

AGENDA

Grand Haven Charter Township Planning Commission
Monday, October 5, 2015 – 7:30 p.m.

- I. Call to Order
- II. Roll Call
- III. Pledge to the Flag
- IV. Approval of the September 21, 2015 Meeting Minutes
- V. Correspondence
- VI. Public Comments/Questions on Agenda Items Only (Limited to 3 minutes)
- VII. Old Business
 - A. Resilient Master Plan Update
 - 1) Review Draft
 - 2) Complete Implementation Plan
 - 3) Discuss Impact on Zoning Ordinance
- VIII. New Business
 - A. 2016 – 2018 Planning Commission Budget
- IX. Reports
 - A. Attorney's Report
 - B. Staff Report
 - Resilient Master Plan Community Open House – Oct 20th 5-8pm @ Loutit District Library Meeting Room A.
 - C. Other
- X. Extended Public Comments/Questions on Non-Agenda Items Only (Limited to 4 minutes)
- XI. Adjournment

Note: Persons wishing to speak at public hearings, on agenda items, or extended comments, must fill out a "Speakers Form" located on the counter. Completed forms must be submitted to the Zoning Administrator prior to the meeting.

MEETING MINUTES
GRAND HAVEN CHARTER TOWNSHIP
PLANNING COMMISSION
SEPTEMBER 21, 2015

I. CALL TO ORDER

Kantrovich called the meeting of the Grand Haven Charter Township Planning Commission to order at 7:30 p.m.

II. ROLL CALL

Members present: Kantrovich, Kieft, LaMourie, Robertson, Taylor, Reenders, Gignac & Wilson

Members absent: Cousins

Also present: Fedewa and Attorney Bultje

Without objection, Kantrovich instructed Fedewa to record the minutes.

III. PLEDGE TO THE FLAG

IV. APPROVAL OF MINUTES

Without objection, the minutes of the August 17, 2015 meeting were approved.

V. CORRESPONDENCE – None

VI. PUBLIC COMMENTS ON AGENDA ITEMS ONLY

Mark Reenders – 16616 Warner Street

- Questions regarding if the services offered within the medical facility would change its type of land use.
- Proposed building height is greater than what is currently permitted under the Zoning Ordinance. Recommends the Ordinance be updated to reflect a greater building height prior to any approvals.
- Questions if the proposed building materials meet the US-31 Area Overlay Zone requirements, and if they are cohesive with surrounding land uses.

VII. NEW BUSINESS

A. PUD Pre-application presentation – Health Pointe

Fedewa provided an overview through a memorandum dated September 17th.

Jack Barr, the project engineer from Nederveld; Kyle Prochaska, a Spectrum Health representative; Jeff Meyers, a Spectrum Health representative; and Sean Easter, a Spectrum Health staff engineer were present. Their presentation and discussion points included:

- Gross Floor Area (GFA) vs Useable Floor Area (UFA) parking requirements compared to the typical formula utilized by Spectrum Health.
- Nonexclusive Driveway Agreement with Meijer expressly prohibits shared parking arrangements.
- Agrees that realigning Whittaker Way with DeSpelder Street pursuant to the Robbins Road Sub Area Plan would be beneficial to their site, and are willing to discuss easement options in order to accomplish this goal.
- The Traffic Impact Study included with the pre-application submission documents does not conclude that additional traffic volumes warrant an intersection improvement at Robbins Road and 172nd Avenue/Ferry Street. Therefore, are not in favor of assisting with those improvements noted by the Ottawa County Road Commission's (OCRC) preliminary review.
- Proposed building has similar architecture to the facility located in Holland.
- The proposed canopy is designed to accommodate 2-3 vehicles, and has a substantial weight. The proposed building materials are durable, and reliable. Furthermore, the desire is to utilize natural lighting under the canopy rather than artificial.
- Believe the buildings proximity to US-31 and other large bulk buildings such as Meijer, Walmart, and buildings within the City of Grand Haven, will reduce the visual impact of the proposed medical facility.

The project was discussed by Commissioners and focused on:

- Concerns over the building height, cohesion with surrounding land uses, and visual impact. Comparison to other PUD projects that requested an increased building height. Discussed the origin of building heights and their direct correlation to an emergency vehicles ability to reach the top of a building. Emphasized the need to maintain consistency with zoning and aesthetic requirements.
- Discussion on implementing the proposed goals of the Resilient Master Plan, and determining how that may impact the Zoning Ordinance, which may include density and height amendments to focus growth in certain areas.
- Realignment of Whittaker Way and DeSpelder Street would provide more safety to motorists, and benefit residents, surrounding businesses, both jurisdictions, and achieve a goal established in the Joint Robbins Road Corridor Sub Area Plans adopted by Grand Haven Charter Township and the City of Grand Haven, respectively.
- Emphasized the Township desires to preserve as many existing trees as possible even if it means additional measures must be taken to ensure the tree's health during

construction. Requested the potential applicant review the plans and determine if there is potential to save any pockets of trees within the site.

- Inquired why landscaping is not proposed along the north boundary line of the site.
- Noted the preliminary findings of the OCRC.
- Requested the potential applicant review back-loading in the parking lot in order to reduce cross circulation patterns.

B. PUD Pre-application presentation – Stonewater

Fedewa provided an overview through a memorandum dated September 17th.

The developers, Dale Kraker and Jeff Klaasen; and project engineer Rick Pulaski were present. Their presentation and discussion points included:

- Historical review of the property and the former PUD application.
- Indicated the development will meet the designated open space requirements.
- Private roads requested for the proposed attached single family condominiums in order to provide each unit with a driveway—a parking lot has equivalent safety issue.
- Willing to install a construction road as a placeholder for the second entrance on Lincoln Street in order to keep the proposed phasing. Not in favor of establishing a letter of credit or escrow to guarantee its construction.
- Requesting reduced setbacks, and referenced Hunters Woods, Lincoln Pines, and Forest Park East as examples.

The project was discussed by Commissioners and focused on:

- If open space is not accessible by each property owner then it cannot be included as designated open space. Additionally, any portion of the ponds used for storm water must be removed from the open space calculations. Questioned if the proposed open spaces significantly contribute to the purpose and objectives of the PUD Ordinance
- Several suggestions were given to alleviate the potential problem of the second entrance not being constructed.
- Due to the high traffic volume on Lincoln Street at least one outbound left turn lane should be provided, so residents making a right turn are not delayed. Need to address deceleration lanes and tapers with the OCRC at each entrance.
- Sidewalks need to be included in the attached single family condominium area as well.
- Likely to be conservative if reduced setbacks are requested.
- Property to the west of this site is protected by a conservation easement, so it may be unnecessary to have a temporary cul-de-sac in place for a future connection.

VIII. OLD BUSINESS

A. Rezoning application – Grand Haven Financial Center – RR to SP

The adopted motion, during the August 3rd meeting, stated the matter would be tabled until a quorum is met at a future meeting. Such a quorum is present. Wilson recused himself due to a conflict of interest. Staff gave a brief overview of the application. Remaining Commissioners briefly reviewed the case.

Motion by Gignac, supported by Robertson, to recommend the Township Board approve the Grand Haven Financial Center rezoning application of Parcel No. 70-07-09-400-005 from Rural Residential (RR) to Service/Professional (SP) based on the application meeting applicable rezoning requirements and standards of the Grand Haven Charter Township Zoning Ordinance, Master Plan, and Future Land Use Map. **Which motion carried.**

IX. REPORTS

A. Attorney Report – None

B. Staff Report

- Resilient Master Plan Community Open House is Tentatively Scheduled for Oct 20th from 5pm – 8pm @ the Loutit District Library.

C. Other

- Planning Commission requested an update on the Speedway project.
 - As staff understands, Speedway has received preliminary design approval from the OCRC, but is dependent upon MDOT. Currently working with MDOT to determine if widening Hayes Street is permissible.

X. EXTENDED PUBLIC COMMENTS ON NON-AGENDA ITEMS ONLY – None

XI. ADJOURNMENT

Without objection, the meeting adjourned at 9:30 p.m.

Respectfully submitted,



Stacey Fedewa
Acting Recording Secretary



GRAND HAVEN CHARTER TOWNSHIP

Community Development Memo

DATE: October 1, 2015
TO: Planning Commission
FROM: Stacey Fedewa, Planning & Zoning Official
RE: Review of Master Plan Draft

BACKGROUND

Staff has reviewed the third draft of the plan, and believes the content is now ready to be thoroughly reviewed by the Planning Commission. Please keep in mind this is still a draft and has errors that you will find (*spelling, numbering, grammar, sentence structure, etc.*). Therefore, please **focus on the content** during your review.

IMPORTANT NOTES OF DRAFT 4

Below are highlights of some important pieces that will be added, or corrected, in a future draft.

- Chapter 2 – Climate and Shoreline Processes
 - Additional information and pictures to be added from the flooding and erosion that occurred in Grand Haven during the late 1980s.
 - The impact Super Storm Sandy had on the Great Lakes.
 - Data from U of M, especially the fiscal impact.
 - Fix certain maps that are hard to read.
 - Delete duplicate information that is found in Chapter 3.
- Chapter 3 – Vulnerability Assessment
 - Delete duplicate information that is found in Chapter 2.
 - Correct certain graphics (*size, location, colors, etc.*).
 - More information on the 2013 Grand Rapids flooding and perhaps the Warren flooding will be added.

- Chapter 7 – Future Land Use and Zoning Plan
 - This chapter is substantially similar to the 2009 Master Plan, but information has been updated based on the proposed 2015 Future Land Use Map the Planning Commission reviewed on August 17th (*e.g., updating the southwest quadrant, adding the Manufactured Home Park land use designation, etc.*).
- Chapter 8 – People & Social Systems
 - Data from the 2012 Ottawa County Community Assessment supplied by the United Way will be updated to the newly released 2015 data.
 - Building permit data will continue to be updated, with the final draft including all of the 2015 permit numbers.
- Chapter 10 – Non-Motorized Transportation
 - Needs to be expanded.
 - Harbor Transit data will be updated as new figures are published.
 - Vacant/Open Space Table 10.1 identifies a decrease in the amount of acreage dedicated to parks, recreation, and natural areas—staff is still trying to determine how, and why, that data changed from 2007.
 - The description of Law Enforcement needs to be corrected.
- Chapter 11 – Natural Systems
 - The soil types section needs to have additional information, so the reader is provided context on the meaning/implications of each type.
 - The last page of this chapter references pathway expansions in Spring Lake Township, which will be removed and replaced with the Regional Recreation Planning and Strengthening Relationship sections found in the recreation plan.
- Chapter 12 – Economy
 - Still appear to be discrepancies with the ESRI data.
 - Possible the data provided for workers who commute to work in GHT is wrong.

Also note that certain references to tables, figures, and maps may be incorrect due to the various shifts staff has recommended in the ordering of information. Many more graphics and pictures will be added in future drafts as well.

IMPLEMENTATION PLAN – CHAPTER 4

A main goal is to complete the Implementation Table found in Chapter 4. Staff has provided a starting point for the Priority and Timeframe sections, but it can/will be modified. Additionally, the Responsibility and Funding sections need to be completed.

POTENTIAL IMPACTS ON ZONING ORDINANCE

It is important to begin the conversation about how the Zoning Ordinance will be impacted by this Resilient Master Plan. Items such as density, building height, setbacks, etc. may be important points of discussion. Additionally, the Planning Commission may want to consider certain studies such as impacts of the M-231 Bypass, sensitive landscape inventory, tree survey, etc.

This information will assist in developing future budgets that will enable the Planning Commission to accomplish the goals and objectives set forth in this Plan.

PROPOSED TIMELINE FOR PLAN ADOPTION

Staff proposes the following timeline for the adoption of this Plan:

1. Oct 5th – Planning Commission adopts a motion to recommend the Township Board approve the draft plan for public distribution.
2. Oct 12th – Township Board reviews, comments, and approves the draft plan for public distribution and begins the statutory 63 day public comment period (*ends Dec 14th*).
3. Oct 20th – Community Open House hosted by the Township and City.
4. Jan 4th – Planning Commission holds public hearing to formally approve the Plan.
5. Jan 11th – Township Board approves, and formally adopts the Plan through a Resolution.

RECOMMENDATION

If the Planning Commission agrees this draft of the Master Plan is sufficient to request the Township Board approve the Plan for public distribution the following motion can be offered:

Motion to recommend the Township Board approve the current draft of the Resilient Master Plan for public distribution as required by the Michigan Planning Enabling Act of 2008.

Please contact me prior to the meeting with questions or concerns.

RESILIENT GRAND HAVEN CHARTER TOWNSHIP

Grand Haven Charter Township 2015 Master Plan



ACKNOWLEDGMENTS

GRAND HAVEN CHARTER TOWNSHIP TRUSTEES

Karl French, Supervisor
Laurie Larsen, Clerk
William Kieft III, Treasurer
Ron Redick
Howard Behm
Mike Hutchins
Cal Meeusen

MASTER PLAN JOINT PLANNING COMMITTEE

GRAND HAVEN CHARTER TOWNSHIP PLANNING COMMISSION

Adam Kantrovich Ph.D, Chair
Pete LaMourie
Susan Robertson
William Kieft III
Carolyn Taylor
Dave Renders
Steve Wilson
David Gignac
Bill Cousins

STAFF

Stacey Fedewa, Grand Haven Charter Township
Jennifer Howland, City of Grand Haven

YOUTH CHAPTER WRITTEN BY

Sydney Fritz
Anish Mandala
Chase Palmer



CITY OF GRAND HAVEN PLANNING COMMISSION

Scott Blakeney
Cecil Bradshaw
Eric Brenberger, Chair
Joshua Brugger
Bill Ellingboe
Robert Grimes
Mark Hills
W. Robert Huff
James Kalsbeek
Kirsten Runschke
Erin Von Tom

TABLE OF CONTENTS

SECTION I.

Chapter 1.	Introduction	1
------------	--------------	---

SECTION II. PLANNING FOR RESILIENCE

Chapter 2.	Climate and Shoreline Processes	7
Chapter 3.	Vulnerability Assessment	33
Chapter 4	Goals and Objectives	49

SECTION III. CIVIC ENGAGEMENT FOR A RESILIENT GRAND HAVEN TOWNSHIP

Chapter 5.	Public Participation	55
Chapter 6.	Youth Chapter	59

SECTION IV. ZONING AND FUTURE LAND USE PLAN

Chapter 7.	Future Land Use and Zoning Plan	63
------------	---------------------------------	----

SECTION V. COMMUNITY PROFILE

Chapter 8.	People and Social Systems	75
Chapter 9.	Housing	83
Chapter 10.	Built Systems	89
Chapter 11.	Natural Systems	105
Chapter 12.	Economy	123

APPENDICES

A. Robbins Road Subarea Plan	Not Included In This Draft
------------------------------	----------------------------



CHAPTER 1. INTRODUCTION

The *Resilient Grand Haven Charter Township Master Plan* serves as the official policy guide for Grand Haven Township’s future development and growth, including the management of its assets and resources. Organized through a series of relevant topics, goals, and objectives, the Master Plan provides the framework and basis for sound community development and land use decision making. The *Resilient Grand Haven Charter Township Master Plan* also establishes clear direction and expectations for the Township.

PURPOSES AND USE OF THE MASTER PLAN

- Solidifies the vision for the Township.
- Identifies and evaluates existing conditions and characteristics, community values, trends, issues and opportunities.
- Gives guidance to property owners, developers, neighboring jurisdictions, and county and state entities about expectations and standards for public investment and future development.
- Provides support for the allocation and spending of funds.
- Establishes the basis for the zoning ordinance, capital improvements, land use policies, and other implementation tools and programs.
- Provides the framework for day-to-day planning decisions by staff and land use policy decisions by the Planning Commission and Township Board.
- Provides the framework and foundation for creative problem solving and adapting to change – in other words, becoming a resilient community.
- Builds partnerships between informed citizens, community stakeholder groups, non-profit organizations and county and regional entities that help support and participate in plan implementation.

The Master Plan is intended to take a long-range view of the Township, guiding growth and development for the next twenty years and beyond, while also providing flexibility to respond to changing conditions, innovations, new concepts and available resources.

The Master Plan identifies and discusses important community trends like climate variability, which is redefining the Township’s natural environment. The Master Plan also highlights resources that help increase quality of place through better design and projects that consider placemaking. The Master Plan describes where new development should be directed and the character and standards to

The Master Plan

It is important to understand the Master Plan is a guide for growth and development within the Township. Local officials and planning staff will continually need to develop and adapt new land use policies that respond to changing conditions, innovations and new concepts.



which new homes and buildings should adhere. In addition, the Master Plan identifies the preferred characteristics of neighborhoods, ways to support healthy lifestyles, and improvements to the transportation system. The Master Plan also identifies how the Township can better respond and adapt to unanticipated events and adverse situations.

A COLLABORATIVE PLANNING PROCESS

The Master Plan was developed with unique collaboration between public officials from Grand Haven Charter Township and the City of Grand Haven. While local officials from the Township and City have collaborated on joint planning issues before (e.g., Robbins Road Corridor), this marked the first time they collaborated in the development of their Master Plans. This collaborative planning effort also resulted in an updated Master Plan for the City of Grand Haven.

A *Joint Planning Committee*, consisting of the full planning commissions of both the Township and the City, the respective community development staff, and the consultant helped oversee and facilitate the planning process. In addition, the *Joint Planning Committee* provided a sounding board for new ideas and information and a venue for the review and consideration of new materials. This planning process also involved public input and civic engagement throughout, as discussed further in Chapter 5.

Although the Master Plan was developed under this collaborative approach, ultimately, the final components and content of this Master Plan were established and approved by the Grand Haven Charter Township Board, the Grand Haven Charter Township Planning Commission, and Grand Haven Charter Township staff members.

This collaborative planning process should set the groundwork for continued dialogue between local officials from the Township and the City on community-wide land use issues, planning policies, community development, zoning matters and future Master Plan amendments.

PLANNING FOR A UNIQUE FOCUS

Because the Township and the City were willing to discuss and consider how climate variability might impact their community and how they might respond to those impacts, portions of the Master Planning Process were funded through a grant from Michigan's Coastal Zone Management (CZM) Program. In addition, under a grant of services from the *University of Michigan Water Center*, Township and City staff members and the *Joint Planning Committee* worked with a team of professors and researchers from the University of Michigan's Taubman College of Architecture and Urban Planning to study and determine the potential physical and environmental impacts of dynamic coastline processes. More information about their activities and conclusions, and how these impact the Master Plan, is described in more detail in Chapter 2.

MASTER PLAN FRAMEWORK: GUIDING PRINCIPLES OF THE MASTER PLAN

The planning process fostered many ideas and conversations about the past, present, and future of Grand Haven Township. During the planning process, these ideas coalesced into *Ten Guiding Principles*

The Master Plan Process

A Joint Planning Committee, consisting of the full planning commissions of the Township and the City helped to plan, participate in and oversee the master planning process.



for the creation of the plan and the direction of the Township going forward.

The Ten Guiding Principles came from an iterative planning process that involved Grand Haven Charter Township and City of Grand Haven staff members, the *Joint Planning Committee*, the consultant team, and the public. The following ten guiding principles are organized by past, present, and future.

BUILD ON OUR PAST

1) BUILD ON WHAT'S WORKING

Grand Haven Charter Township's last master plan was developed and adopted in 2009. The master plan was a thorough and well-written document, describing the current conditions of the community and identifying key community goals and action statements. In the six years since the plan was adopted, several of these goals and actions have been realized. At the same time, Grand Haven Township continues to address many new challenges.

While the conditions and challenges of the Township have changed, many of the overarching goals and policies discussed in the 2009 Master Plan remain applicable. In addition to incorporating language from the 2009 Master Plan, the Resilient Grand Haven Charter Township Master Plan builds upon existing goals and strategies, as discussed in Chapter 4.

SHAPE THE PRESENT

Each of the guiding principles for shaping the present of Grand Haven Charter Township came from current initiatives and/or resounding themes in the State's planning and community development efforts, and were recognized as important to the Township's planning process by officials, staff, and the public.

2) UNDERSTAND COASTAL PROCESSES

Michigan's beautiful coastline is more than an easy way to find Michigan on a map of the United States. The water resources throughout the state provide an abundance of resources and impact coastal communities in unique ways. Across the state, many efforts are underway to better understand our Great Lakes.

Grand Haven Charter Township has seven miles of Great Lakes shoreline and is framed by the Grand River. Many residents live along shorelines, enjoying scenic views and recreational opportunities.

For this planning process, a specialized team of researchers from the University of Michigan's Taubman College of Architecture and Urban Planning worked to determine the physical and environmental impacts of possible climate scenarios throughout the Township, including the coastal areas. Their research and recommendations influenced the planning process in a number of ways. More information on University of Michigan's involvement can be found in Chapter 2.

3) SUPPORT SMART GROWTH

Smart Growth is a national movement with a strong presence in Michigan. According to the Smart

Build On What's Working

Many of the goals and action statements identified in the 2009 Master Plan are still applicable today and have been included in the new Master Plan. For example, the Township will continue to expand the system of non-motorized trails and pathways.



Coastal Processes

Coastal processes are influenced by natural systems such as wind, waves, lake levels, sediment and weather. Understanding coastal processes can help jurisdictions plan for naturally-occurring changes and activities along the shoreline.



Ten Tenets of Smart Growth

The Ten Tenets of Smart Growth have been accepted and widely used by local



Plan for Place

Even small amenities like this neighborhood library can help promote social interaction



Growth Network, growing is smart when it gives us great communities with more choices, greater return on public investment, a thriving natural environment, and a legacy we can be proud to leave our children.¹ There are 10 key tenets of Smart Growth worth noting, as each of these are addressed to some degree in planning efforts across the state and in this Master Plan.

TEN TENETS OF SMART GROWTH

1. Mix land uses
2. Take advantage of compact building design
3. Create a range of housing opportunities and choices
4. Create walkable neighborhoods
5. Foster distinctive, attractive communities with a strong sense of place
6. Preserve open space, farmland and critical environmental areas
7. Strengthen and direct development toward existing communities
8. Provide a variety of transportation choices
9. Make development decisions predictable, fair and cost-effective
10. Encourage community and stakeholder collaboration

For Grand Haven Charter Township, Smart Growth is a key tool in shaping the current condition of the Township’s land use, housing, and transportation. As a result, Smart Growth principles are incorporated throughout each section of this Master Plan.

4) PLAN FOR PLACE

Where location refers to a particular geography, “place” refers to the physical components that make a location recognizable. Placemaking, then, is the act of designing and managing elements of the public realm to create places that are exciting, accessible, and comfortable. The State of Michigan has promoted and supported placemaking efforts in various communities and has provided a guidebook for communities looking to bring vibrancy back to neighborhoods and downtowns.

Although a majority of the Township is rural, placemaking will be a key strategy to help protect and increase vibrancy of commercial corridors (and centers) and new residential developments.

5) COLLABORATE REGIONALLY

Many elements of a community, from economic health to air and water quality, are not defined by a municipal boundary. Decisions regarding land use, infrastructure and natural resource protection have an impact on surrounding jurisdictions and vice versa.

Local officials in the greater Grand Haven Community recognize that ongoing collaboration is essential. Much of this Master Plan comes from a joint collaboration between Grand Haven Charter Township and the City of Grand Haven. There are also many tie-ins to regional efforts throughout the plan. For examples of these, see Chapters 9 through 13.

¹ This is Smart Growth. The Smart Growth Network

PLAN FOR THE FUTURE

Each of the guiding principles used to plan for the Township's future come from research on future trends to our climate, economy, and areas of public concern throughout the State. As with the other guiding principles, a culmination of input from officials, staff, and the public helped identify these as resounding themes.

6) BUILD COMMUNITY RESILIENCE

By their very nature, communities are continually complex and dynamic. People move and populations shift, industries go out of business and new industries emerge, natural areas are converted to neighborhoods, housing values fluctuate, and shorelines shift and change. Sometimes these changes emerge over a long period of time whereas some changes can be quite sudden. Community resilience, then, is a measure of the sustained ability of a community to utilize available resources to withstand and/or recover from adverse situations.²

For Grand Haven Charter Township, many strategies can be adopted to increase the Township's ability to learn from adversity, creatively solve problems and adapt to change. Resiliency is mentioned throughout the plan.

7) PREPARE FOR CLIMATE VARIABILITY

There is no longer doubt in the scientific community over whether the global climate is changing. A changing climate will mean variable temperatures, increased rains, and more severe storms in the Great Lakes region.

For Grand Haven Charter Township, responding to climate variability is a challenge in the short term and the long term. It requires Township officials and community stakeholders to consider how they plan for new development, transportation, infrastructure, natural resource preservation, energy production, and community health.

For a summary of climate research globally, regionally, and statewide, see Chapter 2. A number of goals and implementation strategies are intended to address climate concerns, as seen in Chapter 4.

8) COMPETE IN THE NEW ECONOMY

The economic drivers of Michigan's economy have changed. While the recovering manufacturing sector will continue to remain a key component of Michigan's economy, most of the manufacturing jobs lost will not return. Most of the future economic growth in Michigan will come from a variety of industries, most of which are high technology and service oriented. According to Michigan State University's Land Policy Institute (LPI), sectors like health care, financial management, highly-skilled manufacturing, human service sectors, and the food industry will become the backbone of what is

Build Community Resilience

According to the City Resilient Framework established by the Rockefeller Foundation, a resilient community is:

1. Reflective
2. Robust
3. Redundant
4. Flexible
5. Resourceful
6. Inclusive
7. Integrated

The Difference Between Climate and Weather

Weather reflects the short-term conditions of the atmosphere while **climate** is the average daily weather for an extended period of time. This difference was never more evident in Michigan than over the last two years. Although the winters of 2014 and 2015 were two of the coldest winters on record, average temperatures in Michigan have increased by 2.5 degrees Fahrenheit since 1950.



