,775	160	13,461	27,418	29	29	0	0	13,461	27,418

Summary of Build-Out Scenarios

	Zoning Scenarios					Land Use Plan Scenarios	
	Base Coverage	Scenario A	Scenario B	Scenario C	Scenario D	Base Coverage	Scenario A
	265,055	280,055	284,055	285,055	287,055	286,812	286,812
TOTAL ACRESAGE							
SUBTRACTION CATEGORIES							
Developed Parcels		Mnus	Mnus	Mnus	Mnus		Mnus
Tax Exempt Parcels		Mnus	Mnus	Mnus	Mnus		Mnus
Wetlands			Agms				
100-Year Floodprints							
State-Owned Lands							
Lake Plain Ponds							
Saginaw Bay Environmental Areas							
Remnant Native Landscape Areas							
Prime Agricultural Lands							
NET BUILDABLE RESIDENTIAL AREA (acres)	264,594	272,488	278,937	279,588	287,790	286,980	287,222
DWELLING UNITS	162,056	181,656	97,036	77,172	35,895	226,361	189,672

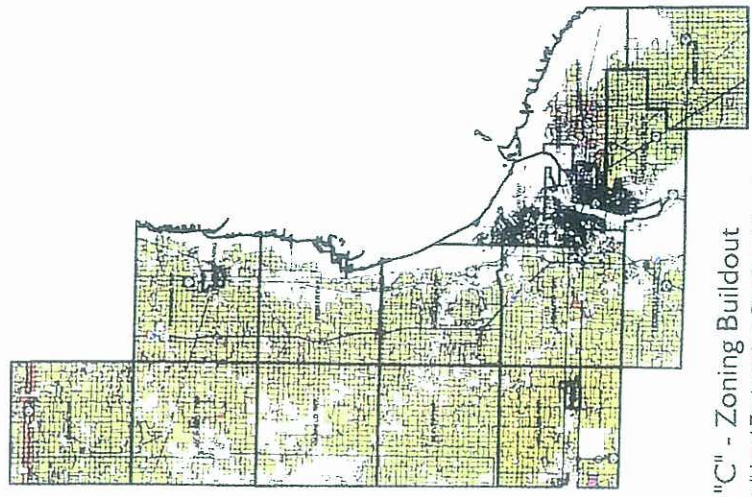
ZONING SCENARIO B BUILD-OUT CAPACITY

Based on consolidated zoning maps minus developed parcels, tax-exempt parcels and wetlands

	Population										Population Change				Dwelling Units (2.56 persons/unit)				Dwelling Units (2.50 persons/unit)		Buildout Potentials (Dwelling Units)		2020 Capacity			
	1990		1999		2010		2020		2010		2020		2010		2020		2010		2020		2020		2020			
	US Census	Claritas	State/Region	State/Region	MDOT/REMI	State/Region	State/Region	State/Region	State/Region	MDOT	State/Region	State/Region	MDOT	State/Region	State/Region	MDOT	State/Region	MDOT	State/Region	MDOT	State/Region	MDOT	State/Region	MDOT	State/Region	
TOWNSHIPS																										
Bangor	16,028	16,335	16,394	17,454	16,410	17,951	59	1,119	75	1,616	23	437	30	647	9,761	9,731	9,731	9,731	9,731	9,731	9,731	9,731	9,731	9,731	9,731	9,731
Beaver	2,774	2,951	2,995	3,021	2,834	3,107	221	247	60	333	86	96	24	133	2,871	2,847	2,847	2,847	2,847	2,847	2,847	2,847	2,847	2,847	2,847	2,847
Frankenmst	2,281	2,158	2,492	2,484	2,333	2,555	211	203	52	274	82	79	21	109	3,832	3,812	3,812	3,812	3,812	3,812	3,812	3,812	3,812	3,812	3,812	3,812
Froxer	3,680	4,153	3,774	4,008	3,706	4,122	94	328	26	442	37	128	10	177	1,755	1,745	1,745	1,745	1,745	1,745	1,745	1,745	1,745	1,745	1,745	1,745
Garfield	1,736	1,492	1,885	1,891	1,835	1,944	149	155	99	208	58	60	40	83	2,139	2,099	2,099	2,099	2,099	2,099	2,099	2,099	2,099	2,099	2,099	2,099
Gibson	1,090	1,300	1,145	1,187	1,112	1,221	55	97	22	131	21	38	9	52	2,864	2,855	2,855	2,855	2,855	2,855	2,855	2,855	2,855	2,855	2,855	2,855
Hampton	9,520	9,522	9,494	10,367	9,315	10,462	-26	847	205	1,142	-10	331	82	457	19,292	19,374	19,374	19,374	19,374	19,374	19,374	19,374	19,374	19,374	19,374	19,374
Kawkawlin	4,888	5,029	4,983	5,323	4,855	5,475	95	435	33	587	37	170	13	235	12,454	12,468	12,468	12,468	12,468	12,468	12,468	12,468	12,468	12,468	12,468	12,468
Merritt	1,510	2,158	1,482	1,644	1,572	1,691	-28	134	62	181	-11	52	25	72	3,935	3,910	3,910	3,910	3,910	3,910	3,910	3,910	3,910	3,910	3,910	3,910
Merritt	9,475	9,925	9,898	10,318	9,752	10,612	423	843	277	1,137	165	329	111	455	4,935	4,824	4,824	4,824	4,824	4,824	4,824	4,824	4,824	4,824	4,824	4,824
Mt. Forest	1,457	1,463	1,616	1,587	1,522	1,632	159	130	65	175	62	51	26	70	2,684	2,658	2,658	2,658	2,658	2,658	2,658	2,658	2,658	2,658	2,658	2,658
Pincanning	2,647	3,935	2,761	2,883	2,479	2,965	114	236	-168	318	45	92	67	127	3,357	3,404	3,404	3,404	3,404	3,404	3,404	3,404	3,404	3,404	3,404	3,404
Portsmouth	3,918	3,259	3,705	4,267	3,879	4,398	-13	349	-21	470	5	136	-8	188	3,680	3,689	3,689	3,689	3,689	3,689	3,689	3,689	3,689	3,689	3,689	3,689
Williams	4,278	4,837	4,511	4,659	4,587	4,791	233	381	309	513	91	149	124	205	22,249	22,125	22,125	22,125	22,125	22,125	22,125	22,125	22,125	22,125	22,125	22,125
Subtotal	65,282	68,517	67,335	71,092	66,209	73,116	1,746	5,503	620	7,527	682	2,150	248	3,011	95,790	95,542	95,542	95,542	95,542	95,542	95,542	95,542	95,542	95,542	95,542	95,542
Percent of Total	59%	62%	62%	60%	59%	59%									99%											
CHILS																										
Auburn	1,855	1,887	1,980	2,020	2,015	2,078	125	165	160	223	49	64	64	89	345	281	281	281	281	281	281	281	281	281	281	281
Bay City	38,936	34,688	34,985	42,401	37,190	43,608	-3,951	3,465	-1,746	4,672	-1,543	1,354	-68	1,869	887	-1,885	-1,885	-1,885	-1,885	-1,885	-1,885	-1,885	-1,885	-1,885	-1,885	-1,885
Essexville	4,088	3,800	3,600	4,452	4,104	4,579	-488	364	16	491	-191	142	6	196	14	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
Pincanning	1,291	1,465	1,500	1,406	1,419	1,446	209	115	128	155	82	45	51	62	0	51	51	51	51	51	51	51	51	51	51	51
Subtotal	46,170	41,840	42,065	50,279	44,728	51,710	4,105	4,109	1,442	5,540	-1,604	1,605	-577	2,216	1,246	-1,823	-1,823	-1,823	-1,823	-1,823	-1,823	-1,823	-1,823	-1,823	-1,823	-1,823
Percent of Total	41%	38%	38%	41%	40%	41%									1%											
BAY COUNTY	111,452	110,357	109,400	121,371	110,937	124,826	-2,359	9,612	-822	13,067	-921	3,755	-329	5,227	97,036	-97,365	-97,365	-97,365	-97,365	-97,365	-97,365	-97,365	-97,365	-97,365	-97,365	-97,365