² Rand Corporation

Walkability

According to walkability expert and noted author Jeff Speck, the General Theory of Walkability explains that to be favored (above driving), a walk has to satisfy four main conditions. It must be:

1. Useful. Most aspects of daily life are located close at hand and organized in a way that walking serves them well.
2. Safe. The street has been designed to give pedestrians a fighting chance against being hit by automobiles; they must not only be safe but feel safe.
3. Comfortable. Building and landscape shape streets into “outdoor living rooms.”
4. Interesting. Sidewalks are lined by unique buildings and friendly faces.



called the “New Economy.”

Although the manufacturing sector continues to thrive in Grand Haven Charter Township and further investment in manufacturing should be made, it will be important for local officials to consider ways to attract a variety of New Economy sectors. Investing in these sectors will increase economic resiliency and proactively attract growing industries.

9) PROTECT AGRICULTURE

As discussed in the 2009 Master Plan, at one time, most of the Township was used for agricultural purposes. However, over the last two decades a substantial amount of agricultural land has been developed for residential purposes or has become vacant or fallow. As the population of the Township continues to grow, local officials will be presented with more proposals to convert agricultural areas into other uses.

In the future, existing agricultural lands may also be subject to changes in the region’s climate. For example, although the region is expected to receive increased precipitation, it will likely come in short but heavy rain events, followed by long periods of very dry conditions. As a result, local officials and area farmers will need to consider new ways to capture, retain, and distribute water.

10) BE A WALKABLE COMMUNITY

A place is walkable when its transportation infrastructure provides multiple ways for people to travel to a variety of locations. Connected pathways, sidewalks, and bike lanes all serve to make a community healthier and more accessible for all incomes and ages. A walkable community can also benefit residents in terms of personal satisfaction, health, and recreation, and there are also economic benefits such as increased revenues from tourism and increased business activity and employment.

There are currently many initiatives across the state to increase awareness about walkability in all types of communities. Although Grand Haven Township is predominately rural and suburban, residents are able to freely move throughout the Township on an inter-connected system of bike paths. In addition, many neighborhoods and commercial corridors are connected by sidewalks. Emphasizing pedestrian connectivity in land use decisions is an important component of any walkability effort.

CHAPTER 2: CLIMATE AND SHORELINE PROCESSES

THE IMPORTANCE OF PLANNING IN COASTAL COMMUNITIES

It is no secret the Great Lakes are one of the most unique and precious environmental features in the world. In fact, “the Great Lakes basin contains more than 20% of the world’s surface freshwater supplies and supports a population of more than 30 million people.”¹ Michigan is home to nearly 3,300 miles of Great Lakes shoreline, with 36,000 miles of rivers and streams, and 11,000 inland lakes.²

Yet in general, riparian land throughout Michigan is not adequately protected from development pressures.³ Coastal communities especially have an important role to play in protecting the Great Lakes. In 2001, the Michigan Department of Environmental Quality acknowledged “fragmentation of coastal habitats, loss of agricultural and forestlands, increased impervious surfaces and resulting stormwater runoff, and the increased development in coastal hazard areas, wetlands, and Great Lakes Islands, could be improved through better coastal land use planning.”⁴

Planning for coastal areas at the local level requires knowledge of both local conditions and state and federal regulations. This chapter aims to address these challenges for the Grand Haven Community and provide clear, well-founded recommendations for future land use planning.

OVERVIEW OF COASTAL DYNAMICS AND THE GREAT LAKES

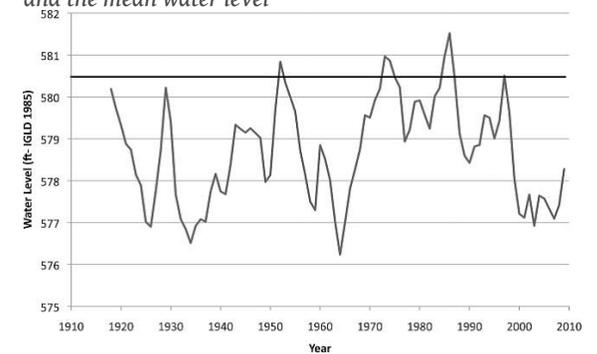
The Great Lakes function differently than other inland water bodies and tidal oceans. Understanding these dynamics can help Grand Haven Township plan for naturally occurring changes along the shoreline.

OSCILLATING WATER LEVELS OF THE GREAT LAKES

Great Lakes water level changes result not from the moon’s gravitational pull, but from cyclical changes in rainfall, evaporation, and riverine and groundwater inflows.⁵ These factors work together to raise and lower the water levels of the Great Lakes in small increments daily, seasonally, and over the course of years and decades. Long-term water levels fluctuate by multiple feet as shown in Figure 2.1.

The Great Lakes are in a period of rising lake levels. Since the early 2000s, water levels have remained low, but historical patterns over the last century indicate higher water levels are sure to return.⁶ Lake Michigan’s water level in August of 2015 averaged 579.79 feet, which is equal to the water levels in fall of 1998.⁷

Figure 2.1 Oscillating water levels of the Great Lakes and the mean water level



Source: NOAA, 2011

Erosion on Lake Michigan endangers homes built too close to the shoreline. This photo was taken on the Indiana coastline of Lake Michigan.



Source: EPA.gov

The decadal and multi-decadal shifts in water levels are not solely responsible for the movement of the shoreline landward and lakeward over time. The velocity and height of waves, erosion of shorelines, and variability in the oscillation of water levels also contribute to coastal dynamics on the Great Lakes.

WAVE ENERGY AND HEIGHT

The Great Lakes are subject to high energy waves and wave setup along the coastline. High energy waves are strong in speed and intensity and are primarily created as fast winds move across the surface of the water for extended distances.⁸ Wave setup is the height of the water as waves reach the shore. High wave setup results as regional storm patterns create high winds on the bounded water bodies of the Great Lakes.⁹ Powerful and tall waves are natural conditions that can increase the pace of erosion and damage structures on, or near, the shoreline.¹⁰

EROSION

The shorelines of Lake Michigan are mostly made of gravel and sands that easily erode during times of high energy waves.¹¹ Coastal erosion can flood and damage infrastructure along bluffs and beaches and is a natural occurrence on the geologically young Great Lakes. Erosion is caused mainly by storms and winds, not necessarily by rising lake levels.¹²

QUICKLY CHANGING CONDITIONS

The Great Lakes are contained in gradually shifting and tilting basins. This tilting results as the Earth slowly decompresses and rebounds from the immense weight of the glaciers that created the Great Lakes.¹³ This shifting causes long-term water levels to change more quickly in some places than others, because the shape of the water basin varies along the coast.¹⁴ This attribute of the Great Lakes makes it difficult to predict the pace of shoreline movement. Therefore, it is safest to plan for great variability and rapid change in water levels.¹⁵ Figure 2.2 shows the movement of the shoreline in the Grand Haven Community.

CLIMATE CHANGE AND THE GREAT LAKES

Powerful waves, erosion, and quickly changing shorelines are natural processes of the Great Lakes, each having implications for planning efforts along the coast. Climate change, however, augments these natural processes, and requires preemptive planning in coastal communities. This section will discuss climatologist predictions of increased precipitation and storminess in the Great Lakes region, variable lake water levels, and rising water temperature. First, it is important to understand the global context of climate disruption.

GLOBAL CHANGES IN CLIMATE

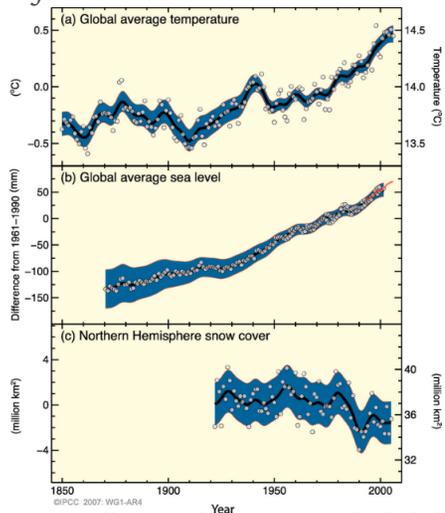
Climate and weather are directly related, but not the same thing. Weather refers to the day-to-day conditions in a particular place, like sunny or rainy, hot or cold. Climate refers to the long-term patterns of weather over large areas. When scientists speak of global climate change, they are referring to changes in the generalized, regional patterns of weather over months, years and decades. Climate

Figure 2.2 The shoreline in Grand Haven for various years, 2015 photo



Source: Google Earth Pro, 2015 Imagery

Figure 2.3



Source: https://www.ipcc.ch/publications_and_data/ar4/syr/en/mains1.html

change is the ongoing change in a region’s general weather characteristics or averages. In the long term, a changing climate will have more substantial effects on the Great Lakes than individual weather events.

Evidence collected over the last 150 years shows a trend toward warmer global temperatures, higher sea levels, and less snow cover in the Northern Hemisphere (see Figure 2.3). Scientists and ecologists from many fields have observed and documented significant changes in the Earth’s climate.¹⁶ Warming of the climate system is unequivocal and is now expressed in higher air and ocean temperatures, rising sea levels, and melting ice.¹⁷

To help predict what the climate will be in the future, scientists use computer models of the Earth to predict large-scale changes in climate. These General Circulation Models (GCM) have been improved and verified in recent years, resulting in relatively reliable predictions for climate changes over large regions.¹⁸ Scientists downscale these techniques to predict climate change for smaller regions.

CLIMATE CHANGE ON THE GREAT LAKES

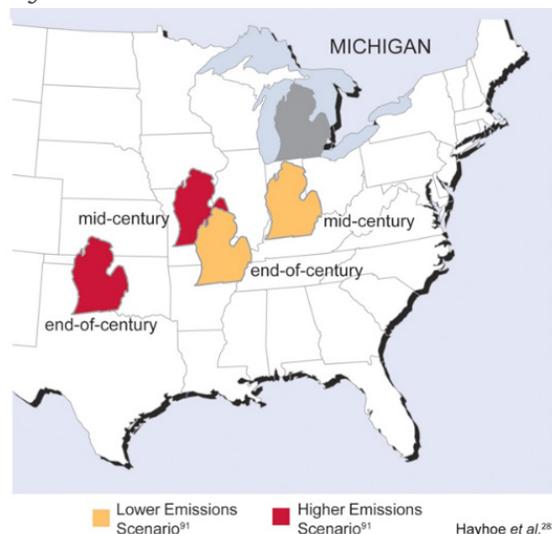
The Great Lakes Integrated Sciences + Assessments Center (GLISA) is a consortium of scientists and educators from the University of Michigan and Michigan State University that provides climate models for the Great Lakes Region in support of community planning efforts like this Master Plan. According to GLISA, the Great Lakes region experienced a 2.0 degree Fahrenheit increase in average air temperatures from 1900 to 2012.¹⁹ An additional increase of 1.8 to 5.4° F in average air temperatures is projected by 2050. Although these numbers appear relatively small, they are driving very dramatic changes in Michigan’s climate and greatly impact the Great Lakes.²⁰

The National Climate Assessment for 2009 included a number of illustrations to help us understand the extent and character of anticipated climate change impacts.²¹ One of these illustrations, Figure 2.4, shows Michigan under several emissions scenarios, each leading to changes in Michigan’s climate. Just by maintaining current emission levels, Michigan’s climate will feel more like present-day Arkansas or Oklahoma by the end of the century.²²

INCREASED PRECIPITATION AND STORMINESS

There is strong consensus among climate experts that storms, greater in number and intensity, will occur in the Great Lakes region.²³ This is already happening as “the amount of precipitation falling in the heaviest 1% of storms increased by 37% in the Midwest and 71% in the Northeast from 1958 to 2012.”²⁴ As storms drop more precipitation and generate stronger sustained winds, the Great Lakes will see stronger and higher waves.²⁵ In addition to direct damage caused by storms, sustained increases in the number of storms and their intensity can both directly and indirectly pollute waters by overloading sewage and stormwater capabilities.²⁶ Increases in the intensity of storms also quickens the pace of erosion on Great Lakes shorelines. In fact, the Federal Emergency Management Agency (FEMA) projects approximately 28% of structures within 500 feet of a Great Lakes shoreline are susceptible to erosion by 2060.²⁷

Figure 2.4



Source: National Climate Assessment, 2009

Hayhoe et al.²⁸³

VARIABILITY OF LAKE WATER LEVELS

The natural ups and downs in the water levels of Lake Michigan will continue regardless of the impacts of climate change.²⁸ However, climate change is likely to augment this natural process resulting in more variable water levels as warmer air temperatures result in fewer days of ice cover and faster evaporation.²⁹ In other words, lake levels will rise and fall faster and with less predictability than in the past. Fortunately, much of Michigan's coastal infrastructure was built in previous decades during times of high water levels.³⁰ However, fast rising waters can erode shorelines, damage infrastructure, and cause extensive flooding in inland rivers.³¹ When lake levels fall, access to infrastructure like docks may be restricted and navigation hazards in shallow waters are exposed. Low lake levels pose a threat to coastal vegetation and can reduce the pumping efficiency of drinking water intake pipes.³² Additional ramifications of changing lake levels include a drop in water supply,³³ restricted fish habitats,³⁴ more invasive species,³⁵ faster erosion, and an overall decline in beach health.³⁶ Climate change is likely to augment the natural highs and lows of lake levels, causing more variability and a faster rate of change, making each of these potential ramifications both more likely and less predictable.

WATER TEMPERATURE

Climatologists predict there will be fewer days below freezing in Michigan and other Great Lakes states. As temperatures remain warm for a greater part of the year, the winter season will shorten and the lake ice cover that accompanies winter weather will decline. Lake ice cover allows heat radiation to be reflected, and when it declines, the surface water temperature will increase as more heat is absorbed by the water. The ice coverage on the Great Lakes and Lake St. Claire declined by 71% from 1973 to 2010, and ice covers the lake for an average of 15 fewer days each year.³⁷

The associated impacts of rising water temperature include changes to where fish and other aquatic animals can live, increased vulnerability to invasive species, and increased risk of algae blooms.³⁸ Rising water temperature also enables winds to travel faster across the surface of the lake, increasing the vulnerability of coastal communities to damaging waves as storms and winds increase.³⁹ Lastly, ice cover protects the shoreline during winter storms. With less ice cover, the shoreline is more susceptible to erosion and habitat disruption.

PARTNERSHIP WITH THE UNIVERSITY OF MICHIGAN

In an effort to make planning decisions based on known information about the Great Lakes systems, the University of Michigan has collaborated with LIAA, with funding from the University of Michigan Water Center, to identify and analyze hazard areas, conduct fiscal impact assessments, and work with community groups to plan for better coastline management. The multi-disciplinary project team has integrated scientific knowledge and research with local planning processes in Grand Haven Charter Township and the City of Grand Haven.

Multi-disciplinary project team. The project team includes University of Michigan researchers and community planning staff from LIAA. The Principal Investigator is Richard K. Norton (UM Urban and Regional Planning). Co-investigators include Maria Arquero (UM Urban and Regional Planning); Jennifer Maignet (UM Architecture); Guy Meadows (Michigan Tech Great Lakes Research Center); and Paul Webb (UM School of Natural Resources and Environment).

Funding overview. Funding for the project came from the University of Michigan Water Center and the Michigan Department of Environmental Quality’s Coastal Zone Management Program. The local governments of the City of Grand Haven and Grand Haven Charter Township also provided a local match.

Research questions and scope of work. The project sought to answer several key questions. First, what data is readily available for coastal planning, and how well does this data reflect current and future climate conditions? Second, does increasing access to coastal research help local jurisdictions plan for coastal changes? These questions are addressed using a scenario planning framework. Environmental, fiscal, and land use ramifications of increased flooding are considered.

The project team chose the jurisdictions of the City of Grand Haven and Grand Haven Charter Township as candidates for this work. LIAA’s ongoing work with the *Joint Planning Commission* and the dynamic coastline in each community made the Grand Haven community a strong partner for this research.

Over the course of 18 months, the project team held several meetings with the Grand Haven *Joint Planning Commission* commissions and was present for the Leadership Summit. The project team also held several public meetings to better inform the research and communicate progress.

GOVERNMENT REGULATIONS

Federal, state, and local policies play an important role in shaping land use and development along the shoreline. Here, the Federal Emergency Management Agency’s National Flood Insurance Program is discussed, in addition to Michigan policies to protect wetlands, High Risk Erosion Areas, Critical Dune Areas, and the shoreline. Possible actions local governments can take to supplement state and federal regulations are outlined as well.

FEDERAL: NATIONAL FLOOD INSURANCE PROGRAM (NFIP)

The National Flood Insurance Program (NFIP) is an optional program from which communities can receive flood insurance for disaster relief by agreeing to regulate development in the floodplain. The NFIP was created in 1968 under the National Flood Insurance Act. The NFIP is currently administered by FEMA and has four major goals:

- To charge flood insurance premiums to private property owners, ensuring taxpayers do not bear the sole burden of private property flood losses
- To provide residents with aid after flooding
- To guide development away from hazard areas

- To require building construction to minimize or prevent flood damage

Flood Insurance Rate Maps. The floodplain must be locally regulated to qualify for the NFIP, but FEMA defines what land is considered eligible in a floodplain for the NFIP. Floodplains are mapped in either a Flood Hazard Boundary Map (FHBM) or, more commonly, a Flood Insurance Rate Map (FIRM).

FIRMs are created and released by FEMA. FIRMs are generated for various return periods, like the 50-year storm, 100-year storm, and 500-year storm.⁴⁰ It is important to note that individual property owners can petition to change the flood zone designation for their property, so FIRMs may not be fully derived from scientific analysis.

The FIRMs for Ottawa County were adopted in 2011 by the City of Grand Haven and Grand Haven Charter Township.

In 1973, the Flood Disaster Protection Act was passed, which penalized communities that did not participate in the NFIP by limiting federal money to acquire floodplain property available to non-participating communities. This act also mandated buildings in floodplains must have flood insurance coverage in order to receive any federal financing, loans, or disaster relief.⁴¹

Community Rating System. In 1994, the Community Rating System (CRS) was added to the NFIP through the National Flood Insurance Reform Act of 1994. The CRS offers discounts in the premium a property owner must pay if a community's floodplain management exceeds the minimum NFIP regulations. A community can receive credit toward premium reductions by educating the public, increasing mapping and regulation, reducing flood likeliness by relocating and retrofitting flood-prone structures, maintaining drainage systems, and creating flood warning and response programs. Currently, 22 Michigan communities participate in the CRS,⁴² and Grand Haven Charter Township is taking steps toward joining.

Local Government Role. A participating community has a number of responsibilities to remain compliant with NFIP regulations. These include monitoring floodplain development and building permits, inspecting development, maintaining records, revising and assisting in floodplain mapping, and providing information to the local public about the requirements of the program. Once a community's FEMA region releases updated FIRMs, a community has a period to review and appeal the drafted map. After that point, the community has six months to adopt the new FIRM through an ordinance.⁴³

GREAT LAKES COASTAL FLOOD STUDY

In 2010, FEMA and the United States Army Corps of Engineers (USACE) began the Great Lakes Coastal Flood Study. The project seeks to update existing FIRMs to account for revised lake levels, wave setup, and wave energy. The process to create the drafted maps differs significantly from the process to create existing FIRMs. The existing FIRMs are determined using event-based modeling, where the projected

flooding impacts are derived from a selected historical storm.⁴⁴ The updated approach is statistically based, where the influences of wave energy and wave setup are modeled using refined 100-year lake level elevations provided by the USACE.

The Great Lakes Coastal Flood Study is scheduled to release maps for public comment and adoption in 2016. Preliminary draft maps are available for Ottawa County and are used in the analysis further described in this chapter.

Local Opportunity. Both Grand Haven jurisdictions participate in the NFIP. The City of Grand Haven joined the NFIP in 1978 and the Township followed in 1981. Since that time, each jurisdiction has submitted claims as seen in Table 2.1. The Township has received over \$229,000 in aid for 17 separate claims.

Under the Community Rating System, the Grand Haven community can receive credit for implementing *Table 2.1 NFIP Claims*

	Total Number of Claims	Total Value of Claims
Grand Haven Charter Township	17	229,374
City of Grand Haven	19	309,623
Ottawa County	255	2,562,999
Statewide	11,183	66,748,379

Source: <http://bsa.nfipstat.fema.gov/reports/1040.htm#26>; current as of April 2015

several of the changes recommended in this report (see recommendations at the end of this chapter). As times of high intensity waves and inundation are Expected to increase, the Grand Haven Community might consider making changes to zoning ordinances, building codes, and other policies to better manage floodplain development. Additionally, NFIP flood insurance premiums are rising nationwide, as storms increase and payouts rise.⁴⁵ Participating in the CRS is a proactive approach to keeping costs low while protecting both man-made, and natural, resources near the shoreline.

WETLANDS

BENEFITS OF COASTAL WETLANDS

Wetlands help to reduce flood damage by absorbing flood water and then slowly releasing it. One acre of the typical wetland is able to absorb one million gallons of water,⁴⁶ protect adjacent and downstream land from damage,⁴⁷ and slow the speed of flooding across an area.⁴⁸ The storage capacity of a specific wetland varies by its size, slope, type of vegetation, location relative to the flooding path, and water levels in the wetland prior to flooding.⁴⁹ Coastal wetlands also alleviate the severity of erosion along a shoreline during a storm.⁵⁰ Perhaps more than any other environmental asset, wetlands buffer the coast by absorbing high energy waves and disrupting the flow of currents.⁵¹

EXISTING REGULATION FOR WETLANDS

The Clean Water Act of 1972 mandated permits be granted for development on regulated wetlands. This federal act gives the United States Army Corps of Engineers (USACE) the authority to grant permits to build on regulated wetlands, with the Environmental Protection Agency (EPA) having the authority to veto permits issued to fill wetlands. The Michigan Department of Environmental Quality (MDEQ) is the co-administrator of the permitting process, sharing joint regulation with the Army Corps of Engineers.⁵² Michigan was the first state, and is one of only two states, to assume a role in the permitting process for wetlands.⁵³ Here, the MDEQ issues a permit to build on wetlands if the applicant meets qualifications. Permitting decisions are subject to public comment, including those made by local governments.

The State must grant a permit in order anyone can build on a regulated wetland. A wetland is regulated if it:⁵⁴

- Is connected to or within 1000 feet of a Great Lake shoreline
- Is connected to or within 500 feet of an inland lake, pond, or river
- Is equal to or greater than 5 acres in size
- Is essential to the preservation of the state’s natural resources, as designated by the MDEQ

Michigan has coastal, forested, and shrub wetlands, each inundated with water either all or part of the year.⁵⁵ The function and diversity of wetlands was misunderstood as European settlement began, and many wetlands were dredged, drained, and converted to serve industry and agriculture.⁵⁶ Today, less than half of the state’s wetlands remain, and in a time of changing climate, the need to conserve and restore wetlands is paramount.⁵⁷

Wetlands face a number of challenges related to climate variability:

- Rising water levels will actually increase the number of naturally occurring wetlands on low-lying uplands. However, wetlands cannot expand where structures like bulkheads, dikes, and other structures block their advance.⁵⁸
- As precipitation and storminess increase, runoff water and draining can increase sedimentation and nutrient input in wetlands. This can lead to algae blooms and invasive species.⁵⁹
- Consistent high water levels endanger vegetation and animals that depend on the naturally fluctuating water levels in wetlands.

Local Opportunity. Local governments in Michigan can protect additional wetlands not regulated by the state.⁶⁰ Under Michigan’s Natural Resources and Environmental Protection Act (NREPA), local governments can require wetlands less than 5 acres in size be regulated by a permitting process.⁶¹ A local government must possess an inventory of existing wetlands to adopt a wetland ordinance. The MDEQ must be notified of a local wetland ordinance, though the State does not need to review or

approve.⁶²

Local governments can also protect wetlands through site plan review provisions and zoning ordinances.⁶³ Under the Michigan Zoning Enabling Act, protecting the natural environment is a justification for zoning requirements like buffers and other tools.⁶⁴ Site plan review provisions in the zoning ordinance can require wetland permits be obtained from the MDEQ as a condition of local zoning approval.⁶⁵

HIGH RISK EROSION AREAS

The State of Michigan regulates development in what it designates as High Risk Erosion Areas (HREAs). The purpose of this regulation is to prevent costly clean up, mitigation, and hazards to residents, while keeping insurance costs down. Preventing buildings in HREAs also protects the Great Lakes from pollutants from structure debris and septic fields.⁶⁶ The authority for this regulation comes from the Shoreline Protection and Management statute.⁶⁷

The MDEQ compares new and historic imagery to designate areas of coastline that have eroded by more than 1 foot per year as HREAs. The MDEQ then uses erosion rates to calculate 30- and 60-year setbacks from the “erosion hazard line,” or generally, the line of stable vegetation. Usually, new structures must be built landward of the erosion hazard line by either 30 times or 60 times the erosion rate, as designated by MDEQ. While some small permanent structures may be permitted within the 30-year setback, all new structures must be built landward of the erosion hazard line. MDEQ is in the process of updating HREAs in some areas of Michigan.⁶⁸

Local opportunity. Local governments can assume MDEQ’s permitting responsibilities for HREAs through an ordinance. To do so, the ordinance cannot be less restrictive than the State’s regulations and the MDEQ must approve the ordinance. A local government can adopt an ordinance requiring greater and more uniform setbacks in HREAs than the MDEQ.⁶⁹

Other actions can be taken through a local zoning ordinance, including performance standards for soil and vegetation, clustering development away from vulnerable erosion areas, and instituting site plan review processes for any development in HREAs.⁷⁰

SOIL EROSION AND SEDIMENT CONTROL

Eroding soil and sediment deposits into Michigan waterways damage wildlife habitats, pollute water, and decrease water depth. Sedimentation can also carry nutrients and toxic pollutants, mainly from agriculture and construction activities, directly into water systems.⁷¹ Soil erosion and sediment control comes from a variety of activities, but construction and earth change is specifically monitored by the State under Part 91 of NREPA.⁷² A permit is required for earth changes that disturb 1 or more acres of land or are within 500 feet of the water’s edge of a lake or stream.