Sources:

- 1990: U.S. Census Bureau
- 1999: Claritas, Inc. of Ithaca, New York
- 2010: Office of State Demographer, Department of Management and Budget
- Eastern Central Michigan Planning and Development Regional Commission (State and Region)
- 2010: State/Ratio estimate from State of Michigan 0.89% projected population increase from 1990 to 2010.
- 2020: Michigan Department of Transportation - Planning Division (MDOT)
- University of Michigan REMI Model
- 2020: State/Ratio estimate from State of Michigan 12% projected population increase from 1990 to 2020.



Scenario "C" - Zoning Buildout

Based on Consolidated Zoning minus Developed Parcels, Tax-Exempt Parcels, Wetlands, Remnant Native Landscapes, State-Owned Lands & 100-Year Floodplains

- Rural Residential (Less Than 1 Dwelling Unit per Acre)
- Urban Residential - Low Density (2 - 3 Dwelling Units per Acre)
- Urban Residential - Moderate Density (4 - 6 Dwelling Units per Acre)
- Urban Residential - High Density (More Than 6 Dwelling Units per Acre)
- Commercial
- Industrial
- Transportation/Transitional
- Recreation/Institutional
- Water

- 1 Inch Approximately Equals 3.5 Miles
- Subtracted Land Area
- Political Boundary
- Highway

ZONING SCENARIO C BUILD-OUT ANALYSIS

Based on consolidated zoning maps minus developed parcels, tax-exempt parcels, wetlands, 100-year floodplains, native landscapes, and state-owned lands

TOWNSHIPS	Common 1 (Rural Res.)		Common 2 (Urban Res.-Low Density)		Common 3 (Urban Res.-Med Density)		Common 4 (Urban Res.-High Density)		TOTAL Residential Codes City		Common 5 (Office/ Comm.)	Common 6 (Industrial)	Common 7 (Transp.)	Common 8 (Rec./ Inst.)	Common 9 (Water)	TOTAL Non-Res. Codes Only	TOTAL ALL Codes
	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits	Acres	Acres	Acres	Acres	Acres	Acres	Acres
Bearfoot	0	0	0	0	2,117	5,926	125	614	2,242	6,541	106	17	454	0	0	572	2,815
Brewster	18,324	2,846	0	0	0	0	0	0	10,324	2,848	0	0	227	0	227	18,952	18,952
Frankford	6,310	1,081	627	877	89	280	121	593	7,147	2,771	0	0	360	0	366	7,513	7,513
Greener	11,347	961	0	0	29	83	6	27	11,992	1,071	126	4	448	0	580	12,562	12,562
Greenfield	14,252	2,123	0	0	0	0	0	0	14,252	2,123	0	0	176	0	176	14,428	14,428
Gibson	17,876	2,855	0	0	0	0	0	0	17,876	2,855	1,603	0	203	0	1,807	19,683	19,683
Hempston	205	38	1,373	1,923	2,784	4,116	16	79	3,762	8,076	474	0	361	0	777	4,540	4,540
Massachusetts	8,412	4,798	4,217	5,904	48	134	16	79	12,693	10,315	127	0	269	0	516	13,209	13,209
Merrill	15,328	2,655	572	801	0	0	0	0	15,110	3,456	6	0	660	0	666	16,776	16,776
Milford	15,434	2,698	0	0	764	2,084	0	0	16,178	4,792	106	11	1,014	0	1,233	17,412	17,412
Mt. Forest	15,950	2,442	0	0	0	0	0	0	15,950	2,442	205	18	199	0	423	16,372	16,372
Packamisho	16,483	3,033	0	0	0	0	0	0	16,483	3,033	49	0	406	0	455	16,939	16,939
Parsmouth	8,879	1,595	0	0	671	1,879	0	0	9,550	3,474	4	0	454	0	458	10,008	10,008
Willards	0	0	15,948	21,907	81	226	0	0	15,729	22,133	140	250	896	0	1,276	17,006	17,006
CITIES																	
Aurum	0	0	0	0	123	345	0	0	123	345	0	0	98	0	98	221	221
Bay City	0	0	0	0	23	53	159	778	187	942	28	18	1,470	3	1,459	1,641	1,641
Essexville	0	0	0	0	5	14	0	0	5	14	1	0	3	0	3	8	8
Freemont	0	0	0	0	0	0	0	0	0	0	0	0	81	0	81	81	81
PRECOUNTY	149,609	26,498	22,437	31,411	6,114	17,132	427	2,093	70,388	77,172	3,922	420	7,809	3	11,175	169,763	169,763