Local Opportunity. County governments can administer Soil Erosion and Sediment Control programs by adopting an ordinance. Ottawa County has done so and currently administers permits through the Ottawa County Water Resources Commission.⁷³ Local monitoring can be more restrictive than the state

by permitting for earth changes adjacent to wetlands, storm drains, or environmentally sensitive areas, or earth changes on less than 1 acre.⁷⁴ Local governments, however, cannot expand Part 91 to monitor stormwater management control outside of soil erosion control.⁷⁵ Any local control program must be approved by the MDEQ, and the MDEQ offers assistance to communities looking to implement stricter regulation under NREPA.⁷⁶

Outside of NREPA, local governments can adopt stormwater control ordinances, impervious surface limitations, or require street sweeping to reduce pollutants in water runoff.⁷⁷

CRITICAL DUNE AREAS

Michigan’s dunes are one of the most striking environmental features in the nation. Together, they represent the largest freshwater dune ecosystem in the world.⁷⁸ The dunes provide unique habitats for rare and endangered species and hold priceless environmental and recreation value.⁷⁹

Michigan’s Sand Dune Protection and Management statute calls for the protection of Critical Dune Areas (CDAs) through state regulation.⁸⁰ MDEQ determines whether a dune is designated a Critical Dune Area.⁸¹ Under the statute, a property owner must receive a permit for any activity that alters the appearance or contour of a Critical Dune.

Generally, CDA regulation states development:

- should not occur lakeward of the crest of the dune
- should plan for soil erosion and water runoff
- should not alter the elevation or slope of the dune

Recent updates to the Sand Dune Protection and Management Act. In 2012, Governor Snyder signed Public Act 297. This Act updates the Critical Dune regulation in several ways, which all make acquiring permits to build on the dunes easier. The amendment clarifies that MDEQ cannot deny a permit solely because “public interest” would be violated by the proposed development. It also limits who is able to challenge a permit to just property owners and those living nearby. The Act no longer requires an analysis of alternative placements for buildings and requires the MDEQ to issue permits for driveways and other paved pathways to permanent structures in a CDA. Additionally, the Act now permits building on the lakeward-facing slope of the first foredune.⁸²

Local Opportunity. Local opportunity under the updated Sand Dune Protection and Management Act is limited. While Part 353 allows the local government to assume the permitting process for CDAs, local governments can no longer be more restrictive than the State. As a result, adopting the permitting power of the State through the Sand Dune Protection and Management Act will not increase regulation on Critical Dune Areas. A local government can do much more to protect the dunes through zoning ordinances and other planning efforts.⁸³ Only 30% of the State’s dunes are considered Critical

Dune Areas and are subject to state regulation, unless wetlands, High Risk Erosion Areas, or other environmental areas are located on the property.⁸⁴ Local government administration of the permitting process has been met with mixed results, especially in areas with small coastal lot sizes, where the requirements of Part 353 may trigger a regulatory takings claim.

WATER MARK LINES

In addition to the above regulatory powers, there are also three water marks used by different entities to regulate activities along the shoreline.

First, the United States Army Corps of Engineers uses a high water mark line (called the Ordinary High Water Mark or OHWM) to determine the extent of navigational waters they regulate. This boundary is set based on a 581.5-foot water level. Second, the MDEQ regulates development below a separately determined water line. This is sometimes referred to as the Elevation Ordinary High Water Mark Line (or EOHWM). This water line is elevation based and is determined using a 580.5-foot water level.

There is only a 1-foot difference between the water level used to determine the regulatory authority of the USACE and the MDEQ. Because of this, the two bodies co-administer a joint permitting process for activities taking place below either water mark line. These include dredging, placing seawalls or rock revetment, or building of permanent docks.

Lastly, Michigan uses a water mark line sometimes referred to as the Natural Ordinary High Water Mark (or NOHWM) to determine the extent of the public trust. The NOHWM comes from the 2005 Michigan Supreme Court case *Glass v. Goeckel*, which determined the public has a valid right to walk below the NOHWM, defined as the point where natural vegetation begins or evidence of past high water levels exist.⁸⁵ This case also determined the NOWHM line is not equal to, or dependent on, the State’s regulatory power defined by the Elevation Ordinary High Water Mark.

UNIVERSITY OF MICHIGAN RESEARCH STUDY

As part of this master planning process, the University of Michigan partnered with Grand Haven Charter Township and the City of Grand Haven to analyze shoreline dynamics to help Grand Haven manage its coastal areas. The remainder of this chapter summarizes the project team’s framework, results, and recommendations pertinent to this planning effort.

OVERVIEW OF RESEARCH FRAMEWORK

The Research Framework of this study uses scenario planning to assess environmental, fiscal, and

Table 2.2 Research Framework

	Lucky Climate Future	Expected Climate Future	Perfect Storm Climate Future
Current Practices			
Build-Out According to Current Zoning			
Build-Out According to Current Master Plan			
Build-Out According to Best Management Practices			

land use conditions under different management options and Climate Futures. Scenario planning, in general, identifies driving forces to inform a range of scenarios that are then analyzed and evaluated. In this context, the project team identified two driving forces: (1) rising levels of flood waters and (2) local government management options. These forces informed the creation of multiple Climate Futures each of which are managed differently. Each Climate Future was tested against each management option and evaluated for impacts on the environment and land use in the community. This framework is presented visually in Table 2.2.

CLIMATE FUTURE DEFINITIONS

- “Lucky” Future – Under the Lucky Climate Future, Great Lakes water levels will continue to stay relatively low. Although there will be wave and wind action, major storm events and wave impacts will not encroach on properties landward of current beaches. Potentially flooded inland areas will remain as currently delineated by FEMA under effective FIRMs (specifically, zones A and AE). Other climactic conditions (e.g., storm frequency and intensity, heat waves) will remain consistent with patterns in recent history. The Lucky Climate Future also accounts for riverine flooding. A Lucky flood projection is shown in Map 2.1.
- “Expected” Future – Under the Expected Climate Future, Great Lakes water levels will continue to fluctuate according to long-term decadal patterns, including recent extreme storm events incorporated into FEMA’s ongoing Great Lakes Coastal Flood Study. There will be periods of high water levels similar to the long-term highs recorded in 1986, with Great Lakes still-water elevation closer to that of long-term average (580 feet). There will also be more frequent large storm events than in the past. During these high water periods, waves from a “100-year” storm event will encroach on properties, with areas subject to wave action as delineated by FEMA’s proposed coastal high velocity (VE) zones; areas subject to sheet flow as delineated by FEMA’s proposed AO zones; and nearshore areas subject to inundation as delineated by FEMA’s proposed AE zones. During the “100-year” storm, areas located within the high velocity (VE) zone will be completely destroyed, while areas of the community within the AO and AE zones will be severely damaged by inundation. The Expected Climate Future also accounts for riverine flooding. Map 2.2 shows an Expected flood projection.
- “Perfect Storm” Future – Under the Perfect Storm Climate Future, Great Lakes water levels will continue to fluctuate according to decadal patterns, consistent with assumptions made for the Expected future. However, still-water elevation will be higher than the long-term average and closer to the long-term high (583 feet). In addition to that assumption, because of increased frequency and intensity of storms, the shoreland areas subject to high velocity (VE) zones, as well as inundation as delineated by FEMA’s proposed 500-year storm event (shaded-x zones), will

essentially become the 100-year storm event (i.e., much more likely to occur), such that properties within these areas (i.e., in addition to the proposed AE and AO zones) will be severely damaged by inundation. Similar to the Expected Climate Future, during the “100-year” storm, areas located within the high velocity (VE) zone will be completely destroyed. The Perfect Storm Climate Future also accounts for riverine flooding. Map 2.3 shows a Perfect Storm flood projection.

MANAGEMENT OPTIONS

1. Current Practices

Under this option, the Grand Haven Community will continue to manage land in the same manner it current employs, in accordance with adopted plans, zoning ordinances, and relevant local ordinances.

2. Build-out According to Current Zoning

Under this option, the community will undergo a full build-out of residential development according to its existing zoning code. Additional homes are built in areas at the base flood elevation and are at risk for flooding. This is not an exact picture of the development capacity in the community; rather, this work equates to an estimate of where development may possibly occur under the current zoning, with additional land set aside for open space, driveways, streets, and yards. See Maps 2.4, 2.5, and 2.6 for a visual of where these points are located.

3. Build-out According to Master Plan

Under this option, the community will achieve a full build-out in accordance with guidelines set forth in its master plan. This experimental option was intended to capture measurable differences between a master plan and a zoning ordinance, which could help local jurisdictions identify opportunities to improve both documents.

4. Build-out According to Best Management Practices (BMPs)

Under this option, the Grand Haven Community will adopt and implement Best Management Practices to preserve natural resources and protect private property. See Maps 2.4, 2.5, and 2.6 for a visual of where these points are located. For this study, only several Best Management Practices are modeled. The selected BMPs were chosen as they have a significant spatial effect that can be easily modeled using CommunityViz software. Additionally, each has a policy or regulatory impact achieved through a zoning ordinance.

The intent of including this management option is to present several amendments that could be adopted that may influence the impact on land use, fiscal conditions, and the environment in the community.

The BMPs modeled in this management option are:

- 50-foot buffers around any inland water like rivers, lakes, and streams.
- 50-foot buffers around any wetland 5 or more acres in size, as defined by the

- State of Michigan’s Final Wetland Inventory data.
- A complete restriction of any development within a wetland 5 or more acres in size, as defined by the State of Michigan’s Final Wetland Inventory data.

Scope of analysis. Each Climate Future was tested against each management option for its impact on the land use and environmental conditions in the Grand Haven Community. The experimental “Build-out According to Master Plan” management option served as a useful conceptual aid during the planning process, but it did not yield enough measurable data to be effectively modeled. Therefore, only the results of the “Current Practices,” “Build-out According to Current Zoning,” and “Build-out According to Best Management Practices” management options are discussed in this chapter.

SCENARIO PLANNING TO ASSESS LAND USE, FISCAL, AND ENVIRONMENTAL CONDITIONS

Each management option can be analyzed in each of the three Climate Futures. This creates an array of scenarios the Township could reasonably encounter in the foreseeable future regarding flooding and local government management options. Each scenario has a different impact on the land use, fiscal, and environmental conditions in Grand Haven Township. The remainder of this chapter presents the results of the modeling, derived by pairing each management option with each Climate Future. Land use impacts include the acreage, parcels, structures, and critical facilities that would be impacted under different Climate Futures for each management option. Fiscal conditions are not included in this draft, but will be in the final document. Environmental conditions include the acreage of wetlands, tree canopy, impervious surface, Critical Dune Areas, and High Risk Erosion Areas impacted in each Climate Future for each management option.

LAND USE RESULTS

TOTAL ACRES IMPACTED BY FLOODING

The total acres of land impacted by flooding increases from the Lucky Climate Future to the Perfect Storm Climate Future. The number of acres impacted increases the most between the Lucky and Expected forecast (15%). Between Expected and Perfect Storm, the total acres impacted increases by about 3%. Table 2.3 shows the total acres of land impacted under each future flood forecast in Grand Haven Township.

PARCELS IMPACTED BY FLOODING

Table 2.3 Total Land Acres Impacted by Flooding

	Lucky	Expected	Perfect Storm
Grand Haven Township	1,195	1,381	1,418

As Table 2.4 shows, between 700 and 950 parcels are impacted by flooding depending on the severity of the Climate Future.

In the Lucky Climate Future, 89% of the parcels impacted are zoned for some type of residential use. An

Table 2.4 Parcels Impacted by Zone

	Lucky		Expected		Perfect Storm	
Agricultural (AG)	37	5.3%	37	4.0%	37	3.9%
Commercial I (C-1)	3	0.4%	3	0.3%	3	0.3%
Industrial I (I-1)	1	0.1%	1	0.1%	1	0.1%
Planned Unit Development (PUD)	19	2.7%	22	2.4%	22	2.3%
Residential I (R-1)	303	43.3%	523	56.6%	535	56.3%
Residential II (R-2)	279	39.9%	279	30.2%	293	30.8%
Residential V (R-5)	1	0.1%	1	0.1%	1	0.1%
Rural Preserve (RP)	15	2.1%	15	1.6%	15	1.6%
Rural Residential (RR)	40	5.7%	40	4.3%	40	4.2%
Other	2	0.3%	3	0.3%	3	0.3%
Total Parcels Impacted by Zone	700	100%	924	100%	950	100%

additional 5% (37 parcels) are zoned agricultural, and nearly 3% (19 parcels) are zoned for Planned Unit Development.

In the Expected Climate Future, 91% percent of parcels impacted by flooding are zoned for some type of residential use. Between the Lucky and Expected Climate Futures, an additional 224 parcels are impacted. The bulk of this increase impacts parcels zoned R-1 Single Family Residential.

In the Perfect Storm Climate Future, the number of residential parcels impacted increased by 39% from the Lucky Climate Future to a total of 869 parcels. In this Climate Future, a greater number of Planned Unit Development parcels are also impacted.

In general, as the Climate Future causes more severe flooding, greater numbers of residential and publicly owned parcels may be impacted. Commercial parcels seem to bear the least impact across all Climate Future forecasts.

Maps 2.7, 2.8, and 2.9 visualize the type of parcels impacted under the Lucky, Expected, and Perfect Storm Climate Futures.

NUMBER OF STRUCTURES IMPACTED BY FLOODING

Between 46 and 385 structures would be impacted in the Township depending on the severity of the climate and the management practices the Township pursues. Table 2.5 summarizes the total number of structures impacted under the Climate Futures and management options.

In the Lucky Climate Future, 52 properties could be impacted if Best Management Practices are

Table 2.5 Number of Structures Impacted by Flooding

	Lucky	Expected	Perfect Storm
Current Practices	46	96	119
Build-Out According to Current Zoning	209	347	385
Build-Out According to Best Management Practices	52	145	171

implemented for future development. If no Best Management Practices are implemented and the Township achieves a full build-out according to current zoning, 209 structures could be built in areas subject to inundation.

In the Expected Climate Future, 145 properties could be impacted if Best Management Practices are implemented for future development. If no Best Management Practices are implemented, 347 structures could be subject to inundation.

In the Perfect Storm Climate Future, 171 properties could be impacted if Best Management Practices are implemented for future development. If no Best Management Practices are implemented, 385 structures could be subject to inundation.

In general, as the Climate Future causes more severe flooding, implementing Best Management Practices reduces the number of structures impacted by over 60% as the community grows.

CRITICAL FACILITIES IMPACTED BY FLOODING

There were no critical facilities impacted under any future climate forecast. Critical facilities analyzed included current locations of police and fire stations, schools, places of worship, utilities, public facilities, and water treatment plants.

ENVIRONMENTAL RESULTS

WETLANDS

Wetlands are an important tool for community resilience, particularly for benefits related to flood control and water quality. GIS was used to compare existing wetlands to areas of potential wetland restoration in each Climate Future to give the Township a broader picture of areas that could best provide the flood-control benefits of wetlands. Additionally, unprotected wetlands (i.e., under 5 acres in size) were counted using GIS. It is important that this analysis is an overall, generalizable study useful to compare one scenario to another. It should not be used to identify individual wetlands or areas of private property suitable to wetland restoration.

Table 2.7 shows the number of acres of wetlands impacted by flooding in each Climate Future. Existing wetlands are estimated using national and state data, and wetlands included in Maps 2.10, 2.11, and 2.12 either are, or are likely to be, a wetland. Table 2.7 shows the inundation of existing wetlands is relatively stable across the Climate Futures. There are nearly 1,400 acres of existing wetlands impacted

by all three Climate Futures. These wetlands provide some flood protection by absorbing flood water. While this study does not quantify the benefit of the existing wetlands to the Township, studies have shown one acre of coastal wetlands can hold up to one million gallons of water.

Over 40% of the Township’s existing wetlands are likely to received flood waters in the Lucky Climate Future. The existing wetlands compared to the three Climate Futures are shown in Maps 2.10, 2.11, and 2.12.

Potential wetlands are areas with hydric soils, are not currently developed, and have been identified by

Table 2.7 Wetlands Summary

	Lucky	Expected	Perfect Storm
Existing Wetlands In Each Climate Future (Acres)	1,390	1,394	1,399
% of existing wetlands in each climate future	41%	41%	42%
Potential Wetlands In Each Climate Future (Acres)	199	201	216
% of potential wetlands in each climate future	6%	6%	6%
Unprotected Wetlands In Each Climate Future (Acres)	82	89	91
% of unprotected wetlands in each climate future	33%	36%	37%

the National Wetland Inventory as potential wetland restoration areas. Table 2.7 shows there is some opportunity to increase wetlands in each flood zone – an increase of about 14% to 15% depending on the Climate Future. Potential wetlands compared to three Climate Futures are shown in Maps 2.13, 2.14, and 2.15.

Wetlands are under 5 acres in size are considered unprotected, as they are not currently regulated by any local or state process. In aggregate, small wetlands can still have a large effect on the ecosystem’s flood control. Table 2.7 shows the Township has between 80 to 90 acres of unprotected wetlands in areas likely to flood in each Climate Future. Over one third of the Township’s unprotected wetlands are in areas likely to flood under each Climate Future. Unprotected wetlands are shown io Maps 2.16, 2.17, and 2.18.

WETLANDS AT RISK

It is difficult to estimate the impacts of future development on existing and potential wetlands, given the site-specific permitting process currently in place. That is, it is impossible to predict how many land owners may apply to develop a wetland area, or how many of those applications may be approved or denied. However, the project team was able to demonstrate the impact future development may have on wetlands by visually showing the wetlands on or near properties with room for development under current zoning. Map 2.19 shows existing wetlands and nearby areas that are open, under current zoning, for development. Many existing wetlands in the Township are near areas open to development.

If the Township pursues development in line with Best Management Practices, fewer existing wetlands

are at risk as seen by comparing Maps 2.19 and 2.20.

TREE CANOPY

Trees help absorb some inundation during times of flooding. In addition to flood mitigation, tree canopies reduce heat by providing shade and wildlife habitat, improving air quality, and adding aesthetic value.

The purpose of this tree canopy analysis is to roughly estimate the area within the public right of way that might be forested to better mitigate increased flooding and its associated impacts. It may lay a groundwork for future research into areas that could be strategically reforested to help reduce flood risk. Table 2.8 shows the acres of existing and potential tree canopy in each Climate Future.

This tree canopy analysis shows the potential for increased tree canopy in the public right of way

Table 2.8 Tree Canopy Analysis

	Lucky	Expected	Perfect Storm
Existing tree canopy (acres)	636	710	728
Potential tree canopy (acres)	3	4	4
% of potential tree canopy increase	1%	0.5%	0.5%

(i.e., not including private property) in each flood zone. Map 2.21 shows the existing and potential tree canopy used in this analysis. In general, tree planting is a weak strategy for flood reduction in the Township, as the potential tree canopy is only three acres in each Climate Future. The high acreage of existing tree canopy suggests maintaining existing tree canopy is a key strategy the Township can use to increase resiliency.

IMPERVIOUS SURFACES IN AREAS LIKELY TO FLOOD

Impervious surfaces have a well-understood negative impact in a flood event. The increased runoff can exacerbate the risk of structural damage and reduce regional water quality. This is an especially important variable to consider in a flood zone. Impervious surface includes building footprints as well as sidewalks, driveways, and roads.

The purpose of this analysis is to roughly estimate the percentage of each flood zone that is currently impervious. These numbers only reflect current conditions and can be seen as conservative in light of inevitable future growth.

The Township has, compared to nearby urbanized areas, a low proportion of impervious surface as

Table 2.9 Impervious Surfaces in Acres

	Lucky	Expected	Perfect Storm
Impervious (Acres)	5	11	13
% of Impervious Land In Each Climate Future	0%	1.0%	1.0%

shown in Map 2.22. Table 2.9 shows a nominal percentage of each Climate Future’s flood area is paved. Studies recommend the percentage of impervious surface in any general area be below 10% to remain protected from harmful amounts of runoff.⁸⁶ This analysis suggests the Township should work to prevent large increases in impervious surface, especially in the Climate Future areas subject to flooding.

CRITICAL DUNE AREAS IMPACTED BY FLOODING

Critical Dune Areas are important assets for the Grand Haven Community and, due to their soil composition, may be especially vulnerable to damage from flooding. Our intent is to provide some base of analysis for the future health of Critical Dunes, especially as development on Critical Dunes is likely to increase due to weakened regulations noted earlier.

While it is impossible to predict the number and scope of development permits that may be granted in the future, we were able to provide some insight into parcels that may be developed in or near Critical Dune Areas (Maps 2.23 and 2.24).

Table 2.10 shows that relatively few acres of Critical Dune Area would be impacted by flooding in any

Table 2.10 Critical Dune Areas

	Lucky	Expected	Perfect Storm
Critical Dune (Acres)	56	198	198
% of land in each climate future designated Critical Dune	3%	10.4%	10.2%

of the Climate Futures analyzed. Around 10% of the Critical Dune land is impacted under Expected and Perfect Storm Climate Futures. While this analysis does not investigate how dune land behaves during flooding, the proportion of dune land in each flood zone is useful information for planning future development in the Township.

Perhaps more importantly, the potential for development in and near Critical Dune Areas is very high. Map 2.23 shows the “Build-out According to Current Zoning” management option in relation to Critical Dune Areas. It is clear the Grand Haven Community has intense build-out potential in areas designated as Critical Dunes. The Township should consider methods, as recommended in the next section, to restrict this potential for development. Map 2.24 shows the build-out potential of the Township in relation to Critical Dune Areas if the Township builds out according to Best Management Practices. Still, great potential for development is clustered in or near Critical Dune Areas, suggesting the Township should consider new methods, beyond what is modeled here, to address this concern.

HIGH RISK EROSION AREAS IMPACTED BY FLOODING

Nearly the entirety of Grand Haven Township's shoreline is designated as a High Risk Erosion Area (HREA). As part of this study, we compared HREAs in the Township with VE zones, the zones designated in the Great Lakes Coastal Flood Study as having strong, high velocity waves that could increase the pace of erosion. Maps 2.25 and 2.26 show the areas along the coastline designated as an HREA as a line offset from the shore. The maps also show areas designated as a VE zone in the Great Lakes Coastal Flood Study.

RECOMMENDATIONS

The analysis presented above modeled only several of many Best Management Practices. Yet, even these minimal interventions greatly reduced the land use, fiscal, and environmental assets at risk as the community and the climate continues to change. The goal of this exercise was to identify how the order of magnitude changes as flood risks rise. By implementing best practices, this analysis suggests the land use and environmental risks can be largely addressed.

Following is a list of Best Management Practices collected from other research throughout the state. This list is in no way comprehensive, and each recommendation needs further research to determine if it is appropriate in either community.

These recommendations are summarized around six key areas of focus:

- Private Property
- Public Health
- Emergency Management
- Public Infrastructure
- Natural Resources and Ecosystem Services
- Water Quality

PROTECTING PRIVATE PROPERTY

- a. Public acquisition of repetitive loss areas or areas identified as at risk for coastal flooding. Develop these areas as parks, trails, or other community amenities that can withstand temporary flooding and inundation.
- b. Participate in the FEMA Community Rating System and set benchmarks to increase score.
- c. Adopt a local wetland ordinance to protect smaller wetlands (less than 5 areas) to promote wetland services in neighborhoods.
- d. Require that state and local wetland permits are obtained prior to a zoning amendment approval.
- e. Enact deed restrictions stating the existence of an environmentally sensitive area on public

- property.
- f. Encourage implementation of green infrastructure through incentives, stormwater utility fees and stormwater credit manuals.
- g. Encourage cluster development that allows structures to be sited in less vulnerable coastal areas.
- h. Adopt performance standards that minimize on-site soil and vegetative disruptions.
- i. Implement a Transfer of Development Rights program, where development rights are transferred to inland areas away from coastal hazards.
- j. Purchase of Development Rights – Work with a land bank or conservation district to purchase rights to development in areas at risk for coastal zone flooding.

PROTECTING PUBLIC HEALTH

- k. Disconnect combined sewer system (stormwater and sanitary).
- l. Provide incentives for on-site stormwater treatment to reduce standing water.
- m. Increase capacity of stormwater sewer system to handle heavier precipitation events.

EMERGENCY MANAGEMENT

- n. Regularly update the County Hazard Mitigation Plan to address coastal hazards and dynamic coastal conditions.
- o. Ensure at least one municipal staff employee is a certified floodplain manager.
- p. Convene collaborative discussions to integrate emergency management planning and land use planning from a climate adaptation perspective.
- q. Implement and test emergency communications systems.
- r. Identify public locations with back-up power supplies.
- s. Require homes in areas prone to flooding and/or storm events to have back-up power supplies.
- t. Ensure all large institutions have an all-hazards plan.

PROTECTING PUBLIC INFRASTRUCTURE

- u. Update design standards to build roads, culverts, and bridges in adherence with updated precipitation tables.
- v. Do not allow public infrastructure to be built in Special Flood Hazard Areas, VE zones, AE zones, AO zones, or X zones.
- w. Ensure critical facilities are sited outside the VE/AE zones.
- x. Encourage development to occur in high, vertical density in areas where infrastructure is available. This will help ensure the protection of natural spaces and help local governments maintain valuable infrastructure.

PROTECTING NATURAL RESOURCES AND MAXIMIZING ECOSYSTEM SERVICES

- y. Identify high priority public lands for wetland restoration and apply for MDEQ grants to fund restoration projects.
- z. Conduct a community inventory of environmentally sensitive areas and create 50-foot buffers around all environmentally sensitive areas.
- aa. Require native vegetation on coastal properties, particularly near Critical Dune Areas and other environmentally sensitive areas.
- bb. Zone for low intensity and low density around environmentally sensitive areas.
- cc. Adopt a local soil erosion and sedimentation control ordinance.
- dd. Adopt a stormwater control ordinance for stormwater retention and treatment.
- ee. Adopt overlay zones, including: prohibition of off-road vehicles; special use permits and developments in well-protected and vegetative areas behind foredunes; impervious surface restrictions; design standards allowing for raised structures; and native vegetation requirements.
- ff. Designate Critical Dune Areas and adopt a local critical dune ordinance to protect these areas.

PROTECTING WATER QUALITY

- gg. Require street vacuuming or street sweeping on a regular basis.
- hh. Prioritize open space protection through the master plan process for areas that are continuous, provide flood protection, and provide stormwater filtration.
- ii. The Master Plan should recognize the relationship between water quality and stormwater management.
- jj. Limit percentages of impervious surfaces in new developments (no more than 10%).
- kk. Adopt lakeshore setbacks to regulate tree cutting, mowing, and fertilizer use.
- ll. Regulate key hole development (large developments with narrow frontage on the water).

CONCLUSION AND NEXT STEPS

Overall, this project outlines a clear way for the Grand Haven Community to identify areas at risk of flooding. It includes a strategy for reasonably assessing build-out potential in relation to flood risk, and evaluates how that risk lowers when each jurisdiction adopts several Best Management Practices as ordinances. These carefully adopted Best Management Practices can make the community more resilient to flood risk in terms of land use (structures, roads, and critical facilities impacted) and environmental assets (wetlands, trees, pervious surface). This analysis suggests that the Grand Haven Community should conduct further research and choose Best Management Practices that best fit the community's unique needs. To that end, this report includes a library of Best Management Practices that could be adopted in this and future master plans, zoning ordinances, and other ordinances.

1. Mackey, S. D., 2012: Great Lakes Nearshore and Coastal Systems. In: U.S. National Climate Assessment Midwest Technical Input Report. J. Winkler, J. Andresen, J. Hatfield, D. Bidwell, and D. Brown, coordinators. Available from the Great Lakes Integrated Sciences and Assessments (GLISA) Center, http://glisa.msu.edu/docs/NCA/MTIT_Coastal.pdf.
2. Ardizzone, Katherina A. and Mark A. Wyckoff, FAICP. Filling the Gaps: Environmental Protection Options for Local Governments, 2nd Edition. Michigan Department of Environmental Quality, Coastal Zone Management Program with financial assistance from the National Oceanic and Atmospheric Administration, authorized by the Coastal Zone Management Act of 1972. December 2010.
3. As cited by Norton 2007- Michigan Department of Environmental Quality. 2001. 309 Enhancement Grants Assessment/Strategy. Lansing, MI: DEQ Coastal Management Program.
4. Ibid.
5. Norton, Richard K. , Meadows, Lorelle A. and Meadows, Guy A.(2011) 'Drawing Lines in Law Books and on Sandy Beaches: Marking Ordinary High Water on Michigan's Great Lakes Shorelines under the Public Trust Doctrine', Coastal Management, 39: 2, 133 – 157, First published on: 19 February 2011 (iFirst)
6. Meadows, Guy A., and Meadows, Lorelle A., Wood, W.L., Hubertz, J.M., Perlin, M. "The Relationship between Great Lakes Water Levels, Wave Energies, and Shoreline Damage." Bulletin of the American Meteorological Society Series 78: 4. (1997): 675-683. Print.
7. <http://www.glerl.noaa.gov/data/dashboard/GLWLD.html>
8. National Oceanic and Atmospheric Administration. "Coastal Currents." Ocean Service Education. NOAA, 25 March 2008. Web. Accessed July 2015. <<http://oceanservice.noaa.gov/education/kits/currents/03coastal1.html>>.
9. Norton, Richard K. , Meadows, Lorelle A. and Meadows, Guy A.(2011) 'Drawing Lines in Law Books and on Sandy Beaches: Marking Ordinary High Water on Michigan's Great Lakes Shorelines under the Public Trust Doctrine', Coastal Management, 39: 2, 133 – 157, First published on: 19 February 2011 (iFirst)
10. Ibid.
11. Ibid.
12. Meadows, Guy A., and Meadows, Lorelle A., Wood, W.L., Hubertz, J.M., Perlin, M. "The Relationship between Great Lakes Water Levels, Wave Energies, and Shoreline Damage." Bulletin of the American Meteorological Society Series 78: 4. (1997): 675-683. Print.
13. Dorr, J. A., and D. F. Eschman. 1970. Geology of the Great Lakes. Ann Arbor: University of Michigan Press.
14. Wilcox, D.A, Thompson, T.A., Booth, R.K., and Nicholas, J.R., 2007, Lake-level variability and water availability in the Great Lakes: U.S. Geological Survey Circular 1311, 25 p
15. Ibid.
16. Intergovernmental Panel on Climate Change. (2007). Observed changes in climate and their effects. Web. Accessed July 2015. https://www.ipcc.ch/publications_and_data/ar4/syr/en/spms1.html
17. Ibid.
18. Intergovernmental Panel on Climate Change (2013). What is a GCM? Web. Accessed July 2015. http://www.ipcc-data.org/guidelines/pages/gcm_guide.html
19. Great Lakes Integrated Sciences and Assessments (2015). Temperature. Web. Accessed July 2015. <http://glisa.umich.edu/climate/temperature>
20. Ibid.
21. U.S. Global Change Research Program. Global Climate Change in the United States, 2009. Cambridge University Press, Cambridge, MA.
22. Ibid.
23. Ibid.
24. Mackey, S. D., 2012: Great Lakes Nearshore and Coastal Systems. In: U.S. National Climate Assessment Midwest Technical Input Report. J. Winkler, J. Andresen, J. Hatfield, D. Bidwell, and D. Brown, coordinators. Available from the Great Lakes Integrated Sciences and Assessments (GLISA) Center, http://glisa.msu.edu/docs/NCA/MTIT_Coastal.pdf.
25. Great Lakes Integrated Sciences and Assessments. Climate Change in the Great Lakes Region. GLISA, 2014. Web. Accessed July 2015. http://glisa.umich.edu/media/files/GLISA_climate_change_summary.pdf
26. Cruce, T., & Yurkovich, E. (2011). Adapting to climate change: A planning guide for state coastal managers—a Great Lakes supplement. Silver Spring, MD: NOAA Office of Ocean and Coastal Resource Management.
27. The Heinz Center. (2000). Evaluation of Erosion Hazards. Web. Accessed July 2015. <http://www.fema.gov/pdf/library/erosion.pdf>
28. Dinse, Keely. Preparing for Extremes: The Dynamic Great Lakes. Michigan Sea Grant. Web. Accessed July 2015. <http://www.miseagrant.umich.edu/downloads/climate/11-701-Preparing-Coasts-for-Extremes.pdf>

29. Cruce, T., & Yurkovich, E. (2011). Adapting to climate change: A planning guide for state coastal managers—a Great Lakes supplement. Silver Spring, MD: NOAA Office of Ocean and Coastal Resource Management.
30. Dinse, Keely. Preparing for Extremes: The Dynamic Great Lakes. Michigan Sea Grant. Web. Accessed July 2015. <http://www.miseagrant.umich.edu/downloads/climate/11-701-Preparing-Coasts-for-Extremes.pdf>
31. Ibid.
32. Ibid.
33. Cruce, T., & Yurkovich, E. (2011). Adapting to climate change: A planning guide for state coastal managers—a Great Lakes supplement. Silver Spring, MD: NOAA Office of Ocean and Coastal Resource Management.
34. Ibid.
35. Ibid.
36. Dinse, Keely. Preparing for Extremes: The Dynamic Great Lakes. Michigan Sea Grant. Web. Accessed July 2015. <http://www.miseagrant.umich.edu/downloads/climate/11-701-Preparing-Coasts-for-Extremes.pdf>
37. Austin, J. A., & Colman, S. M. (2007). Oceans- L06604 - Lake Superior summer water temperatures are increasing more rapidly than regional air temperatures: A positive ice-albedo feedback (DOI 10.1029/2006GL029021). *Geophysical Research Letters*, 34, 6.).
38. Dinse, Keely. Preparing for Extremes: The Dynamic Great Lakes. Michigan Sea Grant. Web. Accessed July 2015. <http://www.miseagrant.umich.edu/downloads/climate/11-701-Preparing-Coasts-for-Extremes.pdf>
39. Cruce, T., & Yurkovich, E. (2011). Adapting to climate change: A planning guide for state coastal managers—a Great Lakes supplement. Silver Spring, MD: NOAA Office of Ocean and Coastal Resource Management.
40. FEMA (2013). Great Lakes Coastal Flood Hazard Studies. Web. Accessed July 2015. http://www.michigan.gov/deq/0,4561,7-135-3313_3684_3725-285488--,00.html
41. FEMA (2005). Floodplain Management Requirements: A Study Guide and Desk Reference for Local Officials. Web. Accessed July 2015. http://www.floods.org/ace-files/documentlibrary/CFM-Exam/FEMA_480_Complete.pdf
42. <https://www.fema.gov/media-library/assets/documents/26319>
43. Ibid.
44. FEMA (2013). Great Lakes Coastal Flood Hazard Studies. Web. Accessed July 2015. http://www.michigan.gov/deq/0,4561,7-135-3313_3684_3725-285488--,00.html
45. EDEN Inc. (2014). Flood Premiums Rising Dramatically. Web. Accessed July 2015. <http://eden.lsu.edu/Topics/Hazards/Floods/NFIP/Pages/FloodPremiumsRisingDramatically.aspx>
46. Environmental Protection Agency (2001). Functions and Values of Wetlands: Wetland Fact Sheet. Web. Accessed July 2015. <http://water.epa.gov/type/wetlands/outreach/upload/functions-values.pdf>
47. Ibid.
48. Ibid.
49. Ibid.
50. Ardizzone, Katherina A. and Mark A. Wyckoff, FAICP. Filling the Gaps: Environmental Protection Options for Local Governments, 2nd Edition. Michigan Department of Environmental Quality, Coastal Zone Management Program with financial assistance from the National Oceanic and Atmospheric Administration, authorized by the Coastal Zone Management Act of 1972. December 2010.
51. Ibid.
52. Ibid.
53. Ibid.
54. NREPA PA 451 of 1994, Part 303
55. Michigan Department of Environmental Quality. Wetlands Protection: Protecting Michigan's Wetlands. Web. Accessed July 2015. http://www.michigan.gov/deq/0,1607,7-135-3313_3687---,00.html
56. NREPA PA 451 of 1994, Part 303
57. LIAA (2014). Climate Change Adaptation & Local Planning for Michigan's Coastal Wetland Resources. Web. Accessed July 2015. http://www.greatlakeswetlandadaptation.org/uploads/2/6/5/3/26539851/final_wetlands_report_sept_2014.pdf
58. Maryland Department of the Environment. Wetland Disturbance and Impact. Web. Accessed July 2015. http://www.mde.state.md.us/programs/Water/WetlandsandWaterways/AboutWetlands/Pages/Programs/WaterPrograms/Wetlands_Waterways/about_wetlands/disturbance.aspx#natural
59. Ibid.

60. Ardizone, Katherina A. and Mark A. Wyckoff, FAICP. Filling the Gaps: Environmental Protection Options for Local Governments, 2nd Edition. Michigan Department of Environmental Quality, Coastal Zone Management Program with financial assistance from the National Oceanic and Atmospheric Administration, authorized by the Coastal Zone Management Act of 1972. December 2010.
61. Ibid.
62. NREPA, Michigan Public Act 303, 324.30307
63. Ardizone, Katherina A. and Mark A. Wyckoff, FAICP. Filling the Gaps: Environmental Protection Options for Local Governments, 2nd Edition. Michigan Department of Environmental Quality, Coastal Zone Management Program with financial assistance from the National Oceanic and Atmospheric Administration, authorized by the Coastal Zone Management Act of 1972. December 2010.
64. NREPA, Michigan Public Act 303, 324.30307
65. Ardizone, Katherina A. and Mark A. Wyckoff, FAICP. Filling the Gaps: Environmental Protection Options for Local Governments, 2nd Edition. Michigan Department of Environmental Quality, Coastal Zone Management Program with financial assistance from the National Oceanic and Atmospheric Administration, authorized by the Coastal Zone Management Act of 1972. December 2010.
66. Ibid.
67. Ibid.
68. Ibid.
69. NREPA, 1994 Michigan PA 451, Part 323.
70. Michigan Department of Environmental Quality. High Risk Erosion Areas: Program and Maps. Web. Accessed July 2015. http://www.michigan.gov/deq/0,4561,7-135-3313_3677_3700-344443--,00.html
71. Ardizone, Katherina A. and Mark A. Wyckoff, FAICP. Filling the Gaps: Environmental Protection Options for Local Governments, 2nd Edition. Michigan Department of Environmental Quality, Coastal Zone Management Program with financial assistance from the National Oceanic and Atmospheric Administration, authorized by the Coastal Zone Management Act of 1972. December 2010.
72. Ibid.
73. Ibid.
74. Soil Erosion and Sedimentation Control of the Natural Resources and Environmental Protection Act 1995 PA 451, as amended: R 323.1704.
75. Ardizone, Katherina A. and Mark A. Wyckoff, FAICP. Filling the Gaps: Environmental Protection Options for Local Governments, 2nd Edition. Michigan Department of Environmental Quality, Coastal Zone Management Program with financial assistance from the National Oceanic and Atmospheric Administration, authorized by the Coastal Zone Management Act of 1972. December 2010.
76. Ibid.
77. Ibid.
78. Ibid.
79. Ibid.
80. Ibid.
81. Ibid.
82. Ibid.
83. Ibid.
84. Ibid.
85. Glass v. Goeckel. Michigan Supreme Court. 29 July 2009f
86. Flinker, AICP (2010). The Need to Reduce Impervious Cover to Protect Water Quality. Web. Accessed July 2015. <http://www.dem.ri.gov/programs/bpoladm/suswshed/pdfs/imperv.pdf>

CHAPTER 3. DEFINING VULNERABILITY IN THE GRAND HAVEN COMMUNITY

INTRODUCTION

The impacts of climate variability on agriculture, infrastructure and human health are being felt almost everywhere across Michigan. With thoughtful planning and preparation, communities can better withstand and recover from severe storms, becoming even better places to live and thrive. Through community-wide planning efforts like this one, resilient municipalities can actively cultivate their abilities to recover from adverse situations and events, working to strengthen and diversify their local economies and communication networks, increase social capital and civic engagement, enhance ecosystem services, improve human health and social systems, and build local adaptive capacity.

BUILDING COMMUNITY RESILIENCE

Community resilience is a measure of the sustained ability of a community to utilize available resources to respond, withstand, and/or recover from adverse situations.¹ The Rockefeller Foundation, a noted global leader on such issues, emphasizes equity as an important component of resilience, stating that community resilience is the capacity for people – particularly the poor and vulnerable – to survive and thrive no matter what stresses or shocks they encounter.² Communities that are resilient are able to learn from adversity and adapt quickly to change. In general, the most important characteristics of community resilience are: (1) strong and meaningful social connections, (2) social and economic diversity, (3) innovation and creative problem solving capacity, and (4) extensive use of ecosystem services.³ The Rockefeller Foundation has identified 12 indicators that make for a resilient community (see right panel). However, it is important to acknowledge that every community is unique and not all indicators or characteristics are needed to be “resilient”.

Community master planning processes (like this one) can increase resilience by fostering civic engagement and improving communication and cooperation between cultural and service organizations. To improve economic resilience, communities can work to encourage and support local production of goods and supplies, increasing self-reliance and reducing the flow of money and resources out of the community. Programs to encourage local investing and entrepreneurship have been helpful in building both employment and production capacity. Consuming locally produced products, shopping at locally owned businesses and investing in local companies are activities that help to diversify the community’s economy, giving it greater resilience.

A Resilient Community Often Has:

1. Minimal human vulnerability
2. Diverse livelihoods and employment
3. Adequate safeguards to human life and health
4. Collective identity and mutual support
5. Social stability and security
6. Availability of financial resources and contingency funds
7. Reduced physical exposure and vulnerability
8. Continuity of critical services
9. Effective leadership and management
10. Empowered stakeholders
11. Integrated development planning

Rockefeller Foundation

¹ The Rand Corporation. <http://www.rand.org/multi/resilience-in-action/faqs.html>

² The Rockefeller Foundation: City Resilience Framework. April 2014. ARUP. <https://www.rockefellerfoundation.org/report/city-resilience-framework/>

³ Walker and Salt. (2006) Resilience Thinking: Sustaining Ecosystems and People in a Changing World. Island Press, Washington.

The following chapter discusses the results of a community vulnerability assessment for Grand Haven Township and the City of Grand Haven. This assessment begins with an overview of regional climate trends and predicted societal impacts, then transitions to detailed assessments of the community’s vulnerabilities to extreme **heat and flooding** events. Although the assessment is concentrated on these two specific types of events, many of the considerations and societal impacts identified would be present under other stresses and shocks within the community.

In completing the assessment, factors, such as demographics, environmental conditions, locations of critical facilities and essential services, and the built environment are considered. This assessment informs recommendations in both the Master Plan for the Township

Downscaled Climate Data

Downscaling climate data is a strategy for generating locally relevant data from global scaled predictions. The result is regionally specific forecasts.

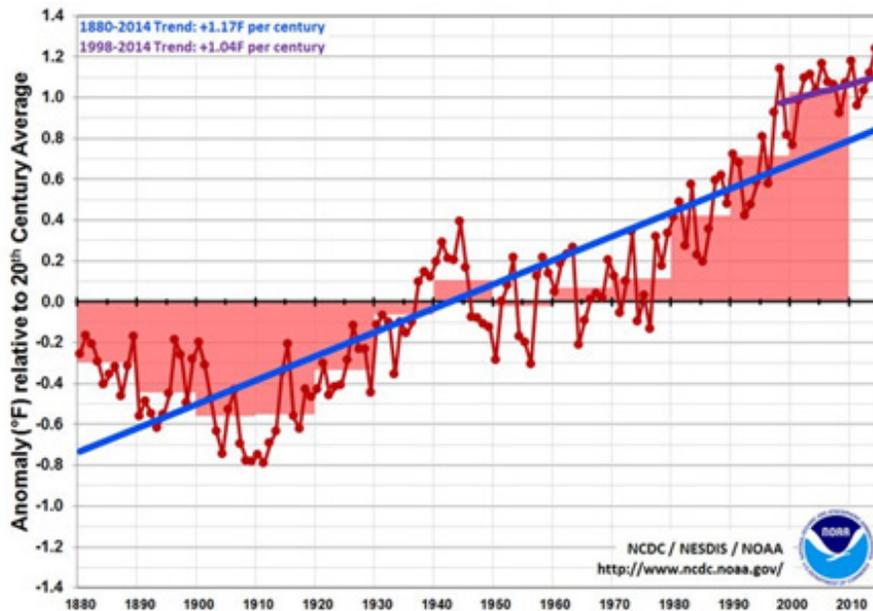
CLIMATE CHANGE AND VARIABILITY

Climate and weather are directly related, but not the same thing. Weather refers to the day-to-day conditions we encounter in a particular place: sun or rain, hot or cold. The term *climate* refers to the long-term weather patterns over regions or large geographic areas. When scientists speak of global climate change, they are referring to generalized, global patterns of weather over months, years and decades. To help predict what the climate will be in the future, scientists use three-dimensional computer models of the earth’s atmosphere, oceans and land surfaces to understand past trends and predict future changes. These General Circulation Models (GCM) have been improved and verified in recent years, resulting in relatively reliable predictions for climate changes over large regions. To help predict future climate patterns for smaller regions, scientists apply *downscaling techniques*.

As stated by the Intergovernmental Panel on Climate Change (IPCC), significant changes in the earth’s climate have been observed and thoroughly documented.⁴ Warming of the climate is now evident in average air and ocean temperatures around the globe (Figure 3.1 provides a summary of observed changes in land and ocean temperatures over the last 150 years).⁵ This change has significant impacts for the Midwest. The graph in Figure 2 presents observed changes in the amount of ice cover on the Great Lakes. Overall, there has been a 71% reduction in the extent of Great Lakes ice cover between 1973 and 2010, led by losses on Lake Superior.⁶

The Great Lakes Integrated Sciences Assessment (GLISA) is a consortium of scientists and educators from the University of Michigan and Michigan State University that is funded by the National Oceanic and Atmospheric Administration (NOAA) to provide

Figure 3.1. Observed change in global land and ocean temperatures



⁴ International Panel on Climate Change 2014 Synthesis Report. 2014 <http://www.ipcc.ch/>
⁵ NCDC/NEDIS/NOAA www.ncdc.noaa.gov

⁶ Wang, J., X. Bai, H. Hu, A. Clites, M. Colton, and B. Lofgren. 2011. Temporal and spatial variability of Great Lakes Ice Cover, 1973-2010. *Journal of Climate* 25:1318-1329.

climate resources, including downscaled models, for communities across the Great Lakes Region. According to GLISA, the Great Lakes Region has already experienced a 2.3° F increase in average temperatures. An additional increase of 1.8 to 5.4° F in average temperatures is projected by 2050. Although these numbers are relatively small, they are driving very dramatic changes in Michigan’s climate.

Based on the most recent models, the climate of the Grand Haven Community will continue to warm, with greater increases in temperature during the winter months and at night. There are a variety of weather impacts expected with this change. Some of the potential impacts of climate variability in the Grand Haven Community include:

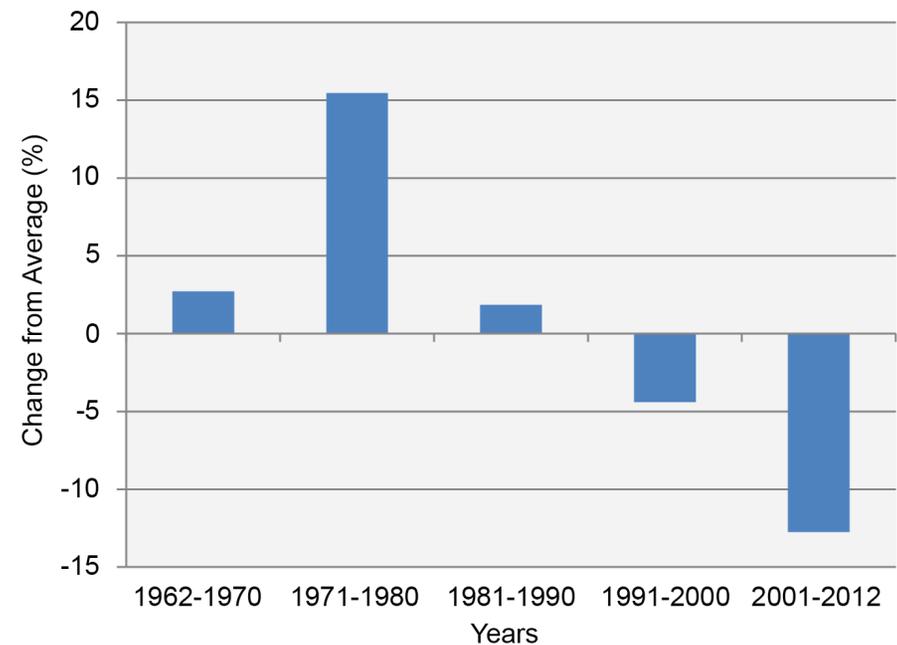
- Storms are expected to become more frequent and more severe.
- Increases in winter and spring precipitation
- Less precipitation as snow and more as rain
- Less winter ice on lakes
- Extended growing season (earlier spring/later fall)
- Greater frequency and intensity of storms
- More flooding events with risks of erosion
- Increases in frequency and length of severe heat events
- Increased risk of drought, particularly in summer

It is important to note that increased flooding and more intense drought are not mutually exclusive nor contradictory. In the Great Lakes region, scientists are predicting more intense rain events in the fall and winter and more intense droughts in the summer months. These changes in climate could have a number of both positive and negative effects on the Grand Haven Community.

What About the Winters of 2014 & 2015?