Summary of Build-Out Scenarios

	Zoning Scenarios					Land Use Plan Scenarios	
	Base Coverage	Scenario A	Scenario B	Scenario C	Scenario D	Base Coverage	Scenario A
	286,000	285,023	285,025	285,015	285,005	286,892	286,892
TOTAL ACREAGE							
SUBTRACTION CATEGORIES							
Developed Parcels	MFDU	MFDU	MFDU	MFDU	MFDU		MFDU
Low Density Parcels	MFDU	MFDU	MFDU	MFDU	MFDU		MFDU
Wetlands							
100-Year Flood Zone							
State-Owned Lands							
Lake Plain Prairie							
Saginaw Bay Environmental Area							
Remnant Native Landscape Areas							
Prime Agricultural Lands							
NET BUILDABLE RESIDENTIAL AREA (ACRES)	261,159	212,489	203,937	170,580	88,790	240,980	201,222
DWELLING UNITS	167,886	101,658	97,036	77,122	35,895	238,361	198,622

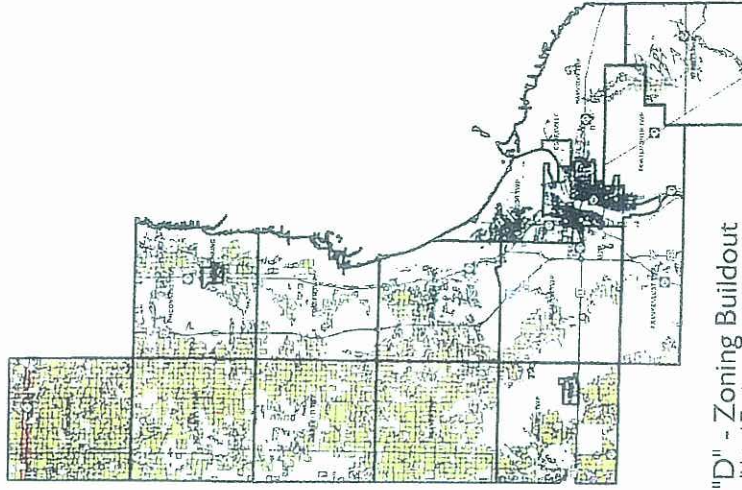
ZONING SCENARIO C BUILD-OUT CAPACITY

Based on consolidated zoning maps minus developed parcels, tax-exempt parcels, wetlands, 100-year floodplains, native landscapes, and state-owned lands

	Population			Population Change			Dwelling Units (2.56 persons/unit)			Dwelling Units (2.50 persons/unit)			Buildout Potentials (Dwelling Units)	2020 Capacity			
	US Census	1999	2010	MDOT/REMI	2020	2010		2020		2010		2020		MDOT	State/ Ratio		
						State/ Region	State/ Ratio	State/ Region	State/ Ratio	State/ Region	State/ Ratio	MDOT				State/ Ratio	
TOWNSHIPS																	
Banger	16,028	16,335	17,454	16,410	17,951	59	1,119	75	1,616	23	437	30	647	6,541	-5,894	-6,511	
Beaver	2,774	2,951	3,021	2,834	3,107	221	247	60	333	86	96	24	133	2,848	-2,715	-2,824	
Frankenlust	2,281	2,158	2,484	2,333	2,555	211	203	52	274	82	79	21	109	2,771	-2,750	-2,661	
Fraser	3,680	4,153	4,008	3,706	4,122	94	328	26	442	37	128	10	177	1,071	1,061	-895	
Garfield	1,736	1,492	1,885	1,835	1,944	149	155	99	208	58	60	40	88	2,123	-2,083	-2,040	
Gibson	1,090	1,300	1,145	1,112	1,221	55	97	22	131	21	38	9	32	2,855	-2,846	-2,803	
Hampson	9,520	9,522	9,494	10,367	9,315	10,662	26	847	205	1,142	-10	331	82	457	8,076	-8,158	-7,620
Kawakawin	4,868	5,029	4,983	5,323	4,855	5,475	95	435	-33	587	37	170	13	235	10,315	-10,328	-10,080
Merritt	1,510	2,156	1,510	1,644	1,572	1,691	-23	134	62	181	11	52	25	72	3,456	-3,431	-3,383
Monitor	9,475	9,925	9,898	10,318	9,752	10,612	423	843	277	1,137	165	329	111	455	4,782	-4,672	-4,328
MI Forest	1,457	1,463	1,616	1,587	1,522	1,632	159	130	65	175	52	51	26	70	2,442	-2,416	-2,372
Pincanning	2,647	3,935	2,761	2,883	2,479	2,965	114	236	-168	318	45	92	-67	127	3,033	-3,100	-2,906
Pattsmouth	3,918	3,259	3,905	4,267	3,897	4,388	-13	349	-21	470	5	136	-8	188	3,474	-3,483	-3,286
Williams	4,278	4,837	4,511	4,659	4,587	4,791	233	381	309	513	91	149	124	205	22,133	-22,009	-21,928
Subtotal	65,282	68,517	71,092	66,209	73,116	67,335	71,092	1,746	5,503	620	7,527	682	2,150	75,920	-75,872	-72,910	
Percent of Total	59%	62%	59%	60%	59%	62%	59%							98%			
CITIES																	
Auburn	1,855	1,887	1,980	2,015	2,078	125	165	160	223	49	64	64	89	345	-281	-256	
Bay City	38,936	34,688	34,985	42,401	37,190	43,608	-3,951	3,465	-1,746	4,672	-1,543	-698	1,869	842	-1,541	1,026	
Essexville	4,088	3,800	3,600	4,452	4,104	4,579	-488	364	16	491	-191	142	6	14	-8	182	
Pincanning	1,291	1,465	1,500	1,408	1,419	1,446	209	115	128	155	82	45	51	0	51	62	
Subtotal	46,170	41,840	42,065	50,279	44,728	51,710	-4,105	4,109	-1,442	5,540	-1,604	1,605	-377	2,216	1,202	-1,779	1,014
Percent of Total	41%	38%	38%	40%	41%	41%								2%			
BAY COUNTY	111,452	110,357	109,400	121,371	110,937	124,826	-2,359	9,612	-822	13,067	-921	3,755	-329	5,227	77,122	-77,451	-71,895

Sources:

- 1990: U.S. Census Bureau
- 1999: Claritas, Inc. of Ithaca, New York
- 2010: Office of State Demographer; Department of Management and Budget
- Eastern Central Michigan Planning and Development Regional Commission (State and Region)
- 2010: State/Region estimate from State of Michigan 8.89% projected population increase from 1990 to 2010.
- 2020: Michigan Department of Transportation - Planning Division (MDOT)
- University of Michigan REMI Model
- 2020: State/Region estimate from State of Michigan 1.2% projected population increase from 1990 to 2020.



Scenario "D" - Zoning Buildout

Based on Consolidated Zoning minus Developed Parcels,
 Tax-Exempt Parcels, Wetlands, Remnant Native Landscapes,
 State-Owned Lands, 100-Year Floodplains & Prime
 Agricultural Lands

- Rural Residential (Less Than 1 Dwelling Unit per Acre)
- Urban Residential - Low Density (2 - 3 Dwelling Units per Acre)
- Urban Residential - Moderate Density (4 - 6 Dwelling Units per Acre)
- Urban Residential - High Density (More Than 6 Dwelling Units per Acre)
- Commercial
- Industrial
- Transportation/Transitional
- Recreation/Institutional
- Water

- 1 Inch Approximately Equals 5.5 Miles
- Subtracted Land Area
- Political Boundary
- Highway

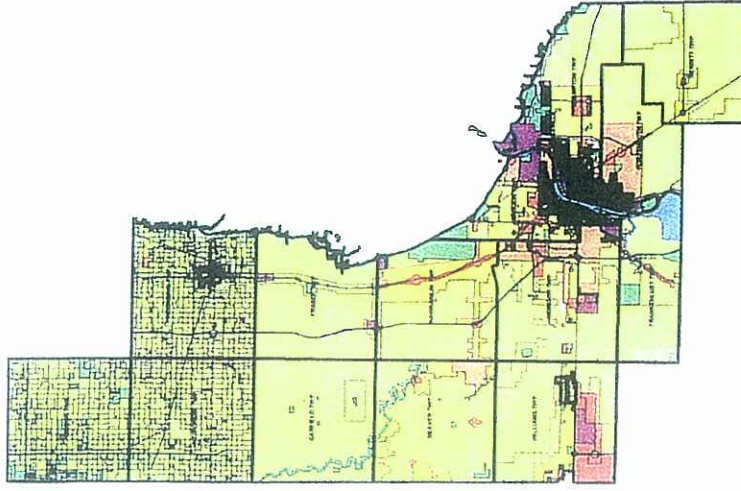
ZONING SCENARIO D BUILD-OUT ANALYSIS

Based on consolidated zoning maps minus developed parcels, tax-exempt parcels, water-owned parcels, state-owned lands and prime agricultural lands

	Common 1		Common 2		Common 3		Common 4		Common 5		Common 6		Common 7		Common 8		Common 9		TOTAL					
	(Rural Res.)		(Urban Res.-Low Density)		(Urban Res.-Med Density)		(Urban Res.-High Density)		(Office/Comm.)		(Industrial)		(Transp.)		(Rec./Inst.)		(Water)		Non-Res. Codes Only		ALL Codes			
	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits
TOWNSHIPS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Beaver	14,933	2,600	0	0	1,489	4,170	52	254	66	4,425	1,341	4,425	371	1,341	0	0	0	0	0	447	1,988	1,988	1,988	
Beaver	1,011	187	124	174	7	19	1	6	0	14,733	2,658	2,658	216	216	0	0	0	0	0	216	15,149	15,149	15,149	
Franklin	3,377	340	0	0	0	0	0	0	0	1,144	386	386	0	0	0	0	0	0	0	0	89	1,233	1,233	
Frazier	11,569	2,077	0	0	0	0	0	0	0	3,377	340	340	0	0	0	0	0	0	0	0	242	3,620	3,620	
Garfield	15,768	2,991	0	0	0	0	0	0	0	11,369	2,077	2,077	141	141	0	0	0	0	0	141	11,210	11,210	11,210	
Gibson	22	11	308	291	256	716	0	0	0	15,768	2,991	2,991	192	192	0	0	0	0	0	192	17,362	17,362	17,362	
Hampden	4,054	1,996	2,480	3,472	23	63	14	67	87	485	1,017	1,017	92	92	0	0	0	0	0	92	1,799	1,799	1,799	
Kawka	1,966	705	16	23	0	0	0	0	39	5,958	528	5,958	172	172	0	0	0	0	0	172	6,794	6,794	6,794	
McIntosh	2,570	662	0	0	47	132	0	0	0	1,553	794	794	30	30	0	0	0	0	0	30	2,002	2,002	2,002	
Maple Forest	13,446	2,380	0	0	0	0	0	0	0	2,817	794	794	203	203	0	0	0	0	0	203	2,820	2,820	2,820	
Maple Forest	7,486	1,847	0	0	0	0	0	0	0	3,446	2,380	2,380	166	166	0	0	0	0	0	166	13,793	13,793	13,793	
Parsons	700	187	0	0	34	95	0	0	29	1,847	744	1,847	99	99	0	0	0	0	0	99	229	2,715	2,715	
Williams	0	0	6,940	9,716	51	142	0	0	0	734	282	734	56	56	0	0	0	0	0	56	57	790	790	
CHIEFS	0	0	0	0	0	0	0	0	0	6,970	9,857	6,970	578	578	0	0	0	0	0	578	824	7,815	7,815	
Auburn	0	0	0	0	17	47	0	0	0	17	47	17	47	47	47	0	0	0	0	47	0	0	0	0
Bay City	0	0	0	0	2	5	132	599	24	604	604	604	373	373	0	0	0	0	0	373	59	75	75	
Exeterville	0	0	0	0	5	14	0	0	0	14	14	14	0	0	0	0	0	0	0	0	1,421	1,545	1,545	
Frederick	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	8	8	
Frederick	76,904	15,891	9,768	13,675	1,930	5,403	109	928	28,790	226	4,193	4,193	74	74	0	0	0	0	0	74	4,386	95,176	95,176	
BAY COUNTY																								

Summary of Build-Out Scenarios

	Zoning Scenarios					Land Use Plan Scenarios	
	Base Coverage	Scenario A	Scenario B	Scenario C	Scenario D	Base Coverage	Scenario A
	285,035	285,155	287,053	285,055	285,053	286,892	286,892
SUBTRACTION CATEGORIES							
Developed Parcels	Minus	Minus	Minus	Minus	Minus		Minus
For Essential Purposes	Minus	Minus	Minus	Minus	Minus		Minus
Wetlands	Minus	Minus	Minus	Minus	Minus		Minus
100-Year Floodplain							
State-Owned Lands							
Local Plan Priorities							
Seagrass Bay Environmental Areas							
Remnant Native Landscapes Areas							
Prime Agricultural Lands							
NET BUILDABLE RESIDENTIAL AREA (acres)	261,186	212,468	333,937	178,988	89,770	248,979	201,272
DWELLING UNITS	162,086	101,658	97,036	71,177	38,895	226,361	188,622



Consolidated Land Use Plans*

Based on Common Key Master Plan Methodology

*Urban Growth Element Database, Institute of Urban and Environmental Planning & Engineering, Inc.