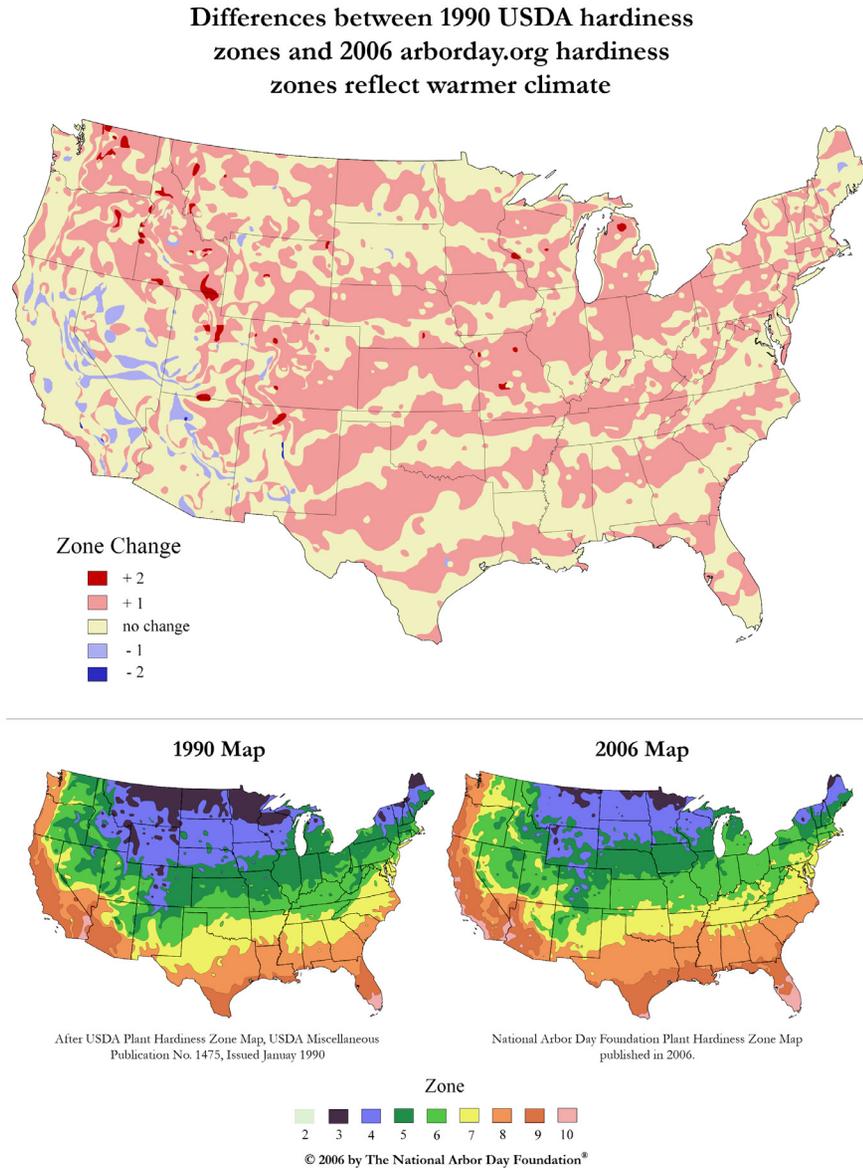
Remember, weather reflects the short-term conditions of the atmosphere while climate is the average daily weather for an extended period of time. This difference was never more evident in Michigan than over the last two years. Although most of the Great Lakes froze over the winters of 2014 and 2015 overall there has been a 71% reduction in the extent of ice cover between 1970 and 2010 have increased by 2.5 degrees since 1950

Figure 3.2



Source: <http://nca2014.globalchange.gov/report/our-changing-climate/melting-ice#graphic-16703>

Figure 3.3. Hardiness Zones



For example, an extended growing season could help support new crops and increase crop yields for area farmers. On the other hand, the highly variable weather conditions such as severe storms and flooding mixed with summer droughts could impact future crop production and stress groundwater supplies.

Much of the U.S. has been warmer in recent years, and that affects which plants grow best in various regions. The Arbor Day Foundation completed an extensive updating of the U.S. Hardiness Zones based upon data from 5,000 National Climatic Data Center cooperative stations across the continental United States. As is illustrated in Figure 3.3, zones in west Michigan are shifting northward. Zone 5 plants that previously thrived in the Grand Haven community now do best in northern Michigan, while Zone 6 plants that once thrived in states like Tennessee, now will grow well in the Grand Haven Community.

Agricultural Impacts

According to the third U/S. National Climate Assessment (2014), “Future crop yields will be more strongly influenced by anomalous weather events than by changes in average temperature or annual precipitation. Cold injury due to a freeze event after plant budding can decimate fruit crop production, as happened in 2002, and again in 2012, to Michigan’s \$60 million tart cherry crop.

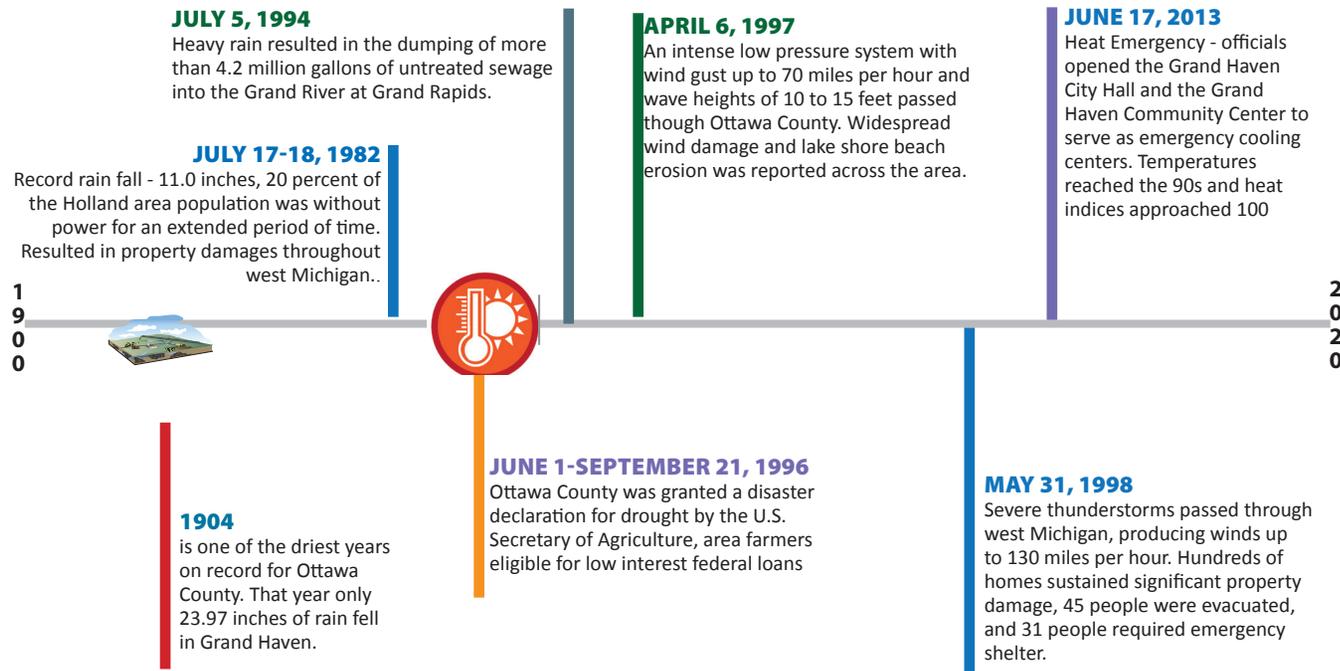
While there are no cherry farms in Grand Haven Township, analogous weather events could affect local crop production.



Source: https://www.arborday.org/media/map_change.cfm

SEVERE WEATHER EVENTS IN THE GRAND HAVEN COMMUNITY

The following section summarizes a few of the major weather-related events in the Grand Haven Community and West Michigan over the past 40 years. Oftentimes, severe weather events result in negative impacts to the local economy and to vulnerable populations within the community.

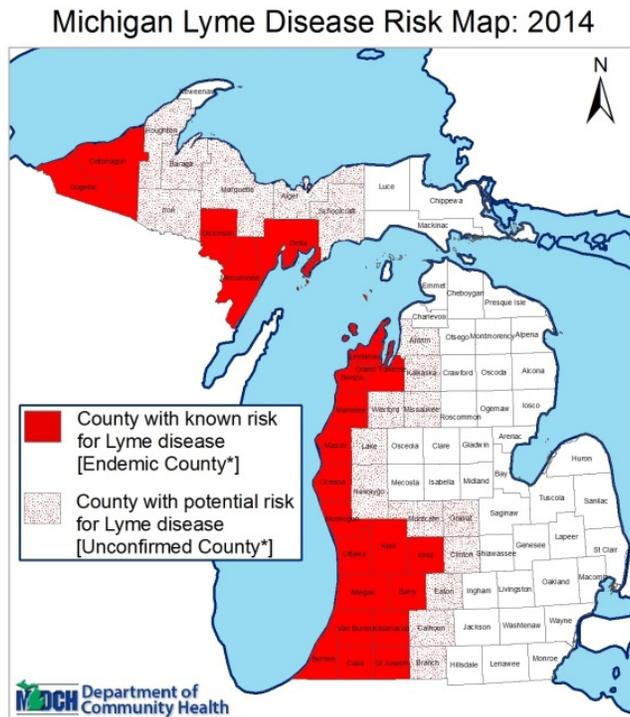


Severe Weather Events - The 2013 Storm

In April of 2013, following several days of steady rain, the Grand River (near Grand Rapids) crested at 21.85 feet, flooding many areas around the City. Although the Grand Haven Community was spared from severe flooding, large amounts of debris and sediment was pushed down the Grand River and deposited on the community's shoreline.



Figure 3.4. Distribution of Deer Ticks in West Michigan



* Lyme disease risk in this map is based on known, field confirmed populations of infected blacklegged ticks, or laboratory confirmed human cases.
 a) Counties labeled "endemic" are counties where infected tick populations have been confirmed - and/or -
 Two or more laboratory confirmed human cases have been identified with local exposure.
 b) Counties labeled "unconfirmed" are counties bordering endemic counties, but which do not meet the above criteria for "endemic" counties.

MDCH Zoonotic Disease and Special Projects Section: Revised April, 2014

PUBLIC HEALTH AND CLIMATE

Major health effects of long-term changes to the climate are predicted for the Midwest Region. Already, people in Michigan are experiencing higher rates of skin and eye damage from increased exposure to ultraviolet radiation, increased incidence of respiratory and cardiovascular diseases, and increased incidence of vector-borne and water-borne diseases.⁷ Weather conditions and high heat events exacerbate poor health conditions like allergies, asthma, and obesity.

In 2011, the Michigan Department of Health and Human Services (MDHHS) published their Michigan Climate and Health Adaptation Plan. The Plan notes there is an increase in the number of illnesses and deaths as a result of extreme heat events; declining air quality as a result of increased production of ozone and particulate matter from heat and drought events; and adverse changes to water quality and availability following severe weather events. In the long-term, health experts are most concerned with a rising incidence of infectious diseases and outbreaks of new diseases not currently endemic to Michigan, increasing numbers of disease vectors and appearance of new vectors not currently established in Michigan, and a degradation of food safety and security and food supply. For example, deer ticks are one disease vector that has increased in recent years. According to the MDHHS, the first official reported human case of Lyme disease was in 1985. Cases have now been reported in both the upper and lower peninsula and are increasing. It is anticipated that the number of cases reported will continue to increase due to public and medical personnel education, and expanding tick ranges. Figure 3.4 illustrates the distribution of deer ticks in West Michigan.

VULNERABILITY ASSESSMENTS

Communities interested in becoming more resilient assess their vulnerabilities and make action plans to reduce their sensitivities and exposures to hazards of all kinds. This Community Vulnerability Assessment has been compiled to provide a wide variety of useful information aimed at improving climate resilience by reducing human and community vulnerabilities. This Assessment supports focuses on Grand Haven Charter Township and the City of Grand Haven.

⁷ National Research Council. Reconciling observations of global temperature change. Washington, DC: National Academy Press, 2000:86.

A Vulnerability Assessment is designed to identify and help prioritize adaptation strategies in the community planning process. A model that defines ‘vulnerability’ as ‘exposure plus sensitivity’, is used to complete the assessment.⁸ Exposure refers to hazards in the natural or built environment, while sensitivity refers to the degree to which a community or certain segments of a community could be impacted by an event. This concept has been used recently in a variety of studies such as equity and adaptation assessments conducted by the NAACP⁹, vulnerability and its relationship to adaptation¹⁰, and hazard-specific vulnerability assessments aimed at measuring exposure, sensitivity, and resilience.¹¹

By assessing the potential for exposure to a hazard and the sensitivities of specific populations, maps are generated that identify areas with relatively greater vulnerability. This tool provides direction for planning commissioners, staff and public health workers as they work to reduce risks to human health.

Based on the greatest risks for Michigan and predicted climate trends, the vulnerability assessments were limited to extreme heat waves and flooding. However, climate change is predicted to result in increases of other exposures that should also be considered in community planning and development (e.g., high winds, tornadoes, and extreme heat).

These assessments were based in part on data obtained from the 2009-2014 American Community Survey (ACS) This data includes information on housing, income, and education characteristics of the populations in geographic areas called block groups, containing between 600 and 3,000 individuals. Data from the 2010 Census was also used, including population age and racial composition collected by Census blocks, which are the smallest available geographic areas for demographic data. Data sets concerning parcel characteristics were obtained from Ottawa County, Grand Haven Charter Township and the City of Grand Haven. Building footprint and tree canopy cover were digitized using an orthophotograph from 2009.¹²

Vulnerability Assessment

Vulnerability, equals **exposure** plus **sensitivity**.

Exposure refers to the natural or built environment while **sensitivity** refers to the degree to which a community or certain segments of a community could be impacted by an event.

⁸ Foundations for Community Climate Action: Defining Climate Change Vulnerability in Detroit. University of Michigan. December 2012.

⁹ Equity in Building Resilience in Adaptation Planning. National Association for the Advancement of Colored people (NAACP)

¹⁰ Adger, W. N. (2006). “Vulnerability.” *Global Environmental Change* 16 (3): 268-281. Adger, W. N., N. Arnell, and E. Tompkins (2005).

“Adapting to climate change-perspectives across scales.” *Global Environmental Change* 15(2):77-86.

¹¹ Polsky, C., R. Neff, and B. Yarnal (2007). “Building comparable global change vulnerability assessments: the vulnerability scoping diagram.” *Global Environmental Change* 17(3-4): 472-485.

¹² USDA and NRCS Geospatial Data Gateway

HEAT VULNERABILITY

Community vulnerability to heat events varies depending on location. In Michigan, there are varying degrees of vulnerability to heat based on a community's proximity to the Great Lakes. Access to air conditioning, and surrounding environmental factors like tree canopy and impervious surfaces also play a role

Studies have shown that heat-related mortality generally occurs in areas of the community that are warmer, less stable, and home to more disadvantaged populations.¹³ One study found that neighborhoods with the highest temperatures and the least amount of open space and vegetation were also likely to be the most socioeconomically disadvantaged.¹⁴ The same study also found the strongest protective factor for residents was access to air conditioning in the home and in other places, as well as having access to transportation.

A 2012 literature review conducted by researchers at the University of Michigan indicates that infants under five and persons over 65 are highly sensitive to heat events, as are persons living in lower-income census tracts and minority populations. Living alone, being confined to bed, having a mental illness, not leaving home daily, living on higher floors of multistory buildings, and suffering from alcoholism are additional factors that are associated with increased risk of heat-related mortality.

There have been limited studies conducted on how heat events impact rural and suburban communities, but one study notes that rural populations may exhibit patterns of vulnerability different from those of urban populations.¹⁵

HEAT SENSITIVITY ASSESSMENT

To create the sensitivity and exposure maps for this Plan, as well as the resulting vulnerability maps, the consultant relied on methodologies developed at the University of Michigan's Taubman College of Architecture and Urban Planning.¹⁶

To conduct the heat sensitivity assessment of the Grand Haven Community, the project team used a geographic information system (GIS) for spatial data analyses to show the relative distribution of people most at risk. Five factors were identified as the primary contributors to the sensitivities and risks of people exposed to a heat wave (1. people over 65 years of age, 2. people living alone, 3. people over 25 with less than a high school education, 4. minority populations, and 5. people living below the poverty line). Using U.S. Census data, the project team identified the percentages of people living in each area (by Block Group or Block) for each sensitivity factor.

Studies show that people who are older have greater sensitivity to extreme heat events. Studies also indicate that older age is associated with higher hospital admission rates in heat waves. The Percent of Population 65 and Older (Map 3.1) depicts the relative concentration of older adults in the community by Census Block.

¹³ Foundations for Community Climate Action: Defining Climate Change Vulnerability in Detroit. University of Michigan. December 2012

¹⁴ Semenza JC, Rubin CH, Falter KH, et al. Heat-related deaths during the July 1995 heat wave in Chicago. *N Engl J Med* 1996; 335:84–90.

¹⁵ Mapping Community Determinants of Heat Vulnerability. *Environ Health Perspectives* 117:1730–1736 (2009). doi:10.1289/ehp.0900683 available via <http://dx.doi.org/> [Online 10 June 2009]

¹⁶ Foundation for Community Climate Action: Defining Climate Change Vulnerability in Detroit (December 2012) University of Michigan's Taubman College of Architecture and Urban Planning.

Upon review of the map, planning commission members noted that many older people do not live in the Grand Haven Community full-time, thus people who leave for the winter (snowbirds) may not be counted. It was also noted there are three senior complexes in close proximity to one another at the intersection of Ferry and Robbins Road.

Another sensitivity factor is living alone, which serves as a measure of social isolation. Although living alone is not necessarily a risky thing, people who are socially isolated are at greater risk during an extreme heat event. Isolated people may not be able to recognize symptoms of heat-related illness and take proper action. For this factor, the project team used the American Community Survey data for Census Block Groups, broken out into individual Census blocks for geographic representation (blocks with no population were not included). Map 3.2 depicts the high concentrations of people living alone. The higher concentration of people living alone in downtown Grand Haven is in line with nationwide trends because downtowns generally have a greater supply of live-work units, single apartments and/or condominium units, and accessory dwelling units.

Studies also suggest that minorities are at greater risk during extreme heat events for various reasons, including less reliable access to health care, transportation and other social supports needed to reduce heat exposures.¹⁷ Census Blocks were used to map the relative percentages of non-white populations in the Grand Haven Community (see Map 3.3). One specific area noted by the planning commission was a cluster of migrant housing in the southeast corner of the community.

Two socioeconomic factors associated with increased heat-related morbidity and mortality are the percentage of the people living in poverty and percentage of people without a high school diploma. In general, persons living at or below the poverty line have less access to air conditioning or cooling options for their residences. This could limit a person's access to relief from an extreme heat event. Census Block Groups were used to map the relative percentages of households living below the poverty threshold in the Grand Haven Community (please see Map 3.4).

Similarly, University of Michigan research team found studies that demonstrate a direct link between low education attainment and poor health.¹⁸ There is also an established correlation between lower educational attainment and income. Based on these findings, Census Block Groups were used to map the relative percent of persons 25 years and older with less than a high school education in the Grand Haven Community (see Map 3.5). One area with a high concentration of low education attainment was the Village Green Mobile Home Park. However, the planning commission also noted that higher income neighborhoods in the northern part of the Township were being flagged as having high concentrations of low education attainment, but may not necessarily be at higher sensitivity for heat events.

To complete the heat sensitivity assessment, a cumulative score for all five sensitivity factors for each Census Block was created. In each of the sensitivity factors, the percentages were grouped into five categories (ranging from a very low percentage of people to a relatively high percentage living with the identified sensitivity). The five categorical groupings were generated by the GIS software ArcMap using natural breaks

¹⁷ Waugh and Tierney (eds.) Emergency Management: Principles and Practices for Local Government. Chapter 13: Identifying and addressing social vulnerabilities by Elaine Enarson.

¹⁸ Curriero FC, Heiner KS, Samet JM, et al. Temperature and mortality in 11 cities of the eastern United States. American Journal of Epidemiology. 30 (2001): 1126-8.

in the data (groupings). A ranking of 1 to 5 was assigned to each of the categories, ranging from 1 for the lowest percentage to 5 for the highest. Finally, the team combined the scores within each Census Block. Thus, the most sensitive Census Blocks would be scored up to 25. The sensitivity is color coded for ease of identifying areas with the greatest sensitivity.

The Grand Haven Community Sensitivity to Excessive Heat Map (Map 3.6) provides a reasonably detailed map of locations where the highest percentages of at-risk residents live. This does not mean these community residents are in immediate danger. Rather, the map provides planning officials a new way of identifying areas where heat waves could present serious problems for a significant number of citizens. These are populations that could be sensitive to extreme heat events.

The Census data used likely counts people twice, such as in cases where a person is both a minority and over 65. This may over-estimate the severity of the sensitivities in some locations. Additionally, the sensitivity analysis may underestimate risk because it leaves out several key sensitive populations, such as those with preexisting health concerns (for example, cardiovascular disease or psychiatric disorders). Such data is not often available publicly or on the Census block level. Emergency managers, hospitals, and community health departments within the region may have additional data available that can be analyzed and considered as the community looks to better understand its overall sensitive populations. To further improve the analysis, additional variables could be collected through local surveys and observation, such as the degree of social connections among individuals within a community, or materials used in housing.¹⁹

HEAT EXPOSURE ASSESSMENT

When larger communities experience heat waves, air temperatures can vary significantly from place to place both during the day and at night. Some of these differences can be attributed to the varying types of land cover found throughout the community. For example, temperatures can be significantly lower at night in locations with a heavy tree canopy and very little pavement. Conversely, temperatures can be higher in locations with little greenery and lots of pavement.

Impervious surfaces such as paved parking lots, roadways, and buildings absorb large amounts of heat from the air and from sunshine that is radiated back into the environment when temperatures begin to fall. At the same time, tree canopy and other vegetation can help cool an area through evaporation, transpiration of water, and by providing shade. In places with a high percentage of impervious surface and little tree canopy, the immediate environment can be much warmer. Urban areas typically have higher heat indexes (combinations of temperature and humidity) than surrounding suburban or rural areas. This condition has been termed the “Urban Heat Island Effect.”²⁰

People living in settings with a Urban Heat Island Effect suffer greater exposures to heat over longer periods of time (e.g., warmer nights), making them more vulnerable to health impacts. Studies of the Urban Heat Island Effect (whereby air temperatures in an urban area are 2–9° F, higher than in a nearby rural area) have shown that

¹⁹ Mapping Community Determinants of Heat Vulnerability. *Environ Health Perspectives* 117:1730–1736 (2009). doi:10.1289/ehp.0900683 available via <http://dx.doi.org/> [Online 10 June 2009]

²⁰ Basu and Samet. (2002) Relation between Elevated Ambient Temperature and Mortality: A Review of the From the Department of Epidemiology, Bloomberg School of Public Health, Johns Hopkins University, Baltimore, MD.

the albedo, or reflectivity, of an urban area is one of the most important determinants in reducing the magnitude of the heat island.²¹ Increasing the tree canopy cover can also reduce air temperature by 1–3° C. Green roofs and plantings on roofs and in large parking lots, may also decrease the Urban Heat Island Effect and decrease stormwater runoff and building energy use. An added benefit that stems from increasing albedo and vegetation include the reduction of ground level ozone and energy costs associated with air conditioning use.²²

With data obtained from Ottawa County and the, two separate exposure maps were created. The first exposure map depicts the percentage of impervious surfaces within each Census Block, as used in the sensitivity assessment (Map 3.7). These percentages are divided into five categories using the GIS software's natural breaks calculation. Since exposure is lowest in areas with the lowest percentage of impervious surface, those scored a 1, with 5 ratings assigned to areas with the highest percentage of impervious surfaces.

The second exposure factor is percentage of tree canopy. Tree canopy is mapped within each Census Block (Map 3.8) and scored using a similar five category process. As illustrated on Map 3.8, the highest percentage of tree canopy (therefore the lowest heat exposure) received a 1 and the least vegetative areas received a 5.

The project team combined the results of the two exposure maps to provide a single Community Excessive Heat Exposures Map (Map 3.9), which provides a reliable depiction of where the Urban Heat Island Effect would be most and least intense during a heat wave. The planning Commission and staff can use this map to better assess where new vegetation and tree canopy should be placed.

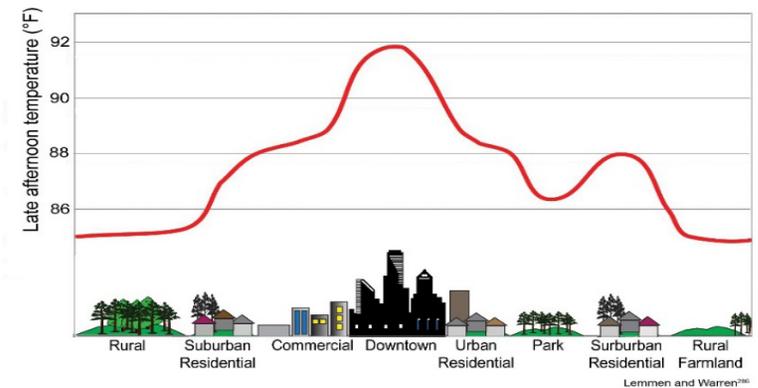
COMPOSITE HEAT VULNERABILITY

The Grand Haven Community Heat Vulnerability Map is a simple additive combination of the overall sensitivity map and the overall exposures map (see Map 3.10). The resulting vulnerability index depicts where concentrations of exposures and sensitive populations create a higher risk for community residents. In general, those areas with a composite score of 8 to 10 (red) have residential populations that may be particularly vulnerable to extreme heat events.

HEAVY RAIN AND FLOODING

Climate models suggest that the Grand Haven Community and West Michigan can expect more frequent storms of increasing severity in the decades ahead. The total amount of rainfall per year is also likely to increase. However, climate models suggest the precipitation will be more concentrated in the winter, spring and fall seasons and there will be more localized, intense storms at almost any time of year. The potential for substantially larger rain events raises concerns over the potential for harm to

Figure 3.5 Urban Heat Island Effect



Large amounts of concrete and asphalt in cities absorb and hold heat. Tall buildings prevent heat from dissipating and reduce air flow. At the same time, there is generally little vegetation to provide shade and evaporative cooling. As a result, parts of cities can be up to 10°F warmer than the surrounding rural areas, compounding the temperature increases that people experience as a result of human-induced warming.³¹³

Source: US Global Change Research Program (2009) <http://www.epa.gov/climatechange/impacts-adaptation/health.html>

What is Albedo?

Albedo is the fraction of solar energy reflected from the earth back into space. It is a measure of the reflectivity of the earth's surface. Ice, especially with snow on top of it, has a high albedo, while pavement has a low albedo.

²¹ Kolokotroni M, Giridharan R. Urban heat island intensity in London: An investigation of the impact of physical characteristics on changes in outdoor air temperature during summer. *Solar Energy* 2008;82(11):986–998.