- Rural Residential (Less Than 1 Dwelling Unit per Acre)
- Urban Residential - Low Density (2 - 3 Dwelling Units per Acre)
- Urban Residential - Moderate Density (4 - 6 Dwelling Units per Acre)
- Urban Residential - High Density (More Than 6 Dwelling Units per Acre)
- Commercial
- Industrial
- Transportation/Transitional
- Recreation/Institutional
- Water

1 Inch Approximately Equals 5.5 Miles



Political Boundary
Highway

LAND USE PLAN BASE COVERAGE BUILD-OUT ANALYSIS

Based on consolidated Master Plan Land Use Maps with no land subtraction categories

TOWNSHIPS	Common 1 (Rural Res.)		Common 2 (Urban Res.-Low Density)		Common 3 (Urban Res.-Med Density)		Common 4 (Urban Res.-High Density)		TOTAL Residential Codes Only		Common 5 (Office/ Comm.)	Common 6 (Industrial)	Common 7 (Transp.)	Common 8 (Rec./ Inst.)	Common 9 (Water)	TOTAL Non-Res. Codes Only	TOTAL ALL Codes Acres	
	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres
Beaver	887	1,853	3,703	0	1,225	306	211	30	5,077	3,076	1,249	851	15	1,313	241	3,669	9,876	
Frankfort	16,596	16,596	3,577	1,788	1,024	246	0	3,157	18,440	10,932	278	0	0	1,173	0	1,457	22,648	
Freser	20,540	10,098	0	54	0	0	0	0	11,035	10,932	572	35	66	1,122	1,965	3,740	14,745	
Grainfield	21,886	20,540	0	0	0	0	0	20,540	20,540	20,540	130	318	150	159	0	777	21,267	
Guzdon	19,868	13,868	0	0	0	0	0	21,055	21,866	23	32	0	0	956	0	1,011	27,896	
Hempden	7,418	7,413	3,575	1,789	282	71	0	3,894	19,869	9,477	153	193	15	3,647	0	3,867	22,735	
Kawakawa	11,684	11,684	6,199	3,099	272	68	55	2,356	14,859	11,511	113	113	150	1,834	104	5,466	17,772	
Merrill	19,268	403	806	0	0	0	0	8,279	14,859	1,151	113	45	0	1,834	0	3,250	21,459	
Mill Forest	16,679	16,679	0	0	3,751	939	546	78	20,976	17,695	1,103	857	743	23	0	142	20,255	
Princeton	22,806	22,806	0	0	0	0	0	22,806	22,806	22,806	0	155	0	0	0	2,682	23,457	
Princeton	22,199	22,199	0	0	3,528	867	0	22,199	22,199	330	0	142	393	0	3	155	22,991	
Princeton	8,384	8,384	0	0	2,112	66	0	2,112	9,466	432	107	0	0	161	83	867	23,066	
Williams	14,362	14,362	2,324	1,143	265	66	101	17,054	15,625	3,249	879	0	150	221	0	4,519	21,573	
CHIEFS																		
Auburn	0	0	272	136	0	0	5	1	277	137	42	10	10	300	0	371	640	
Bay City	0	0	0	0	0	0	2,686	384	3,686	384	494	773	1,474	1,143	644	4,529	7,215	
Essexville	0	0	0	0	0	0	477	68	477	68	140	70	0	129	58	398	875	
Princeton	0	0	0	0	193	48	0	193	48	48	156	19	89	0	0	283	456	
BAY COUNTY	212,704	212,704	70,567	10,283	10,540	2,835	3,189	738	216,783	274,341	10,072	6,146	4,020	14,606	3,709	37,972	285,092	

Summary of Build-Out Scenarios

	Zoning Scenarios					Land Use Plan Scenarios	
	Base Coverage	Scenario A	Scenario B	Scenario C	Scenario D	Base Coverage	Scenario A
TOTAL ACREAGE	285,055	285,055	285,055	285,055	285,055	285,892	286,892
SUBTRACTION CATEGORIES							
Developed Parcels	Minus	Minus	Minus	Minus	Minus		Minus
Tax Exempt Parcels	Minus	Minus	Minus	Minus	Minus		Minus
Wetlands	Minus	Minus	Minus	Minus	Minus		Minus
100-Year Floodplains							
State-Owned Lands							
Lake Plain Parcels							
Saginaw Bay Environmental Areas							
Benmore Native Landscape Area							
Prime Agricultural Lands							
NET BUILDABLE RESIDENTIAL AREA (acres)	261,196	212,488	203,937	178,868	88,790	246,980	201,227
DWELLING UPHI	162,284	101,664	97,036	77,122	35,895	226,301	188,872

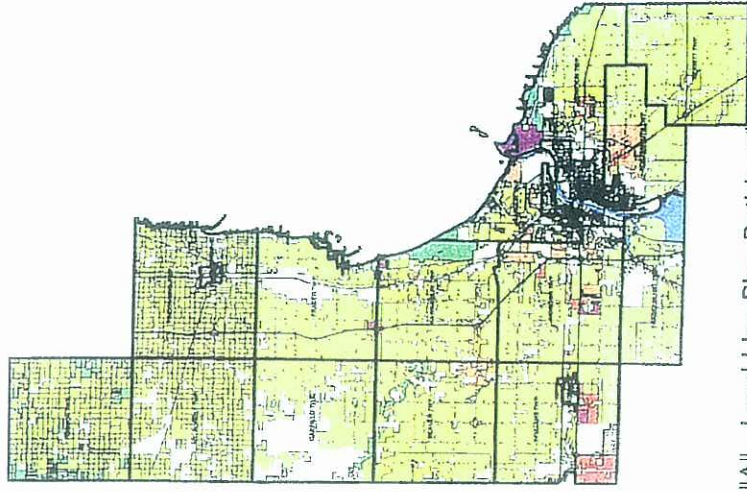
LAND USE PLAN BASE COVERAGE BUILD-OUT CAPACITY

Based on consolidated Master Plan Land Use Maps with no land subtraction categories

	Population						Population Change						Dwelling Units (2.56 persons/unit)		Dwelling Units (2.50 persons/unit)		Buildout Potentials (Dwelling Units)	2020 Capacity	
	1990	1999	2010	2020	2010	2020	2010	2020	MDOT	State/Region Ratio	State/Region Ratio	2010	2020	MDOT	State/Region Ratio	MDOT		State/Region Ratio	
	US Census	Claritas	State/Region	MDOT/REMI	State/Region Ratio	MDOT/REMI	State/Region Ratio	MDOT	State/Region Ratio	State/Region Ratio	State/Region Ratio	MDOT	State/Region Ratio	MDOT	State/Region Ratio	MDOT		State/Region Ratio	
TOWNSHIPS																			
Bangor	16,028	16,335	16,394	17,454	17,951	17,951	59	1,119	75	1,615	23	437	30	647	3,076	-3,046	-2,429		
Beaver	2,774	2,951	2,995	3,021	3,107	3,107	221	247	60	333	36	76	24	133	18,640	-18,616	-18,507		
Frankenlust	2,281	2,158	2,492	2,484	2,333	2,555	211	203	52	274	82	79	21	109	10,952	-10,931	-10,842		
Fraser	3,680	4,153	3,774	4,008	4,122	94	328	26	442	37	128	10	177	20,540	-20,529	-20,343			
Garfield	1,736	1,492	1,885	1,891	1,835	1,744	149	155	99	208	58	60	40	83	21,886	-21,846	-21,802		
Gibson	1,090	1,300	1,145	1,187	1,221	1,221	55	97	22	131	21	38	9	52	18,868	-18,860	-18,816		
Hampden	9,520	9,522	9,494	10,367	9,315	10,662	26	847	-205	1,142	10	331	82	457	9,427	-9,509	-8,970		
Kawakawin	4,888	5,029	4,983	5,323	4,855	5,475	95	435	33	387	37	170	-13	235	14,859	-14,872	-14,624		
Meritt	1,510	2,158	1,482	1,644	1,572	1,691	-28	134	62	181	-11	52	25	72	19,677	-19,652	-19,604		
Monitor	9,475	9,929	9,898	10,318	9,752	10,612	423	843	277	1,137	165	329	111	455	17,695	-17,584	-17,240		
MI. Forest	1,457	1,463	1,616	1,587	1,522	1,632	159	130	65	175	62	51	26	70	22,836	-22,810	-22,746		
Pincanning	2,647	3,935	2,761	2,883	2,479	2,965	114	236	-168	318	45	92	-67	127	22,199	-22,266	-22,072		
Pottermouth	3,918	3,259	3,905	4,267	3,897	4,388	-13	349	-21	470	-5	136	-8	188	9,468	-9,474	-9,278		
Williams	4,278	4,837	4,511	4,659	4,587	4,791	233	381	309	513	91	149	124	205	15,605	-15,482	-15,400		
Subtotal	65,282	68,517	67,335	71,092	66,209	73,116	1,746	5,301	620	7,327	682	2,150	248	3,011	225,735	-225,477	-222,714		
Percent of Total	59%	62%	62%	59%	60%	59%									100%				
CITIES																			
Auburn	1,655	1,887	1,980	2,020	2,015	2,078	125	165	160	223	49	64	64	89	137	73	-48		
Boy City	38,936	34,688	34,985	42,401	37,190	43,408	-3,951	3,465	-1,746	4,672	-1,543	1,354	-698	1,869	384	-1,082	1,485		
Essexville	4,088	3,800	3,600	4,452	4,104	4,579	-488	364	16	491	-191	142	6	196	68	-62	128		
Pincanning	1,291	1,465	1,500	1,406	1,419	1,446	209	115	128	155	82	45	51	62	48	3	14		
Subtotal	46,170	41,840	42,035	50,279	44,728	51,710	-4,105	4,109	1,442	5,940	-1,604	1,605	-577	2,276	637	-1,213	1,579		
Percent of Total	41%	38%	38%	41%	40%	41%									0%				
BAY COUNTY																			
	111,452	110,357	109,400	121,371	110,937	124,826	-2,359	9,612	-822	13,067	-921	3,755	-329	5,227	226,361	-226,690	-221,134		

Sources:

- 1990: U.S. Census Bureau
- 1999: Claritas, Inc. of Ithaca, New York
- 2010: Office of State Demographer, Department of Management and Budget
- Eastern Central Michigan Planning and Development Regional Commission (State and Region)
- 2010: State/Ratio estimate from State of Michigan 8.89% projected population increase from 1990 to 2010.
- 2020: Michigan Department of Transportation - Planning Division (MDOT)
- University of Michigan REMI Model
- 2020: State/Ratio estimate from State of Michigan 12% projected population increase from 1990 to 2020.



Scenario "A" - Land Use Plan Buildout*

Based on Consolidated Land Use Plans minus Developed Parcels & Tax-Exempt Parcels

- Rural Residential (Less Than 1 Dwelling Unit per Acre)
 - Urban Residential - Low Density (2 - 3 Dwelling Units per Acre)
 - Urban Residential - Moderate Density (4 - 6 Dwelling Units per Acre)
 - Urban Residential - High Density (More Than 6 Dwelling Units per Acre)
 - Commercial
 - Industrial
 - Transportation/Transitional
 - Recreation/Institutional
 - Water
- 1 Inch Approximately Equals 5.5 Miles
- Subtracted Land Area
- Political Boundary
- Highway

LAND USE PLAN SCENARIO A BUILD-OUT ANALYSIS

Based on consolidated Master Plan Land Use Maps minus developed parcels and tax exempt parcels