²² Akbari H. Shade trees reduce building energy use and CO2 emissions from power plants. *Environmental Pollution* 2002;116:S119–S126. [PubMed: 11833899]

human health and damage to buildings and infrastructure.

The following pages summarize a Flooding Vulnerability Assessment conducted for the Grand Haven Community. In assessing vulnerability, local officials can evaluate potential exposures as well as sensitivity to flooding. Buildings, roads, bridges, sewer lines and other infrastructure located in a flood zone are exposed to greater risks. Where flowing floodwaters have the greatest energy, structures may be undercut, collapsed or moved, and soils will erode. Even areas outside of an identified floodplain are subject to flooding from heavy downpours. Where the soils have low permeability and physical drainage is inadequate, water will accumulate and cause ponding during large storm events. Appropriate planning and land-use regulations can help reduce exposures caused by poor site selection. The sensitivity of structures can be modified to reduce risk of damage by applying flood-resistant design standards. Figure 3.6 illustrates recommendations from FEMA for retrofitting homes to make them more resilient to flooding events.

Figure 3.6. FEMA recommendations for retrofitting homes to make them more resilient to flooding events

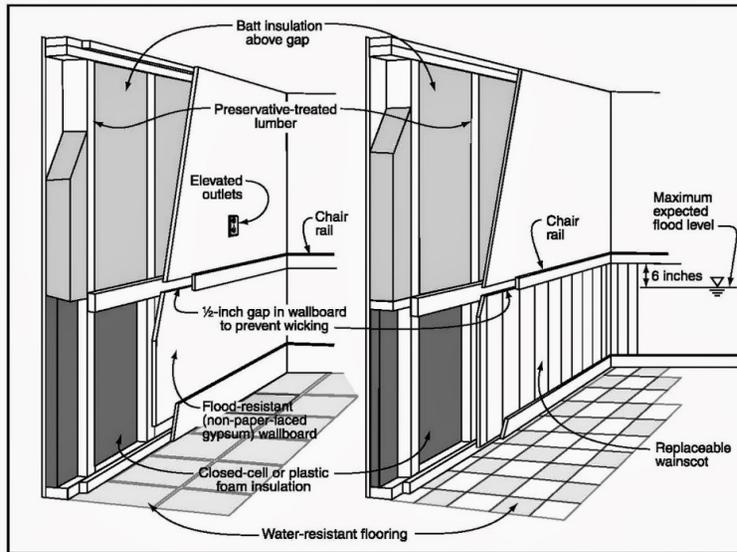


Figure 4. Partial wet floodproofing technique using flood damage-resistant materials for finished wall construction.

EXPOSURE TO FLOODING HAZARDS

The Community Elevation Profile and Drainage Map (Map 3.11) offers a useful view of the topography of the Grand Haven Community, including the most prominent drainage patterns. On this map, the darkest green colors identify the lowest elevations, while the darkest brown colors identify the highest elevations.

The Federal Emergency Management Agency (FEMA) develops Flood Insurance Rate Maps (FIRMs) for each County in the United States. (See Map 12.6) According to FEMA, the FIRM is “the primary tool for state and local governments to mitigate the effects of flooding in their communities.” The National Flood Insurance Program was created in 1968 to reduce future damage and provide an insurance program that would help protect property owners from losses. The FIRM shows areas subject

to flooding, based on historic, hydraulic and meteorological data as well as flood controls. The maps identify a base flood elevation (BFE), sometimes referred to as the 100-year flood zone. These are areas that have a 1% chance of flooding in any given year. The maps also identify the areas with a 0.2% chance of flooding in any given year, also known as the 500-year flood zone. FEMA points out these ratios are only probabilities, not forecasts.

HOUSEHOLD SENSITIVITY TO FLOODING

In many communities, flooding impacts are felt most significantly at the household level. A home's flood risk is based on its relative location to floodplains and other flooding hazard areas. The household flood sensitivity refers to how well the house structure is equipped to deal with flooding. As modeled by the University of Michigan, household sensitivity to flooding can be determined by looking at the age of the housing stock and homeowners financial ability to maintain and improve the home, which is approximated using the median household income. In general, homes built before 1940 used a more porous concrete material for basement construction, so water can flow more rapidly through the foundation (See Map 3.12) Older homes may be more vulnerable if residents have not had the financial resources to make improvements and upgrades. By looking at median household income as a marker of likely upkeep of the home, an attempt was made to exclude older homes that have been well-maintained and undergone upgrades from our areas of flood damage risk (see Map 3.13).

FLOODING VULNERABILITY

By looking at the overlap of flooding exposure and housing sensitivity, the project team identified a number of Census blocks that are the most vulnerable in the community to flooding damage. It is important to note that other factors contribute to flood risk. For example, mobile and manufactured homes are often particularly susceptible to flood damage because they generally lack a reinforced foundation. In addition, the municipal infrastructure plays an important role in protecting homes from flood damage. Communities with an aging storm sewer system or ones where the storm sewer has not been fully disconnected from the sanitary sewer are more prone to damage from an overloaded system in the event of a severe rain event. Map 3.14 depicts the Community Flooding Vulnerability.

OTHER CONSIDERATIONS FOR DEFINING COMMUNITY VULNERABILITY

Locations of key community assets are helpful to map to provide insight on how accessible they are to residents. It is also helpful to map locations of key infrastructure and assets that could be at risk, or would be most negatively impacted if they were impacted.

CRITICAL FACILITIES

In general usage, the term “critical facilities” is used to describe all man-made structures or other improvements that, because of their function, size, service area, or uniqueness, have the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if they are destroyed, damaged, or if their functionality is impaired.²³

²³ Risk Management Series Design Guide for Improving Critical Facility Safety from Flooding and High Winds. FEMA 543 January 2007.

Map 3.15 shows locations of critical facilities within the Grand Haven Community.

- Emergency response facilities (fire stations, police stations, rescue squads, and emergency operation centers);
- Custodial facilities (hospitals, long-term care facilities, jails and other detention centers, and other health care facilities);
- Schools;
- Emergency shelters;
- Utilities (water supply, wastewater treatment facilities, and power);
- Communications facilities;
- Other assets determined by the community to be of critical importance for the protection of the health and safety of the population; and
- Places where 300+ people congregate.

ACCESS AND DISTRIBUTION OF SOCIAL SERVICES

Service centers and institutions (such as homeless shelters and churches) are important in delivering day-to-day support to residents. In the event of an emergency, such as an extreme heat event or flash flooding episode, service centers and institutions are especially important as a safe place where residents can go if they cannot return home. Map 3.16 highlights key locations of places where residents may seek temporary refuge in the event of an emergency. These locations include schools, places of worship, governmental buildings, hospitals and clinics, libraries, and other non-profit social service organizations. In the Grand Haven Community, social services are concentrated in downtown Grand Haven and along major commercial corridors.

Communities with high population densities, frequent extreme weather events, or both are likely to have designated services centers. In the event of extreme heat waves, designated community cooling centers may provide refuge for sensitive populations and those without access to air conditioning. In the event of loss of power due to flooding or extreme storms, locations with a backup power source, such as a generator, are essential.

A best management practice for a resilient community is to designate community service centers that are accessible, evenly distributed across the population, open 24 hours, and well-known to residents.

FOOD AVAILABILITY

Climate variability will likely make significant impacts to the availability and cost of food. A community can decrease its vulnerability to disruptions in food sources by investing and supporting local agriculture and food processing activities. Support for and reliance upon locally produced foods not only alleviates potential future challenges in the food market, but also helps foster another strong economic sector for the region.

Just as cultivating local entrepreneurship makes a community stronger, the capacity of a community to produce and process its own food greatly increases resilience. Because of its ability to impact health, wealth,

and quality of life, there is a national trend in support of the local food movement. Communities can leverage their existing assets, such as the local Farmer’s Market, community gardens, and an established agricultural base, to lay the foundation for additional local food-related jobs. Communities can take more creative approaches as well, such as allowing for agriculture on publicly owned and vacant lands in existing neighborhoods and parklands. To evaluate community vulnerabilities, locations of full service grocery stores in relation to where people live are mapped. In the event of loss of power or disruption in potable water supplies, it is important to ensure that residents have access to affordable food and drinking water.

The project team also evaluated access to healthy food to see if there are areas of the community that qualify as a food desert. According to the United States Department of Agriculture (USDA), a food desert is defined as an area vapid (one-mile) of fresh fruit, vegetables, and other healthful whole foods, usually found in impoverished areas. This is largely due to a lack of grocery stores, farmers’ markets, and healthy food providers.²⁴ Communities looking to reduce the number of residents living in a food desert can promote or zone for pop-up farm stands in low income areas, enact housing policies supportive of mixed income, and establish community gardens in areas identified as food deserts.

Map 3.17 identifies neighborhoods within the Grand Haven Community that are located within one mile of a full service grocery store.

ADDITIONAL RESOURCES DRAWN FOR THIS CHAPTER:

Snover, A.K., L. Whitely Binder, J. Lopez, E. Willmott, J. Kay, D. Howell, and J. Simmonds.

2007 Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments. In association with and published by ICLEI – Local Governments for Sustainability, Oakland, CA

Michigan Climate and Health Adaptation Plan 2010-2015 Strategic Plan, Prepared by the Michigan Department of Community Health (2001)

²⁴ <http://americannutritionassociation.org/newsletter/usda-defines-food-deserts>

CHAPTER 4. GOALS AND OBJECTIVES

The primary function of the *Resilient Grand Haven Charter Township Master Plan* is to guide future development and growth within the Township. The Master Plan identifies a vision for the future and a series of goals and objectives to guide decision making. The goals and objectives in this chapter of the Master Plan provide guidance for the future planning of the Township, and are based on the input gathered during the Resilient Grand Haven planning process, discussions with the Grand Haven Charter Township Planning Commission, and previous community planning efforts.

Goals provide statements that describe the desired future for the Township and provide general direction for local decision makers. Objectives are more detailed descriptions of actions needed to achieve the goals.

The tables on the following pages identify the goals and accompanying objectives of the *Resilient Grand Haven Charter Township Master Plan*. The tables also identify the priority, implementation time frame, responsible parties, and potential funding sources for each goal and objective. The table can be interpreted through the use of the implementation table key found on this page.

Goal and Objective Implementation Table Key

Priority
Most important
Very Important
Important
Time Frame
Within 1 year
1 -3 years
3 plus years
As available
On-going
Responsibility
Project Lead
Key Participants
Contributors
Consultant
Responsible Department/Agency/Organization
Grand Haven Twp., Twp Staff, Planning Commission, Ottawa County, State of Michigan, Public Works, School District, Harbor Transit, Health Department, NORA, Home Owners, Developers, Business Owners, MDOT, United Way, Others
Funding Source
Public (general fund, county/state funding, grants, millage, TIF), Private, Other Sources

PROJECT	PRIORITY	TIMEFRAME	RESPONSIBILITY			FUNDING		
			TOWNSHIP	OTHER GOV'T	PRIVATE	PUBLIC	PRIVATE	OTHER
Goal 1 The Township will preserve valuable natural resources, and the shorelines along Lake Michigan and the Grand River. These natural assets provide a cultural identity and add economic value to the community.	High	Medium	Yes	No	No	No	No	No
The sensitive natural resources that distinguish the Grand Haven landscape will be identified and protected, which include but are not limited to: wetlands, critical dunes, high risk erosion, floodplains, and water resources.	Medium	Short	Yes	No	Yes	No	No	No
Limit the amount of impermeable surface with all new development to minimize surface runoff and maintain infiltration.	Medium	Short	No	No	No	No	No	No
Develop and implement shoreline protection standards such as riparian buffers, erosion protection with native vegetation plantings, and low-impact development.	Medium	Short	No	No	No	No	No	No
The Township will take thoughtful measures to ensure residents will have long-term sustainable water sources.	Medium	Medium	No	No	No	No	No	No
Develop best management practices to prevent the introduction, and spread, of invasive species and diseases transmitted by fauna.	Medium	Medium	No	No	No	No	No	No
Encourage forest stewardship practices through public education.	Medium	Short	No	No	No	No	No	No

PROJECT	PRIORITY	TIMEFRAME	RESPONSIBILITY			FUNDING		
			TOWNSHIP	OTHER GOV'T	PRIVATE	PUBLIC	PRIVATE	OTHER
Goal 2 The preservation and enhancement of natural features of the community will be a central consideration in all civic decisions in Grand Haven Township. Buildings and infrastructure will be planned, constructed and maintained to protect and improve the quality of the natural environment while serving the needs of the population and allowing residents and visitors appropriate access to enjoy natural features.	High	Medium	No	No	No	No	No	No
Develop a green infrastructure plan to enhance and sustain the network of natural features of the Township and the ecological interaction of those features, within the context of the built environment of the community.	Medium	Short	No	No	No	No	No	No
Integrate the Cluster Development Ordinance into the Planned Unit Development (PUD) Ordinance to substantiate the Township's dedication to open space preservation.	Medium	Short	No	No	No	No	No	No
Recognizing the importance and value of tree coverage the Township will evaluate the need and feasibility of implementing a tree planting policy.	Medium	Short	No	No	No	No	No	No
Support the goals and objectives of the <i>Explore the Grand Region: A Community Parks and Recreation Plan in Northwest Ottawa County, 2015 – 2019</i> .	Medium	Medium	No	No	No	No	No	No
Preserve the viewsheds of Lake Michigan, the Grand River, and the bayous by minimizing encroachment into riparian areas, floodplains, and steep slope areas within the Township.	Medium	Short	No	No	No	No	No	No
Incorporate the use of renewable energy whenever feasible.	Medium	Short	No	No	No	No	No	No

PROJECT	PRIORITY	TIMEFRAME	RESPONSIBILITY			FUNDING		
			TOWNSHIP	OTHER GOV'T	PRIVATE	PUBLIC	PRIVATE	OTHER
GOAL 3: Discourage the inappropriate and unplanned use of land through sporadic and isolated land divisions. Encourage carefully planned developments that are responsive to market demands.								
Support a Township land use policy that results in a well-balanced, but diverse pattern of land uses that incorporates sustainable growth principles.								
Refine and enhance the Planned Unit Development (PUD) and Cluster Development Ordinances to ensure that residential developments are designed to promote the goals of clustered residential development, the preservation of large tracts of contiguous open space, and the preservation of development buffers along external county roads.								
Develop a balanced growth policy to discourage fractured development locations and low-density sprawl.								
Limit new development to land that is supported by existing infrastructure and paved roads. All proposed developments within 2,700 feet of municipal water or sewer must bear all costs to extend the infrastructure services.								
Establish ordinances to achieve the targeted growth areas defined in the 2009 Master Plan.								
<ul style="list-style-type: none"> a. Land east of US-31 – new residential development should generally be limited to the north side of Lincoln Street. However, the Township may consider future residential Planned Unit Developments or Cluster Developments along the immediate southern edge of Lincoln Street in limited circumstances. Such as, the proposed development would fulfill a unique housing niche (<i>i.e., affordable housing, senior housing, assisted living, PUD with a crop and livestock theme, etc.</i>). b. Land west of US-31 – limit new residential development to land north of Buchanan Street. c. Limit future commercial and industrial development along US-31 and M-45 to those areas that are currently served, or are planned to be served, by municipal water and sewer. The costs associated with any utility extensions must be assumed by the developer. 								
Preserve the local character of the Township by implementing development regulations to protect the rural character, thriving agricultural operations, and successful agri-businesses, which include roadside stands and farmers markets.								
Support an amendment of the PUD ordinance that permits residential crops and livestock as the main theme of the new development.								

PROJECT	PRIORITY	TIMEFRAME	RESPONSIBILITY			FUNDING		
			TOWNSHIP	OTHER GOV'T	PRIVATE	PUBLIC	PRIVATE	OTHER
GOAL 4: Support multiple housing options and mixed-use developments for all segments of the population that place users near daily services.								
Support the development of diverse housing types to expand choices available to current, and new, Township residents.								
Examine the need, and viability, of increasing densities in certain segments of the Township.								
Support and encourage senior housing and assisted living facilities (<i>i.e., aging in place</i>).								
Integrate and perform a Health Impact Assessment (HIA) when considering new development projects.								

PROJECT	PRIORITY	TIMEFRAME	RESPONSIBILITY			FUNDING		
			TOWNSHIP	OTHER GOV'T	PRIVATE	PUBLIC	PRIVATE	OTHER
GOAL 5: Grand Haven’s public facilities, including its roads, utilities, parks, and public buildings will be carefully planned, constructed and maintained to efficiently serve the needs of current and future generations.								
Incorporate the Capital Improvement Plans into the Master Plan.								
Research the viability of a “Complete Streets” ordinance. If viable, develop and implement a zoning text amendment ordinance.								
If appropriate, the Township will consider establishing a Safe Routes to School program that is administered through the Michigan Department of Transportation (MDOT).								

PROJECT	PRIORITY	TIMEFRAME	RESPONSIBILITY			FUNDING		
			TOWNSHIP	OTHER GOV'T	PRIVATE	PUBLIC	PRIVATE	OTHER
GOAL 6: Grand Haven Township will continue to be a vital economic center that includes a balance of clean manufacturing, professional and personal service, the arts, hospitality, retail, commercial, and institutional employment.								
Research the viability of incorporating an incentive-based development plan for all land uses, including energy efficiency and brownfield redevelopment.								
Support the expansion, and improved access, to high-speed and reliable wireless broadband service.								

PROJECT	PRIORITY	TIMEFRAME	RESPONSIBILITY			FUNDING		
			TOWNSHIP	OTHER GOV'T	PRIVATE	PUBLIC	PRIVATE	OTHER
GOAL 7: Residents and visitors to the greater Grand Haven community will have safe and convenient access by way of non-motorized pathway system, private automobiles, and public transportation.								
Expand the Township's pathway system to promote the health and safety of residents and visitors.								
Coordinate current and future development projects with the Ottawa County Road Commission (OCRC).								
Develop a best practices access management plan with OCRC and Ottawa County Planning Commission. This plan will strive to reduce traffic volumes; correct unacceptable traffic conditions; address safety concerns on major thoroughfares; and develop street design standards.								
Support efforts to increase access to a regional transit system. This includes supporting the goals and objectives of Harbor Transit's strategic plan.								
Investigate the potential impacts of the new M-231 bypass on future development, traffic, and infrastructure in the Township.								

PROJECT	PRIORITY	TIMEFRAME	RESPONSIBILITY			FUNDING		
			TOWNSHIP	OTHER GOV'T	PRIVATE	PUBLIC	PRIVATE	OTHER
Goal 8: Grand Haven Township will be a leader in working with other units of government, state agencies, schools, and special authorities to manage growth and service delivery to the residents and businesses of the area in the most efficient and transparent manner possible.								
Cooperate with other area communities in the evaluation and implementation of any feasible joint approach to service delivery.								
Coordinate planning efforts with surrounding municipalities for well-planned and cooperative communities.								
Complete an evaluation of Township buildings and facilities to identify improvements to reduce energy consumption and stormwater runoff and implement those that prove feasible.								
Partner with the Tri-Cities to create a marketing and branding strategy for the community.								
Consolidate separate community initiatives into a common vision, which results in sound community building, promotes leadership, engages volunteers, and involves students.								

CHAPTER 5 PUBLIC PARTICIPATION

Because the Master Plan should be a reflection of the values and vision of the community, engaging the public was a critical component of the community-wide planning process. Outreach and engagement activities for the Master Plan were designed to:

- Build awareness and promote the community-wide planning process.
- Encourage Township and City citizens to talk about issues of mutual concern and interest.
- Engage citizens and stakeholders about the future of the community.
- Make connections and build partnerships between community stakeholders, non-profits and civic organizations.
- Build awareness about local, state, regional and national issues that impact the community.
- Determine if more detailed information about coastline processes influence coastal land use policy.

The following civic engagement activities were conducted during the community-wide planning effort.

PROJECT WEBSITE

In an effort to raise awareness about the planning project, the consultant team developed an interactive project website (www.resilientmichigan.org/grand_haven.asp). The website provided information about upcoming public meetings, post-meeting notes, draft documents, links to videos and presentations, news articles and an interactive forum. At the conclusion of the planning process, the Township and City Master Plans were placed on their respective websites.

PUBLIC MEETINGS

Over 200 members of the public directly contributed to the Master Plan by participating in the Leadership Summit, Community Action Team Meetings, and a Public Open House.

LEADERSHIP SUMMIT

Nearly 100 people participated in the Leadership Summit, a multi-faceted workshop designed to engage citizens, public officials and community stakeholders with an in-depth discussion about community resilience. During the Summit, experts from the University of Michigan, Michigan State University's Land Policy Institute and the State's Climatologist Office, among others, delivered presentations on how the community could become more resilient to challenges associated with a changing climate, shoreline processes and the dynamic global economy.

Outreach & Civic Engagement

An interactive project website was developed to raise awareness for the master planning effort.



Leadership Summit

During the Leadership Summit, several well-regarded state-wide experts discussed how the community could become more resilient to future climate and economic challenges.



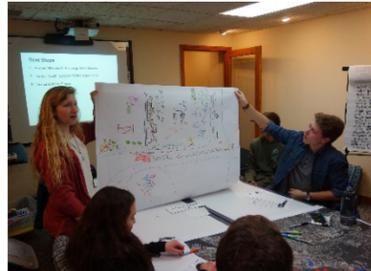
Community Action Team Meetings

Over the course of three meetings, citizens and community stakeholders worked to map community assets and develop goals and objectives for six community topics.



Youth Charrette

Members of the YAC worked to identify community assets and illustrate a vision for the community.



COMMUNITY ACTION TEAM MEETINGS

Over 120 people participated in three successive public meetings to help develop recommendations for the community. Following brief presentations from local stakeholder organizations on specific issues facing the community (e.g. transportation, local economy and families in need), participants were organized into topic specific groups, referred to as *Community Action Teams*.

COMMUNITY ACTION TEAMS

1. Access and Transportation
2. Energy and Economy
3. Neighborhoods and Infrastructure
4. Agriculture and Food
5. Human and Social Systems
6. Parks and Natural Systems

Over the course of the three meetings, participants of the six Community Action Teams (CAT) worked to identify and map assets and threats pertaining to their topic as well as develop specific goals and objectives. The results of these meetings helped create the goals and objectives outlined in Chapter 4.

PUBLIC OPEN HOUSE (scheduled for Oct. 20th)

COMMUNITY OUTREACH

KEY PERSON AND GROUP INTERVIEWS

The consultant team met with staff members from different community organizations such as Harbor Transit, the Grand Haven Area Community Foundation and the Chamber of Commerce, as well as Township staff members and local officials to identify and learn more about land use and community development issues and discuss their vision for the community.

YOUTH ACTIVITIES

In February, about 30 members of the Grand Haven Area Community Foundation Youth Advisory Committee (YAC) participated in a youth charrette. The YAC consists of high-school students from the Tri-Cities area that regularly meet to discuss and assess youth issues. The youth charrette kicked off with an interactive Resilient Bingo game, in which members were asked to identify fellow students who were doing “resilient” things at home (e.g., has ridden a bicycle to run an errand sometime in the last six months). Students then worked to identify and map community assets and illustrate their vision for the community in an activity call Crayon Your Community.

At a second meeting in April, students worked to develop a preferred non-motorized map for the community. Following the meeting, the YAC worked to develop a “Youth Chapter” for this Master Plan, which can be found in Chapter 6.

COMMUNITY PARTICIPATION

A wide variety of community stakeholders participated in the *Resilient Grand Haven* planning process. Public meeting attendees and community outreach participants included local citizens, public officials from a number of local units of government, planning commissioners, municipal staff members, and representatives from the following organizations:

- Grand Haven Area Community Foundation
- Grand Haven Chamber of Commerce
- Harbor Transit
- Hesselsweet Architects
- Loutit District Library
- Covenant Life Church
- Lakeshore Environmental, Inc.
- St. Patrick Church
- Lakeshore Nonprofit Alliance
- Human Services Coordinating Council
- Ottawa County Parks Commission
- GEI Consultants, Inc.
- Brilliance Publishing
- Hofma Park Commission
- Northwest Ottawa Recreation Authority
- Ottawa Conservation District
- Friends of Grand Haven Township Parks
- Tri-Cities Area Habitat for Humanity
- Grand Haven Main Street DDA
- Alliance for the Great Lakes
- Old Things, LLC
- Grand Haven Area Public Schools
- Michigan State University Extension
- David C. Bos Homes
- West Michigan Environmental Action Council
- Southside Neighborhood Association
- West Michigan Sustainable Business Forum
- Buster Mathis Foundation
- Financial Empowerment Center
- Four Pointes Area Agency on Aging
- North Ottawa Community Health
- Center for Women in Transition

CHAPTER 6. THE FUTURE OF GRAND HAVEN – A YOUTH PERSPECTIVE

In an effort to better understand the values and vision for the community of young people in the Grand Haven community, the consultant team worked closely with the Youth Advisory Committee (YAC). Organized as a formal program within the Grand Haven Area Community Foundation, the YAC consists of high-school students from the Tri-Cities area that regularly meet to talk about and think through youth issues. In February, about 30 YAC members participated in a “youth charrette” in which students were asked to identify and map community assets and illustrate their vision for the community in an activity called *Crayon your Community*. In April, the consultant team worked with YAC members to develop a preferred non-motorized map for the greater Grand Haven Community. Following these hands-on activities, a handful of YAC members were tasked to summarize and write - in their own words - the results of the planning activities for this chapter of the Master Plan.

YOUTH DEMOGRAPHIC OVERVIEW:

The population of 15 - 19 year olds in Grand Haven Charter Township and the City of Grand Haven 2010 was just over 1,600. However, between 2000 and 2010 the population of the youth in this age range decreased by 25.9% in the City, but increased 12.9% in Grand Haven Charter Township. It is also important to note that the number of households with children under 18 years has decreased by 7.4% in the City of Grand Haven and 0.1% in Grand Haven Charter Township between 2000 and 2010.