	Common 1 (Rural Res.)		Common 2 (Urban Res.-Low Density)		Common 3 (Urban Res.-Med Density)		Common 4 (Urban Res.-High Density)		TOTAL Residential Codes Only		Common 5 (Office/ Comm.) Acres	Common 6 (Industrial) Acres	Common 7 (Transp.) Acres	Common 8 (Rec./ Inst.) Acres	Common 9 (Water) Acres	TOTAL Non-Res. Codes Only Acres	TOTAL ALL Codes Acres	
	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits								
TOWNSHIPS																		
Bartow	796	796	2,726	1,363	676	174	92	13	4,309	2,346	501	95	10	473	237	1,216	5,626	
Beverly	15,017	15,017	2,394	1,197	600	150	0	0	18,012	16,364	152	0	0	724	0	895	18,887	
Franklin	9,153	9,153	100	30	0	0	0	0	7,253	9,303	366	25	36	72	1,908	2,417	11,670	
Irwin	16,063	16,063	0	0	0	0	0	0	16,063	16,063	36	136	13	2	0	289	16,352	
Garfield	13,094	13,094	0	0	0	0	0	0	13,094	13,094	2	3	0	290	0	295	13,389	
Graydon	16,919	16,919	0	0	0	0	0	0	16,919	16,919	0	0	15	3,647	0	3,662	20,581	
Hampton	7,030	7,030	2,217	1,108	40	10	607	87	9,894	5,235	257	1,461	911	1,428	104	4,159	14,052	
Kew-Forest	10,600	10,600	4,664	2,332	113	28	47	7	15,424	12,967	332	93	159	1,721	0	2,288	17,713	
Marble	18,072	18,072	711	356	0	0	24	3	18,608	19,431	18	25	0	5	0	48	18,855	
Monitor	14,881	14,881	0	0	2,074	578	244	35	17,198	15,434	509	346	242	121	0	1,270	18,419	
Mt. Forest	17,613	17,613	0	0	0	0	0	0	17,613	17,613	0	0	0	0	0	0	17,613	
Pinecroft	30,000	30,000	0	0	0	0	0	0	20,000	20,000	0	0	392	0	3	395	20,395	
Portsmouth	7,907	7,907	0	0	2,400	600	0	0	10,307	8,307	322	17	0	62	89	450	10,797	
Williams	12,683	12,683	1,311	555	160	40	32	5	13,987	13,283	2,318	236	150	86	0	2,790	16,777	
CITIES																		
Auburn	0	0	61	122	0	0	0	0	61	122	8	4	10	48	0	71	132	
Bay City	0	0	0	0	0	0	174	25	174	25	10	36	1,423	37	640	2,154	2,328	
Essexville	0	0	0	0	0	0	107	15	107	15	8	5	0	13	48	84	191	
Pinecroft	0	0	0	0	0	0	0	0	0	0	2	3	67	0	0	72	79	
BAY COUNTY	179,828	179,828	13,964	7,083	6,084	1,577	1,328	109	20,222	18,542	4,850	2,479	3,862	6,797	3,028	22,616	223,869	

LAND USE PLAN SCENARIO A BUILD-OUT CAPACITY

Based on consolidated Master Plan Land Use Maps minus developed parcels and tax-exempt parcels

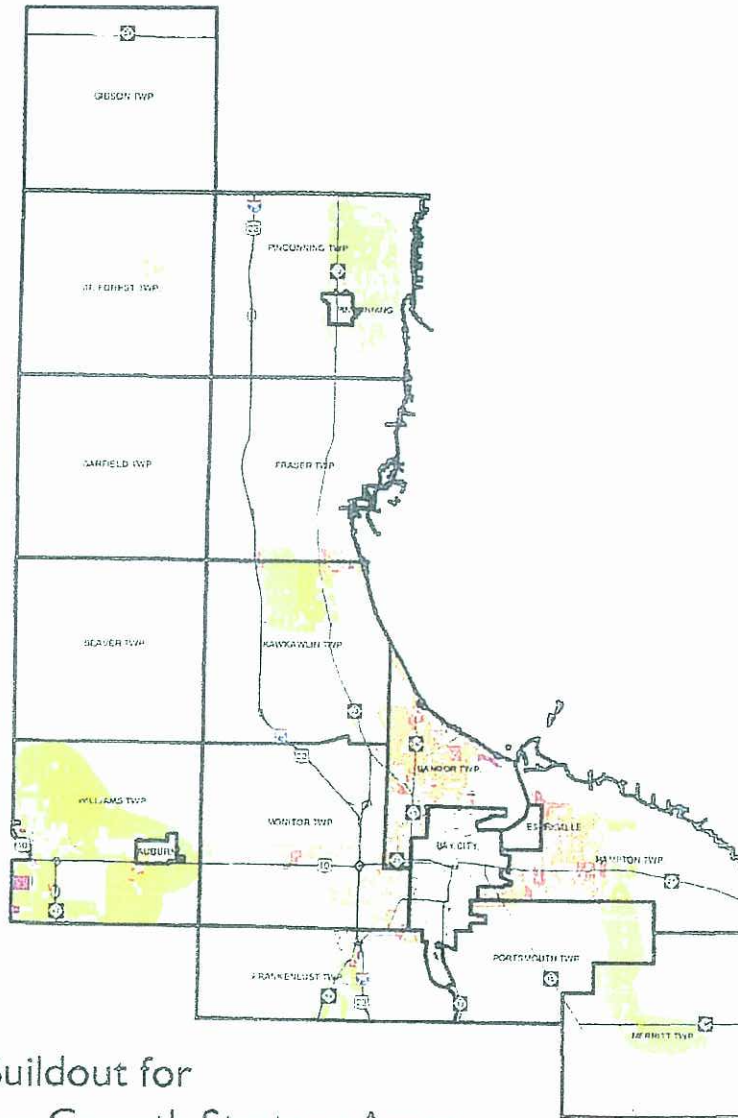
	Population						Population Change			Dwelling Units (2.54 persons/unit)		Dwelling Units (2.50 persons/unit)		Buildout Potentials (Dwelling Units)	2020 Capacity		
	1999		2010		2020		2010		2020		2010		2020		MDOT	State/ Ratio	
	US Census	Claritas	State/ Region	State/ Ratio	MDOT/ REMI	State/ Ratio	State/ Region	State/ Ratio	MDOT	State/ Ratio	State/ Region	State/ Ratio	MDOT				State/ Ratio
TOWNSHIPS																	
Barnort	1,028	1,335	16,394	17,454	16,410	17,951	59	1,119	75	1,616	23	437	30	647	2,346	-2,316	-1,699
Beaver	2,774	2,951	2,995	3,021	2,834	3,107	221	247	60	333	86	96	24	133	16,364	-16,340	-16,231
Franklin	2,281	2,158	2,492	2,484	2,333	2,555	211	203	52	274	82	79	21	109	9,203	-9,182	-9,093
Froser	3,680	4,153	3,774	4,008	3,706	4,122	94	326	26	442	37	128	10	177	16,063	-16,053	-15,887
Garfield	1,736	1,492	1,885	1,891	1,835	1,944	149	155	99	208	58	60	40	83	13,094	-13,054	-13,010
Gibson	1,090	1,300	9,494	10,367	9,315	10,662	55	97	22	131	21	35	9	52	16,919	-16,910	-16,867
Hampton	9,520	9,522	4,983	5,323	4,855	5,475	95	435	-33	587	37	170	-13	235	12,967	-12,980	-12,732
Sawkwolin	4,888	5,029	1,510	1,482	1,644	1,572	-38	134	62	181	-11	52	25	72	18,431	-18,407	-18,359
Merrill	9,475	9,925	9,898	10,318	9,752	10,612	423	843	277	1,377	165	329	111	455	15,434	-15,323	-14,979
Mt. Forest	1,457	1,463	1,616	1,587	1,522	1,632	159	130	65	175	62	51	26	70	17,613	-17,587	-17,543
Pincanning	2,647	3,935	2,761	2,883	2,479	2,965	114	236	-168	318	45	92	-67	127	20,000	-20,067	-19,873
Portsmouth	3,918	3,359	3,905	4,267	3,897	4,388	-13	349	-21	470	-5	136	-8	188	8,507	-8,515	-8,319
Williams	4,278	4,837	4,511	4,659	4,587	4,791	233	381	309	513	91	149	124	205	13,283	13,160	-13,078
Subtotal	65,282	68,517	67,335	71,092	66,209	73,116	1,746	5,503	620	7,527	682	2,150	248	3,011	188,460	-188,212	-185,449
Percent of Total	39%	62%	59%	59%	60%	59%								99%			
CITIES																	
Auburn	1,855	1,887	1,980	2,020	2,015	2,078	125	165	160	223	49	64	64	89	172	-58	-33
Bay City	38,936	34,688	34,985	42,401	37,190	43,608	-3,951	3,465	-1,746	4,672	-1,543	1,354	-698	1,869	25	-773	1,844
Essexville	4,088	3,800	3,600	4,452	4,104	4,579	-488	364	16	491	-191	142	6	196	15	-9	181
Pincanning	1,291	1,465	1,500	1,406	1,419	1,446	209	115	128	155	82	45	51	62	0	51	62
Subtotal	46,170	41,840	42,065	50,279	44,728	51,710	-4,105	4,109	-1,442	5,540	-1,604	1,605	-577	2,216	162	-739	2,054
Percent of Total	41%	38%	38%	41%	40%	41%								1%			
BAY COUNTY	111,452	110,357	109,400	121,371	110,937	124,826	-2,359	9,612	-822	13,067	-921	3,755	-329	5,227	188,622	-188,951	-183,395