The racial makeup of the students in Grand Haven Area Public Schools is relatively Caucasian, which has stayed consistent over the past years, hovering right around 90% since 2010.

Between 2010 and 2015, the number of students in the Grand Haven Area School District increased by 4.6% (273 students), to 6,203 students. ¹There are a number of students who receive a Reduced Lunch in the GHAPS District. According to the United Way 2012 Community Assessment for Ottawa County 37.8% of students in GHAPS receive free or reduced lunch. There have also been expanded learning opportunities to accommodate for the different preferences in learning styles – Grand Haven Central High School offers a more individualized learning environment, and a smaller class size. Additionally, Grand Haven Cyber School is offered.

Youth Charrette

YAC members work together to identify and map community assets during the Youth Charrette



YAC Members



¹ Michigan Department of Education



Photo Credit: Ed Post



Photo Credit: Ed Post



Photo Credit: Ed Post



Photo Credit: Ed Post

WHAT WE LOVE ABOUT DOWNTOWN GRAND HAVEN:

THE YOUTH OF GRAND HAVEN LOVE THE FOLLOWING ASPECTS OF OUR DOWNTOWN GRAND HAVEN:

We love the Waterfront area because it connects our downtown area to the Boardwalk and Beaches. We like the accessibility factor of the downtown area and that everything is walkable and in close proximity. This makes it easy for people of all walks of life to enjoy our downtown. We like that our downtown supports privately owned businesses, and that our downtown offers a diverse array of stores. We feel there is something for everyone.

There are great recreational opportunities in the Mulligan's Hollow area – the skate park, YMCA, and the Imagination Station are just a few. We think it is great that our downtown area supports a variety of festivals and activities. These help to draw diverse crowds of people to our community – especially our downtown area. We enjoy having a Farmer's Market connected to our Boardwalk and downtown area. We love the access to organic, fresh, and locally grown produce. We would love to see this Market continue to grow and expand.

WHAT WE LOVE ABOUT THE GRAND HAVEN COMMUNITY:

THE YOUTH OF GRAND HAVEN LOVE THE FOLLOWING ASPECTS OF THE GRAND HAVEN COMMUNITY:

We are very fortunate to have a great park system that provides us with access to several local parks and nature centers (Rosy Mound, Kirk Park, Hofma Park, and Harbor Island). We are also lucky to have a wide variety of recreational opportunities in our community such as the Rod & Gun Club, various boat launches, kayak launches, sports fields, and other water sport rentals. It is important for our community to be able to take advantage of the great recreation opportunities that are provided to us by our natural resources and landscapes.

We also like the family friendly entertainment options that are available, such as the Grand Haven 9 Movie Theater, and Starlite Lanes. We also like that local businesses support our school system in many ways – with their time, or with monetary support – it is great that they encourage us as students, and invest in our futures.

MODES OF TRANSPORTATION/DIFFICULTIES:

THE GRAND HAVEN YOUTH UTILIZE THE FOLLOWING MODES OF TRANSPORTATION (SOME FOR RECREATION):

We tend to travel via: car, bike, moped, Harbor Transit, skateboards, and by foot. There are other modes of transportation that we use as well. For recreational purposes we utilize: boats, bicycles, skateboards, and the Trolley.

We recognize the following barriers to transportation in our community:

We feel there is incomplete coverage in service with Harbor Transit and the inability to travel in a timely fashion (it does not provide service to all areas of our community). We also notice that in the summer, traffic is often congested and there is a lack of accessible parking spots. This leads us -- the youth and others in our community -- to seek other modes of transportation in the summer months.

We would like to see the following expanded:

We would like to see the Non-Motorized Trail Networks expanded throughout the Grand Haven community in order for non-motorized modes of transportation to be utilized safely. This will also help contribute to the health and well-being of our community members and give us more opportunities to participate in recreation.

We would also like to see increased efficiency with the pick-up, and delivery, times of Harbor Transit. Ridership, including other youth in our community, would grow if it was easier to access.

EDUCATIONAL OPPORTUNITIES IN OUR COMMUNITY:

THE YOUTH OF GRAND HAVEN WOULD LIKE TO SEE THE FOLLOWING EDUCATIONAL OPPORTUNITIES AND/OR CURRICULUM EXPANSIONS IN OUR SCHOOLS:

We would like to be able to take courses that will prepare us for life beyond high school – either career or college readiness (Home Economics, Financial Planning, etc.). It is also important to expose us to as many career opportunities as possible – this could be done by offering more courses focused on specific career opportunities (engineering, coding, general business, accounting, etc.) and we'd also like to see expanded technical learning opportunities (trade schools, etc.).



Photo Credit: Ed Post



Photo Credit: Kelly Ruffing, IFG Photography



Photo Credit: Ed Post



Photo Credit: Ed Post

POTENTIAL FUTURE AMENITIES FOR GRAND HAVEN:

THE YOUTH OF GRAND HAVEN WOULD LIKE TO LIVE IN AREAS THAT HAVE THE FOLLOWING:

We would like to live in an area that has more diversity and cultural opportunities for us to participate in. We'd like to be involved in creative opportunities through art, music, etc. that would be available in our community. We would like to live in an area that gives us the opportunity for an urban/bigger city feel in the downtown area while also providing the choice of living in more spacious areas. For this, we would need reliable, and easily accessible, public transportation.

In our future communities we will also be looking for a family friendly environment. A community that will provide and support good school systems, good childcare, and a high quality healthcare system. We would love to live in an area with expanded and continued recreational opportunities – the parks system, water access, and beaches.

WHAT WE PLAN TO DO AFTER COLLEGE:

THE YOUTH OF GRAND HAVEN HAVE MANY PLANS FOR LIFE AFTER COLLEGE INCLUDING:

We would like jobs in the following fields: Medical, Education, Financial, Public Relations, Automotive/Engineering, Social Work, and Technology. We would like to live in apartments, loft, single-family homes (in subdivisions), and single-family homes that are within walking distance to the downtown area.

We see Grand Haven as a great place to raise a family and would eventually like to return to the area. When we return to the area we would like to live in Grand Haven Township, the downtown area, or on waterfront property. We would also like to work in the downtown area, for major companies that are well-established in the area, or those that have recently relocated to provide jobs that are relevant to our experiences and provide great value to Grand Haven.

The following is a list of all members of the Youth Advisory Council at the Grand Haven Area Community Foundation who contributed to the ideas and concepts mentioned in this chapter: Max Anthes, Sophia Barron, Sydney Borchers, Tommy Clover, Gabby Coates, Jack Costello, Hannah Dillree, Sydney Fritz, Geoff Gabala, Abbi Garrison, Adam Greer, Leah Hoffer, Landon Hudson, Kaden Kar, Connor Kippe, Olivia Kuhn, Anish Mandala, Ryan Montgomery, Chase Palmer, Alli Pennington, Michala Ringquist, Ellie Scholtz, Lukas Steffel, Brant Verlinde, and YAC Advisor; Lauren Grevel.



Photo Credit: Ed Post

CHAPTER 7. FUTURE LAND USE AND ZONING PLAN

The Future Land Use Plan depicts the preferred but generalized composition of future land uses for Grand Haven Township. The Future Land Use Plan is the general framework upon which land use and policy decisions for Grand Haven Township will be guided for the next 20 to 25 years. The Future Land Use Plan was developed after careful consideration of several dynamic factors, including: existing land use, future development plans, community services, environmental features and a built-out analysis.

According to Section 2(d) of the Michigan Planning Enabling Act, PA 33 of 2008, the Master Plan shall include a “Zoning Plan” - depicting the various zoning districts and their uses, as well as standards for height, bulk, location and the use of buildings and premises. The Zoning Plan serves as the basis for the zoning ordinance. Zoning recommendations - noted, “Corresponding Zoning District” - for the Township are included in this chapter, within the description of each Future Land Use.

RELATIONSHIP BETWEEN THE MASTER PLAN AND ZONING PLAN

The Master Plan describes the vision, goals and objectives for the Township. The Zoning Plan is based upon the Master Plan and is intended to guide in the development of the zoning ordinance. The zoning ordinance is the primary implementation tool for the future development of Grand Haven Township.

There are two key elements to a Future Land Use Plan

Future Land Use Map. The Future Land Use Map (Map 7.1) designates specific land uses that are to occur on certain parcels or areas of the Township.

Future Land Use Text. The Future Land Use text provides the written support for the map regarding the purposes and intent of the plan, as well as strategies for plan implementation.

The Township should continue to develop as a place with quality residential neighborhoods, natural beauty, and limited commercial and industrial development. To ensure that the Township’s desirable qualities are maintained, policies of limiting continued and expansive residential growth, as well as limiting commercial and industrial development to areas designated in the plan, are strongly supported. This plan bases many of its policies on the 2009 Master Land Use Plan. A foundation for the success of that plan has been the policy of “balanced residential development”, which still remains a critical component. The goal of balanced residential development is to protect rural, agricultural, and environmentally sensitive land from untimely or inappropriate residential development. In support of such a goal a two-pronged strategy is recommended:

- Encourage residential development in those areas adequately served by infrastructure, including paved roads, natural gas, municipal water, and sanitary sewers.
- Employ zoning regulations, in conjunction with the Future Land Use Plan, to prevent residential development from occurring in areas designated as Agricultural Preservation.

While commercial and industrial uses are critical for the economic health of any community, an expansive amount of such land uses would have a significant impact on the character of Grand Haven Township. However, such expansion, especially in areas where dense commercial and industrial uses already exist may be necessary to attract new industries and expand the Township's tax base.

This balance weighs the community's current character against opportunities for future economic growth and development. Consequently, the Plan supports an appropriate amount of land available for both commercial and industrial uses. These land uses are strategically clustered on the US-31, M-45 and Robbins Road corridors. These concentrations focus development activity in locations that are well served by roads and utilities, and result in separating additional traffic and nuisances from the Township's residential neighborhoods. In addition, concentrating such activities helps support the concept of mixed land uses. Clustering commercial activities closer to higher concentrations of development, the residential neighborhoods they support, and employment uses benefit from nearby shopping, restaurants and other personal services.

FUTURE LAND USE CLASSIFICATIONS

AGRICULTURAL PRESERVATION

Intended Land Uses

This designation describes areas of the Township that consist of agricultural and agri-business uses such as blueberry and Christmas tree farms, dairies, commercial nurseries, and other such farm-related uses. However, it also includes large vacant properties, fallow fields, and woodlots that contribute to the rural character of certain areas of the Township.

Despite population growth in Grand Haven Township, agri-business remains a significant activity, particularly those lands deemed valuable for specialty farms, such as for blueberry production. While a home that is subordinate to an agricultural use conducted on a property would be allowed, this classification is not intended for residential development. In fact, the creation of residential lots through land divisions or new residential development are strongly discouraged given the lack of appropriate infrastructure and the large inventory of pre-approved residential lots and units located elsewhere in the Township.

Properties identified as Agricultural Preservation on the Future land Use Map that are not currently zoned Agricultural, but meet its criteria, should be allowed to downzone to Agricultural, or be used for agricultural purposes whenever the opportunity arises.

Corresponding Zoning District

Land uses that are allowed in the Agricultural zoning district should correspond to the Agricultural Preservation land use designation and require a 20 acre minimum lot size. This will ensure that agricultural and rural lands are not subdivided into small parcels that affect their ability to maintain adequate, contiguous areas for farm land and the preservation of rural character.

General Location

Agricultural Preservation land uses are primarily located south of Lincoln Street (east of US-31) and south of Buchanan Street (west of US-31).

RURAL RESIDENTIAL**Intended Land Uses**

Areas planned for Rural Residential are characterized by single-family homes on lots that range from 1 to 10 acres. This “rural development” pattern is typically integrated with or adjacent to agricultural activities and homes are often located very far apart. Unchecked, the indiscriminate application of this type of development can lead to an early or inappropriate transition of agricultural/rural land uses to a sprawling suburban residential development pattern. Therefore, this classification should be applied cautiously. The transition to Rural Residential should be guided by the availability of public infrastructure. For parcels smaller than ten acres this means requiring direct access to a paved public roadway.

Corresponding Zoning Districts

Rural Preserve (RP) and the Rural Residential (RR) zoning districts correspond to areas planned for Rural Residential. These two zoning districts should respectively require 10 acre and 45,000 square foot minimum lot sizes. The primary purpose for the RP zoning district is to preserve large areas of rural land from premature development; therefore, parcels ten acres or greater that are designated Rural Residential and are currently zoned RR, or more intensely, should be rezoned to RP.

General Location

Small pockets of Rural Residential are found throughout the Township; primarily near areas designated Agricultural Preservation. Rural Residential areas are so designated because of existing patterns of this type of land use. Specifically, most existing one acre or greater lots either contain a single-family home, or they are vacant but are too small to subdivide or develop as a Planned Unit Development. Therefore, to avoid an inappropriate transition from agricultural/rural land to residential sprawl development the plan limits its application.

LOW DENSITY RESIDENTIAL**Intended Land Uses**

When served by adequate public infrastructure, Low Density Residential areas are appropriate places for future residential development. The minimum infrastructure requirements include natural gas, municipal water and sewer (if available within 2,700 feet of the edge of the property), and direct access to a paved public roadway. However, additional residential growth in the Township, even in areas master-planned for such uses, must be carefully evaluated and should be permitted only where there is a demonstrated need.

To promote high quality development, Planned Unit Development (PUDs) or Open Space Cluster requirements should apply to all future development in Low Density Residential designated areas. While these development options may allow increased residential densities, they also promote innovative design techniques (e.g. open space preservation, public amenities, and mixed housing and land use types) which are supported by this Master Plan.

Corresponding Zoning Districts

The Low Density Residential District and the Residential PUD should accommodate those land uses in Low Density Residential category. Specifically, the minimum lot size should be 25,000 square feet, or in the case of a PUD, it should be used to establish a base density that is appropriate for the area.

General Location

This category includes areas of the Township that currently contain low density residential land uses and those that are appropriate for residential growth because they either are, or may be served by necessary public infrastructure. Included are existing low density residential areas, such as along 156th Avenue between Winans Street and Pierce Street, and along Hiawatha Drive and other areas in the Township that are suitable for such future growth such as properties in the southwest quadrant and north of Lincoln Street.

MEDIUM DENSITY RESIDENTIAL

Intended Land Uses

Medium Density Residential accommodates both single and two-family residences on lot sizes ranging from between 13,000 square feet to 15,000 square feet for single family residences, and 26,000 for two-family residences. However, individual lot sizes within a Planned Unit or Open Space Development may be smaller provided that the overall density of the development does not exceed the appropriate density levels of the underlying zoning district and surrounding area, as determined by the Planning Commission. This wide range of housing and residential densities provides the well balanced, but diverse pattern of land uses the Master Plan encourages. However, any future residential growth in the Township, even in areas master-planned for such uses, must be carefully evaluated and allowed only where there is a demonstrated need.

The minimum infrastructure requirements for this category include natural gas, municipal water and sewer, and direct access to a paved public roadway. For lower density residential developments, the provision of municipal sewer should only be required where it is available within 2,700 feet of a property.

To promote high quality development, Planned Unit Development (PUDs) or Open Space Cluster requirements should apply to all future development in Medium Density Residential areas. In addition,

two-family residences are preferred to locate in areas planned for High Density Residential rather than Medium Density Residential. However, new residential developments that include two-family residences may be considered on lands planned for Medium Density Residential if approved as a Planned Unit Development in order to provide the Township with an opportunity to require high standards of site layout, architectural design, and construction quality.

Corresponding Zoning Districts

The R-1 and R-2 single family residential zoning districts, and the Residential PUD zoning district should correspond to the Medium Density Residential category. The application of a PUD is strongly recommended above all else whenever a rezoning is considered.

General Location

Generally speaking, most existing, developed neighborhoods, subdivisions, and lots in the Township have been designated Medium Density Residential. They are mainly located in the northeast quadrant of the Township (north of Ferris Street), and near the lakeshore (along Lakeshore Drive). These neighborhoods share the high quality residential character that is held in such high regard by Township residents. There are also a few pockets of vacant (or mostly vacant) land so designated that could potentially be considered for future development.

HIGH DENSITY RESIDENTIAL

Intended Land Use

High Density Residential land uses include a variety of housing types at a density greater than that for a typical Township neighborhood. These residential land uses may include duplexes, apartments, multi-unit condominiums, senior housing, and manufactured home parks. Since these are more intense land uses they should only be allowed if a property is well served by public infrastructure including municipal water and sanitary sewer, and it has direct access to a paved public road.

Corresponding Zoning Districts

The R-3, R-3.5, R-4, R-5 multi-family residential zoning districts, and the Residential PUD zoning district should correspond to the areas designated High Density Residential on the Future Land Use Map. The application of a PUD should also be strongly encouraged whenever a rezoning is considered in order to provide the Township with an opportunity to require high standards of site layout, architectural design, and construction quality. This applies particularly to cases where rezonings are proposed for the purpose of constructing duplexes.

General Location

Existing High Density Residential designated areas include the Grand Haven Club PUD, Timberview Apartments PUD, Riverhaven Village, and the area flanked by numerous four-plexes along Clovernook Drive. The only other vacant land that could be considered for this designation is the southern portion of the Hunters Woods PUD, which was previously approved for apartment buildings.

Other High Density Residential developments (that are inconsistent with the Master Plan) could be considered on a case-by-case basis only where there is a clear demonstrated need, and where adequate public infrastructure exists and surrounding land uses are compatible and would help support a particular land use proposal. For example, a higher density senior housing development located near shopping and personal services could be considered given a desire to accommodate this type of housing for an aging Township population.

OFFICE/SERVICE

Intended Land Use

Areas planned for Office/Service should allow low-intensity commercial uses such as general office buildings, service professional offices, such as for dentists and medical clinics, financial institutions, and personal service establishments. These land uses are desirable transitions between major thoroughfares, and commercial and residential areas. The minimum infrastructure requirements include service by natural gas, municipal water and sewer, and direct access to a paved public roadway.

Corresponding Zoning Districts

The SP-Service Professional and Commercial PUD zoning districts correspond to the Office/Service classification. Any future development proposals that are significant in scale or scope should be considered as Planned Unit Developments.

General Location

Areas designated Office/Service are limited in the Township and are mainly located where such uses already exist, such as along the Robbins Road corridor. This corridor has been subject to more detailed planning and is included in the Appendix. Other existing and planned Office/Service areas are found along 168th Avenue just south of Lincoln Street (the Generation Care Health facility), along the south side of Ferris Street just west of US-31, and along 168th Avenue just south of Johnson Street.

COMMERCIAL

Intended Land Use

The Commercial designation provides for the continuation, redevelopment and new construction of a variety of commercial uses in the Township. These include retail businesses, hotels/motels, restaurants, theaters, shopping centers, as well as most of the uses in the Office/Service land use classification.

Commercial land uses that are appropriately located, high quality, and that further the intent and purpose of this Master Plan are very important for the continued economic prosperity and quality of life in Grand Haven Township. They are also an element of a well balanced but diverse pattern of land uses encouraged by this Master Plan.

The minimum infrastructure requirements for commercial development include service by natural gas, municipal water and sewer, and direct access to a paved public roadway.

Corresponding Zoning Districts

The C-1 Commercial, SP-Service Professional, and Commercial PUD zoning districts should correspond with the Commercial land use designation. Any future Commercial development proposals that are significant in scale or scope should be considered as Planned Unit Developments.

General Location

The major areas designated Commercial are located adjacent to the US-31 and Robbins Road corridors. Both locations are appropriate for commercial activity because of existing land uses and available infrastructure; they can also accommodate higher traffic volumes, provide relatively easy access, and offer the visibility that is desirable in a suburban setting.

A primary goal for the US-31 corridor is to keep businesses and the environment they inhabit attractive and unobtrusive. This concept is buttressed by the Township's Overlay Zoning District. Several large areas along US-31 are also planned for non-commercial uses so as to preserve rural character. Commercial land uses are located in several areas of the Township but the majority are along US-31. These have been clustered in three primary commercial "nodes" and include:

- US-31/M-45 intersection (including a large area just south of Buchanan Street)
- US-31/Ferris Street intersection (extending north to Johnson and south to Lincoln)
- US-31/Robbins Road intersection (extending south to Hayes Street)

There are also a few examples of small scale, neighborhood serving convenience centers, such as the Wesco on Mercury Drive.

GENERAL INDUSTRIAL

Intended Land Use

General Industrial land uses include a wide range of industrial-related operations such as manufacturing, assembly, fabrication, millwork, wholesale businesses, warehousing, and research and development facilities. They may also include more intense commercial uses that have potential to impact properties beyond their boundaries.

These land uses are also very important for the continued economic prosperity and quality of life in Grand Haven Township. Quality manufacturing jobs are highly sought after across the country and successful manufacturing operations can provide numerous benefits to a community, such as jobs and tax revenues. For those reasons, high-quality industrial land uses that further the intent and purpose

of this Master Plan should be encouraged.

The minimum infrastructure requirements include service by natural gas, municipal water and sewer, and direct access to a paved public roadway

Corresponding Zoning Districts

The I-1 Industrial and Industrial PUD zoning districts should correspond with the General Industrial land use designation. Any future development proposals that are significant in scale or scope should be considered as Planned Unit Developments. Properties that are currently zoned I-1 but that are inconsistent with the Master Plan should be rezoned to a more appropriate designation.

General Location

There are currently many industrial uses in the Township and they are a vital part of the region's economy. However, due to the intensive nature of industrial activities, the area planned for General Industrial is somewhat limited. In fact, most of the areas are already developed, such as along 172nd Avenue (between Comstock Street and Johnson Street) and Hayes Street (between 172nd Avenue and 168th Avenue), the property south of Lincoln Street (west of US-31), and the properties south of Lake Michigan Drive (west of US-31). There is also a small section of General Industrial planned along the west side of US-31 near Hayes Street where Heyboer Excavating operates.

EXTRACTION

Intended Land Use

Extraction is essentially a sub-category of the General Industrial classification and recognizes the continued existence of the sole sand mining operation in the Township, Standard Sand.

Corresponding Zoning Districts

Zoning districts that permit the removal and processing of natural resources, either by right or as a special land use, should correspond with the Extraction land use classification. However, the property that Standard Sand occupies is currently zoned R-1 Residential and should not be zoned otherwise. This will allow the property to someday revert back to a residential use, which is consistent with the surrounding properties.

General Location

This land use classification is tied directly to the Standard Sand mining operation, located west side Lakeshore Drive, south of Hayes Street and as such is the only area master planned for Extraction.

PUBLIC/QUASI-PUBLIC**Intended Land Uses**

This designation accommodates schools, government facilities, public utilities, parks, natural areas, and public recreational uses. It also recognizes churches, private recreational uses, and other community-oriented activities located on privately-owned land. These uses positively contribute to the quality of life for Township residents and businesses. They foster interaction between neighbors and are important for the future stability of the community.

Corresponding Zoning Districts

All zoning districts that permit these types of uses either by right or as a special land use correspond with Public/Quasi-Public land use designation. Specifically, schools, parks, recreation areas, and churches are permitted in most of the Township's residential zoning districts as special land uses. Cemeteries are permitted in the Rural Residential district by right, and the C-1 district as a special land use. Public and private campgrounds are allowed in the AG, R-1, and C-1 districts as a special land use. Municipal owned/operated structures are permitted in most residential districts, as are golf courses. Other land uses such as utility infrastructure typically would require a special land use permit.

General Location

Public/Quasi Public land uses can be found throughout Grand Haven Township and are closely tied to neighborhoods and conveniently located for residents. Because of the importance of these land uses, the Future Land Use Plan accounts for all such existing uses in the Township. In addition, future expansion of the Hofma Preserve has been planned for, as have the waterfront access improvements recommended in the 2007-2011 Community Recreation Plan.

ZONING REGULATIONS**AGRICULTURAL DISTRICTS**

The agricultural zoning districts in Grand Haven Township are:

- AG - Agricultural District
- RP - Rural Preserve

The primary purpose of the Agricultural District is to provide for farming, dairy farming, forestry operations and other rural activities. The primary purpose of the Rural Preserve District is to provide a buffer between the agricultural uses and residential uses.

RESIDENTIAL DISTRICTS

The residential zoning districts in Grand Haven Township are:

- RR - Rural Residential District
- LDR - Low Density Residential District
- R-1 - Single Family Residential District
- R-2 - Single Family Residential District
- R-3 - Two Family Residential District
- R-3.5 - Restricted Multiple Family Residential District
- R-4 - Multiple Family Residential District
- R-5 - Manufactured Mobile Home Park Residential District

The main purpose of these zoning districts is to provide a variety of housing options within the Township. The Rural Residential District is intended to provide for large-tract housing developments that co-exist with agricultural activities on open areas in the Township. The Low Density Residential District is designed to support new residential development between large areas of rural residential properties and medium density development. The R-1 and R-2 Single-Family Residential Districts are intended to provide for single-family neighborhoods. The R-3 and R 3.5 Two-Family Districts are intended provide for a higher density of single-family and multi-family neighborhoods. The R-4 Multiple Family Residential District is intended to provide high-density residential developments as well as nursing homes and other adult care or medical facilities. The R-5 Manufactured Mobile Home Park Residential District is dedicated to providing for manufactured housing.

COMMERCIAL DISTRICTS

The commercial zoning districts in Grand Haven Township are:

- SP - Service/Professional District
- C-1 - Commercial District

The primary purpose of these zoning districts is to provide for a variety of commercial and services uses that serve local residents and residents from throughout the region. The SP Service/Professional District is designed to accommodate uses such as offices, banks and other personnel service in areas adjacent to neighborhoods. The C-1 Commercial District is intended to provide for retail operations and other commercial services.