Sources:
 1990: U.S. Census Bureau
 1999: Claritas, Inc. of Ithaca, New York
 2010: Office of State Demographer, Department of Management and Budget
 Eastern Central Michigan Planning and Development Regional Commission (State and Region)
 2010: State/Ratio estimate from State of Michigan 8.88% projected population increase from 1990 to 2010.
 2020: Michigan Department of Transportation - Planning Division (MDOT)
 University of Michigan REMI Model
 2020: State/Ratio estimate from State of Michigan 12% projected population increase from 1990 to 2020.

ATTACHMENT C

Alternative Growth Strategy Areas Scenario A

- Build-Out Map
- Build-Out Zoning Table
- Build-Out Capacity Table



Zoning Buildout for Alternative Growth Strategy Areas

Based on Consolidated Zoning minus Developed Parcels &
Tax-Exempt Parcels

1 Inch Approximately Equals 3.2 Miles

- Rural Residential (Less than 1 Dwelling Unit per Acre)
 - Urban Residential - Low Density (2 - 3 Dwelling Units per Acre)
 - Urban Residential - Moderate Density (4 - 6 Dwelling Units per Acre)
 - Urban Residential - High Density (More than 6 Dwelling Units per Acre)
 - Commercial
 - Industrial
 - Transportation/Transitional
 - Recreation/Institutional
- Subtracted Land Area
 - Political Boundary
 - Highway

ZONING BUILD-OUT FOR ALTERNATIVE GROWTH MANAGEMENT STRATEGY AREAS, SCENARIO A

Based on Consolidated Zoning Maps minus developed parcels and tax-exempt parcels

	Common 1		Common 2		Common 3		Common 4		Total		Common 5		Common 6		Common 7		Common 8		Common 9		Total			
	(Rural Res.)		(Urban Res.-Low Density)		(Urban Res.-Med Density)		(Urban Res.-High Density)		Residential Codes Only		(Office/Comm.)		(Industrial)		(Transp.)		(Rec./Inst.)		(Water)		Non-Res. Codes Only		ALL Codes	
	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits	Acres	HouseUnits
TOWNSHIPS																								
Baneger	0	0	0	0	3,441	364	794	42	3,735	902	221	139	640	0	70	1,070	0	0	0	0	1,070	0	4,605	
Beaver	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Frankenmst	583	149	444	222	139	35	148	24	1,384	430	0	22	206	0	0	0	0	0	0	0	0	0	0	
Frazier	349	86	0	0	76	19	28	4	453	109	36	0	24	0	68	296	0	0	0	0	0	0	1,630	
Garnett	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Gibson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Hampton	203	40	471	236	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Kawkawlin	1,756	295	1,415	708	2,761	540	0	0	2,835	816	596	15	928	0	0	0	0	0	0	0	0	0	0	
Memrit	3,124	605	125	63	150	28	19	3	3,243	1,043	36	20	67	0	5	128	0	0	0	0	0	0	3,773	
Monitor	2,099	495	0	0	0	0	0	0	3,249	668	0	0	76	0	0	76	0	0	0	0	0	0	3,471	
MT Forest	389	83	0	0	597	149	0	0	2,596	644	90	49	553	0	11	703	0	0	0	0	0	0	3,325	
Pocanning	4,845	980	0	0	0	0	0	0	399	83	0	0	11	0	0	11	0	0	0	0	0	0	3,399	
Portsmouth	549	328	0	0	379	93	0	0	4,845	980	48	0	83	0	0	83	0	0	0	0	0	0	4,975	
Williams	0	0	9,717	4,899	7	18	0	0	9,785	4,876	123	227	835	0	0	1,185	0	0	0	0	0	0	2,013	
CHIEFS																								
Auburn	0	0	0	0	123	31	0	0	323	51	0	0	98	0	0	98	0	0	0	0	0	0	400	
Bay City	0	0	0	0	20	5	169	34	66	189	32	58	1,477	0	0	98	0	0	0	0	0	0	221	
Essexville	0	0	0	0	5	1	0	0	5	2	0	0	2	0	0	2	0	0	0	0	0	0	1,595	
Hammond	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,784	
INDEPENDENT																								
1947 COUNTY	14,899	3,061	12,172	6,086	7,162	1,790	678	97	34,911	11,035	1,169	530	4,576	0	153	6,476	0	0	0	0	0	0	85	
TOTAL																								41,307