INDUSTRIAL DISTRICTS

The industrial zoning districts in Grand Haven Township are:

- I-1 - Service/Professional District
- I-1A - Commercial District

The primary purpose of these zoning districts is to provide for manufacturing, assembly and fabricating activities within the Township.

PUD DISTRICT

The PUD District is designed to provide for unique developments that substantially benefit both the users of the project and the community. In areas where such benefits would be unfeasible or unlikely under the other zoning districts.

CHAPTER 8. PEOPLE AND SOCIAL SYSTEMS

The following chapter uses data from various sources to describe the Township's population. In many cases, recent Census data was compared to the Census data from 1990 and 2000 to identify demographic trends. Beyond the Census, this analysis also uses other data sources, like population projections from the West Michigan Regional Planning Commission.

SUMMARY OF DEMOGRAPHIC TRENDS

GRAND HAVEN CHARTER TOWNSHIP CONTINUES TO GROW. In 2010, there were 15,178 people living in Grand Haven Charter Township, an increase of 1,900 people from 2000. The population is anticipated to increase to nearly 23,000 people by 2030.

THE PACE OF GROWTH IN GRAND HAVEN CHARTER TOWNSHIP HAS SLOWED DOWN. Between 1970 and 2000, population within the Township grew by approximately 30% each decade. Between 2000 and 2010, population in the Township increased by just 14.3%, about half its 10 year pace over the previous 30 years.

A GREATER PERCENTAGE OF GRAND HAVEN CHARTER TOWNSHIP IS OVER 50 YEARS OLD. Between 2000 and 2010, the number and proportion of people 50 years old or older increased more than any other age segment.

GRAND HAVEN CHARTER TOWNSHIP HAS A SMALL YOUNG ADULT POPULATION. In 2010, the proportion of Township residents aged 20 to 34 was 13%, compared to 20% in Ottawa County and 18% for the State of Michigan.

GRAND HAVEN CHARTER TOWNSHIP IS PREDOMINATELY WHITE. Although the number of non-white residents increased between 2000 and 2010, they still make up only about 6% of the overall population.

HOUSEHOLD TYPES ARE CHANGING. In line with national trends, the Township's proportion of two-parent households with children continues to decrease from 1990 levels, whereas the proportion of married couples without children and people living alone has increased.

EDUCATIONAL ATTAINMENT RATES IN GRAND HAVEN CHARTER TOWNSHIP ARE HIGH. The proportion of residents with a Bachelor's Degree or higher is 38.3%, compared to 30.9% for Ottawa County and 25.9% for the State of Michigan.

POVERTY RATES ARE INCREASING, ESPECIALLY AMONG YOUTH. The total poverty rate among Township residents increased by 3.6% percent between 2000 and 2010, growing to 5.8%. The proportion of children under 18 living below the poverty level grew from just 1.2% in 2000 to 8.4% in 2010, some 534 children.

POPULATION CHANGE

The overall population in Grand Haven Charter Township in 2010 was 15,178, nearly a 15% increase in total population since 2000. Table 8.1 shows that all of the cities and villages in the Tri-Cities area lost population during this time period, where Grand Haven Charter Township, Spring Lake Township, and Ottawa County overall gained population. Figure 8.1 shows that Grand Haven Charter Township’s percentage of population increase was higher than nearby communities north of the Township.

Grand Haven Charter Township, like many communities along the Lake Michigan coastline, has a substantial seasonal population in addition to the year-round population. This seasonal population is not counted in the total population figures. In 2010, 4.7% of the Township’s housing units were designated as seasonal properties that are used for part of the year. This is discussed more in Chapter 3.

FIGURE 8.1 Regional Population Change.

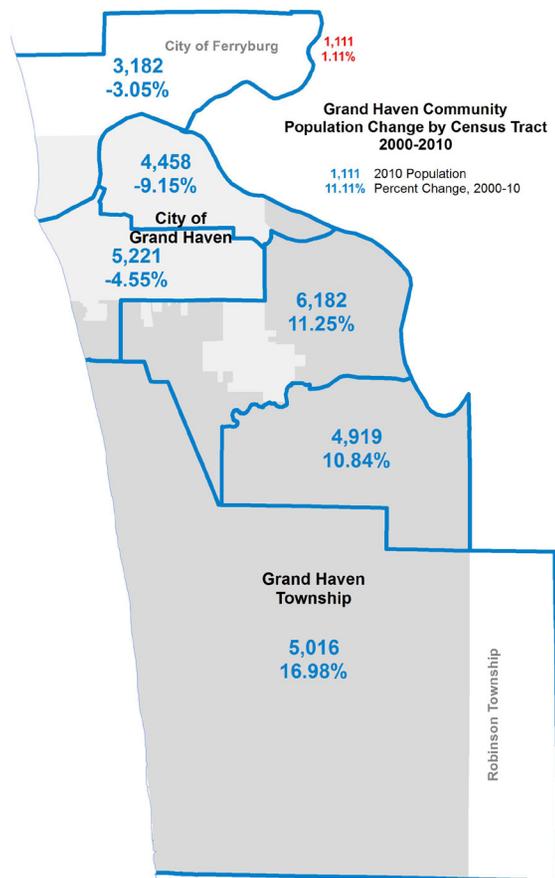


Table 8.1 Population Change, 1970 to 2010

	Population					Change (2000 to 2010)	
	1970	1980	1990	2000	2010	#	%
Grand Haven Township	5,489	7,238	9,710	13,278	15,178	1900	14.3
City of Grand Haven	11,844	11,763	11,951	11,168	10,412	-756	-6.8
Village of Spring Lake	3,034	2,731	2,537	2,514	2,323	-191	-7.6
Spring Lake Township	8,013	9,588	10,751	13,140	14,300	1,160	8.8
City of Ferrysburg	2,196	2,440	2,919	3,040	2,892	-148	-4.9
Ottawa County	128,181	157,174	187,768	238,314	263,801	25,487	10.7

Source: US Census Bureau 1970 to 2010, as compiled by the Northwest Michigan Council of Governments

POPULATION PROJECTIONS

Although there is no way to predict changes in total population with certainty, projection methods can be used to obtain useful estimates. The West Michigan Regional Planning Commission (WMRPC) publishes population projections for Grand Haven Charter Township. According to WMRPC, it is likely the overall population in the Township will continue to increase, at a faster pace than in the last decade, through 2030.

Table 8.2 shows the Township is expected to gain an additional 46.8%, or more than 7,000 residents, between 2010 and 2030. This projection has important implications for redevelopment, housing, service delivery and the Township’s operating budget.

Table 8.2 Projected Population, 2015 to 2030

	Actual Population		Projected Population			% Change
	2010	2015	2020	2025	2030	2010 to 2030
Grand Haven Township	15,178	16,953	18,728	20,502	22,277	46.8
City of Grand Haven	10,412	10,136	9,859	9,583	9,306	-10.6
Ottawa County	263,801	290,236	316,671	343,106	369,541	40.1

Source: US Census 2010, West Michigan Regional Planning Commission

Population Projections

A growing population could increase demand for public services, infrastructure, and utilities. Population increases may also increase pressure for the conversion of agricultural land into other uses.

AGE PROFILE

The age distribution of the Township’s population is an important factor in identifying social, economic, and public service needs. Using U.S. Census Bureau statistics, the Township’s population is characterized into eight life stages, described below. Table 2.3, on the next page, summarizes the distribution of these stages from 2000 to 2010.

LIFE STAGES

PRESCHOOL

This age range includes babies and children under 5 years old. There are fewer residents in this life stage in 2010 than there were in 2000, and this age range comprises a smaller share of the total population in 2010 than it did in 2000.

ELEMENTARY

This age range includes children ages 5 to 14. There are more residents in this life stage in 2010 than there were in 2000, which may hold implications for schools, recreation, and other services for young people in the future.

SECONDARY

This age range includes teenagers age 15 to 19. There are more residents in this life stage in 2010 than there were in 2000, which could mean demand for schools, recreation, and other services for young people is increasing.

COLLEGE

This age range includes youth aged 20 to 24. There are more residents in this life stage in 2010 than there were in 2000. This life stage also comprised a greater share of the population in 2010 than it did in 2000.

YOUNG FAMILY

This age range includes residents aged 25 to 34. This is one of three life stage groups that lost population between 2000 and 2010, which may hold implications for transportation infrastructure, housing, and economic centers.

ESTABLISHED FAMILY

This age range includes residents aged 35 to 49. This life stage group also lost population between 2000 and 2010, which may hold implications for transportation infrastructure, housing, and economic centers. Despite losing population in the last ten years, this life stage is the largest in the Township.

MATURE FAMILY

This age range includes residents aged 50 to 64. There are many more residents in this life stage in 2010 than there were in 2000. This may mean that residents are aging in place or that others in this life stage have relocated to Grand Haven Charter Township.

RETIRED

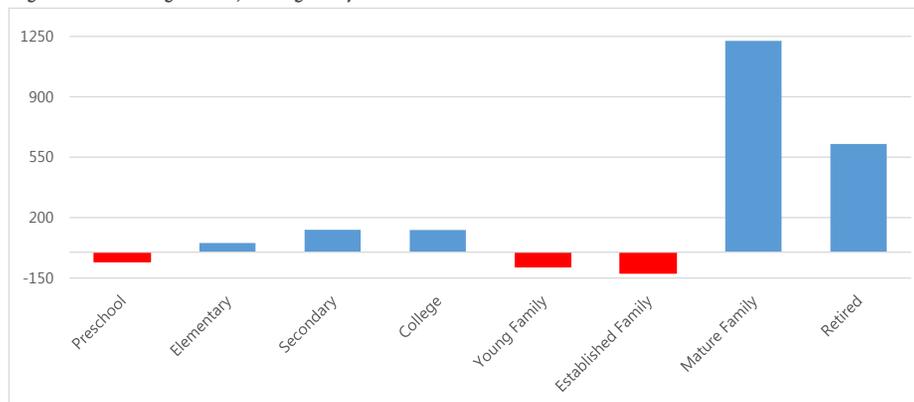
This age range includes residents over age 65. This life stage also gained population from 2000 to 2010. A growing retired population has implications for housing, transportation, and social services.

Table 8.3 Life Stages, 2000 to 2010

Life Stage	2000		2010	
	#	% of total	#	% of total
Preschool	977	7.4	922	6.1
Elementary	2,373	17.9	2,426	16
Secondary	1009	7.6	1139	7.5
College	560	4.2	688	4.5
Young Family	1,483	11.2	1,397	9.2
Established Family	3,620	27.3	3,499	23.1
Mature Family	2,163	16.3	3,387	22.3
Retired	1,093	8.2	1,720	11.3

Source: US Census 2000, 2010.

Figure 8.2 Change in Life Stage Population, 2000 to 2010



Overall, the Established Family Group is the largest in the Township, both in number of residents (3,499) and share of the total population (23.1%). In 2000, the Established Family Group had a slightly higher population and was the most predominate. Figure 8.2 above illustrates that between 2000 and 2010, the Township gained population in all but three life stages, with the Mature Family and Retired life stages growing dramatically. This trend suggests that residents near or in retirement, with fewer school-aged children, are staying or relocating to the Township.

RACE AND ETHNICITY

The population of Grand Haven Charter Township was predominately white (95.8%) in 2010. Just under 3% of the population identified as Hispanic or Latino in the 2010 census (see Table 8.4). Just as the overall population is growing, the Hispanic and Latino population grew by 76%. Asian, American Indian, and Black populations also grew between 2000 and 2010. Still, minorities make up only about 6% of the total population.

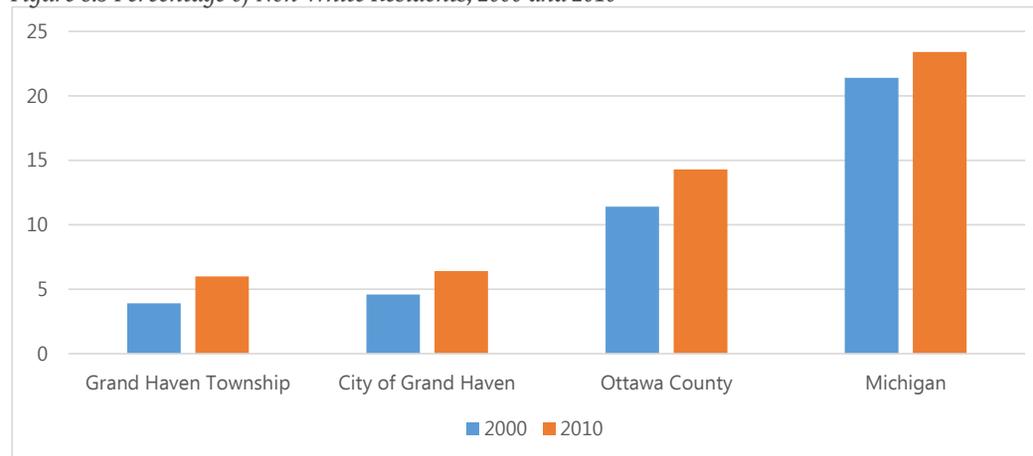
Table 8.4 Racial Composition, 2000 to 2010

Race/Ethnicity	2000		2010	
	#	% of total	#	% of total
White	12,900	97.2	14,263	94.0
Hispanic or Latino	252	1.9	446	2.9
Asian	74	0.6	149	1.0
American Indian	47	0.4	68	0.4
Black	16	0.1	43	0.3
Other, More than One Race	129	1.0	209	1.4

Source: US Census 2000, 2010.

Figure 8.3 shows that the Township has a significantly lower proportion of non-white residents than Michigan and Ottawa County.

Figure 8.3 Percentage of Non-White Residents, 2000 and 2010



Source: US Census 2000, 2010

HOUSEHOLD STRUCTURE

The number and types of households helps characterize the social and economic forces at work in the Township. Table 8.5 shows that between 2000 and 2010, the percentage of two-parent households without children and the proportion of people living alone has increased. While the number of households with children led by single males was not measured in 2000, 122 fit this description in 2010. In general, changes in the Township’s overall household structure are consistent with reported national increases in non-traditional and single-person households.

Table 8.5 Types of Households

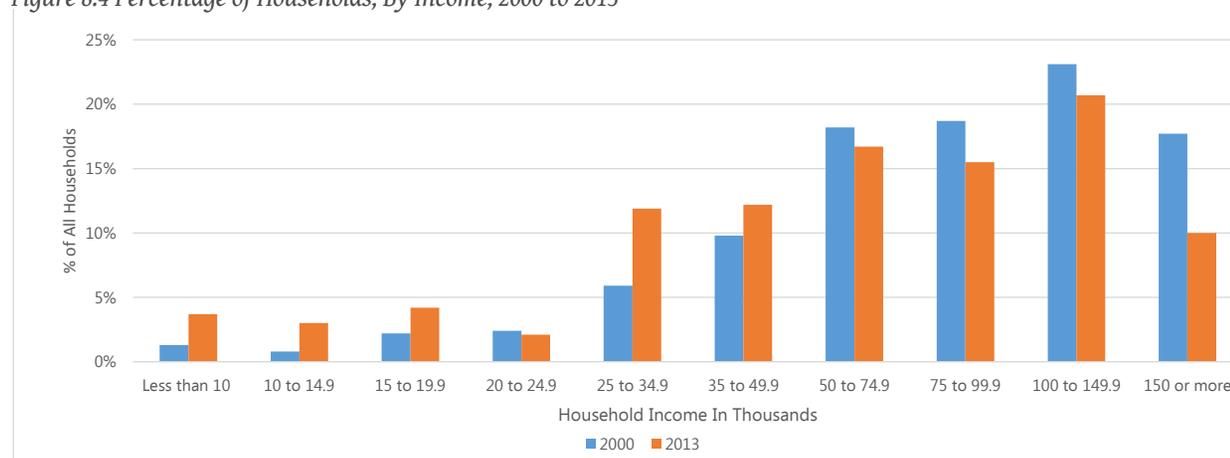
	2000		2010	
	#	% of total households	#	% of total households
Unmarried male, with children	N/A	N/A	122	2.2
Unmarried female, with children	237	5.1	275	5.0
Married couple, no children	1,611	35.0	2,117	38.2
Persons Living Alone Under 65	432	9.4	641	11.6
Persons Living Alone Over 65	205	4.4	315	5.7
Total Number of Households	4,609	100	5,547	100

Source: US Census Bureau, 2000, 2010.

HOUSEHOLD INCOME

Household income is a key measure of the economic condition of a community. Income helps determine how much a household can spend on housing, retail, and local investments. These expenditures and investments directly and indirectly determine the amount of money available for public facilities and services, primarily through property tax revenue collected by Township agencies. Between 2000 and data collected from 2009 to 2013, the median household income in Grand Haven Charter Township increased 8.9% to \$67,908. The percentage of households with income above \$50,000 decreased while

Figure 8.4 Percentage of Households, By Income, 2000 to 2013



Source: US Census Bureau 2000, American Community Survey 2009 to 2013, as compiled by Social Explorer

households with income below \$50,000 tended to increase (see Figure 8.4). In other words, households making incomes under \$50,000 make up a greater share of the population than in 2000. The cause of this change is unknown, but may reflect changes to household incomes as a result of the Great Recession.

EDUCATIONAL ATTAINMENT

Numerous studies have shown that educational attainment is related to an individual’s earning capacity.¹ In other words, people with more education tend to make higher total incomes over their lifetime. A community’s average educational achievement, therefore, can be an indicator of its economic capacity. Table 8.6 shows that, in general, nearly 68% of the Township’s adult population has at least some college education. Table 8.7 shows the median earnings of adults aged 25 and older, by educational attainment. Median earnings increase as educational attainment rises. However, in recent years, median earnings decreased for those over 25 years old with a high school diploma, some college, and a graduate degree or higher.

Table 8.6 Educational Attainment, by Percent of Population 25 Years Old and Over

	2005-2009	2009-2013
Less than High School Diploma	6.4	5.5
High School Diploma	27.3	26.6
Some College	21.3	19.1
Associate’s Degree	9.4	7.5
Bachelor’s Degree	24.9	28.3
Graduate Degree or Higher	10.6	13

Source: American Community Survey 2005-2009, 2009-2013

Table 8.7 Median Earnings by Educational Attainment

	2005-2009	2009-2013
Less than High School Diploma	26,417	27,569
High School Diploma	26,797	25,785
Some College or Associate’s Degree	34,315	32,243
Bachelor’s Degree	54,847	56,569
Graduate Degree or Higher	68,264	63,475

Source: American Community Survey 2005-2009, 2009-2013

Young Professionals

According to a 2013 report from the Detroit Regional Chamber, only about 63% of recent college graduates from Michigan public universities stay in Michigan after they graduate. Of the graduates who stayed, just over 6% moved to the greater Grand Rapids region (including the greater Grand Haven Community).

Of the graduates that stayed, 43% said it was because of Michigan’s recreational activities and 37% said it was because of Michigan’s physical attributes.

The City of Grand Haven, in partnership with Grand Haven Charter Township and other neighboring communities, should continue to invest in projects that support and expand recreational opportunities and projects that protect the community’s natural resources. In doing so, the community can better position itself to compete for young professionals.

¹ United States Census Bureau, American Community Survey Reports, Education and Synthetic Work-Life Earning Estimates. 2011. <<https://www.census.gov/prod/2011pubs/acs-14.pdf>>

Financial Stability

Poverty is a significantly growing problem throughout Ottawa County.

- More than an 80% increase in total poverty between 2006 and 2012
- 76% increase in child poverty between 2006 and 2012
- Ottawa County is one of only five counties in Michigan that had an increase in childhood poverty above 50%

POVERTY

In general, poverty rates in Ottawa County are increasing. According to the 2012 Ottawa County Community Assessment from the United Way of Ottawa County, poverty rates are growing significantly throughout the county, especially among children. This holds true in Grand Haven Charter Township, where the American Community Survey measured the total poverty rate at 5.8% from 2006 to 2010 and 9.6% in from 2009 to 2013.

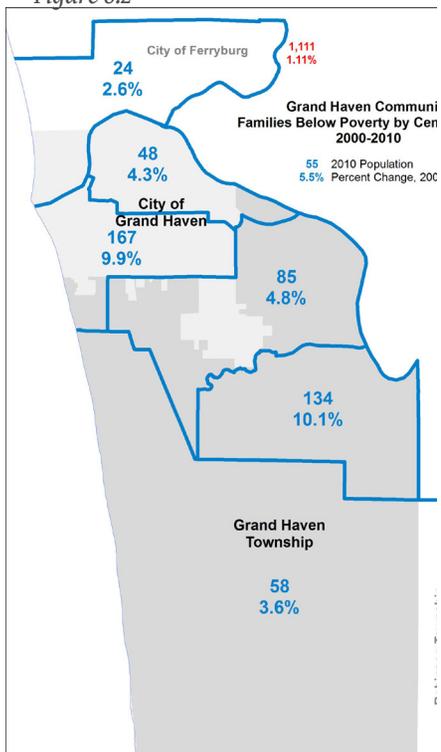
In the Township, poverty rates are growing the fastest among children and those aged 18 to 64. Table 8.7 shows that the number of children in poverty has grown significantly in recent years. While Table 8.7 shows the percentage of total population in poverty, Figure 8.2 shows the majority of the Township is in a block group with a moderate percentage families living in poverty. Compared to other nearby communities, the Township has a moderate to low poverty rate among families.

Table 8.7 Population in Poverty Comparison

	2006 to 2010	2009 to 2013	% Increase
Under 18	346	534	54.3
18 to 64	447	843	88.6
Over 65	67	87	29.9
Total Population	860	1,464	70.2

Source: American Community Survey, 2006-2010, 2009-2013

Figure 8.2



CHAPTER 9. HOUSING

Understanding the types and number of households, the choices households make to own or rent, and the condition of the housing stock are all important elements of a master planning process. The information in this chapter draws from decennial U.S. Census data, American Community Survey 5-year estimates from 2009 to 2013, and building permit data from Grand Haven Charter Township.

HOUSING UNITS AND TENURE

In 2010, there were 6,219 housing units in Grand Haven Township, an increase of nearly 1,200 units from 2000. This boost in housing stock included over 400 additional rental units, causing a 108% increase in residents choosing to rent. From 2000 to 2010, owner-occupied housing units also grew. Table 9.1 also shows that in 2010, about 86% of units were occupied by owners and 14% of units were rented. Nationally, more residents are choosing to rent. A recent report from Harvard's Joint Center for Housing Studies have determined that a nationwide surge in rentership is due both to changing consumer preferences and to economic impacts of the Great Recession.¹

HOUSING VACANCY AND SEASONAL HOUSING

From 2000 to 2010, the number of seasonal units, which are considered vacant by the United States Census, increased by 50 units, about 5% of the total housing stock in the Township. The number of non-seasonal, vacant units increased dramatically. Perhaps due to the Great Recession, nearly 200 additional non-seasonal units were counted as vacant between the 2000 and the 2010 census. This change is summarized in Table 9.1.

Table 9.1 Occupancy and Tenure, 1990 to 2010

	1990		2000		2010	
	#	% of total units	#	% of total units	#	% of total units
Owner-occupied	2936	89	4235	91.9	4766	85.9
Renter-occupied	364	11	374	8.1	781	14.1
Non-seasonal Vacant	100	2.7	191	3.7	380	6.1

Source: U.S. Census Bureau

1. Joint Center for Housing Studies, "America's Rental Housing: Evolving Market and Needs". Cambridge, President and Fellows of Harvard College, 2013.
http://www.jchs.harvard.edu/sites/jchs.harvard.edu/files/jchs_americas_rental_housing_2013_1_0.pdf

HOUSING TYPES

Between 2000 and 2010, the housing stock gained many multi-unit structures. Table 9.2 shows the percentage of housing structures with more than 3 units grew by over 100 units to comprise 7.6% of the housing stock in the Township. This increase is concentrated in large structures with 10 to 19 units per structure. Single-unit structures, most likely single family homes, grew relatively proportionate to the Township overall. While the number of 2-unit properties decreased between 2000 and 2010, the number of properties with 3 or more units increased by 86%.

Table 9.2 Housing Types 2000 to 2010

	2000		2010		Percent Change, 2000 to 2010
	#	%	#	%	%
1 Unit	4,171	84.1	4,973	82.4	16.7
2 Units	112	2.2	91	1.5	-18.8
3 or more Units	136	2.7	253	7.6	86
Mobile Home	357	11	510	8.5	42.9

Source: U.S. Census Bureau

HOUSEHOLD SIZE

Table 9.3 shows the average household size decreased in Grand Haven Township, Ottawa County, and the State of Michigan from 2000 to 2010. This reduction in average household size follows a national trend in which choices like marrying later in life and having fewer children increases the prevalence of smaller households. Additionally, multi-generational households continue to decline in number, further reducing the average household size in the United States. In each of these places, the average household size has stayed constant from 2010 to 2013. In 2013, the average household in Grand Haven Township had 2.7 persons.

Table 9.3 Average Household Size, 2000 to 2013

	2000	2010	2013
Grand Haven Township	2.9	2.7	2.7
Ottawa County	2.8	2.7	2.7
State of Michigan	2.6	2.5	2.5

Source: U.S. Census Bureau, American Community Survey 5 -Year Estimates

HOUSING VALUE AND GROWTH

The value of housing in Grand Haven Township continues to rise. Table 9.4 shows the median value of an owner-occupied home has risen substantially in the Township since 1990. Home values in Ottawa County grew by 18.9% from 2000 to 2013, while Grand Haven Township values grew slightly less at 15.1%. The values of owner-occupied housing in the Township and Ottawa County increased more than the State overall.

Table 9.4 Median Household Value

	1990	2000	2013	% increase, 2000 to 2013
Grand Haven Township	77,600	149,900	172,500	15.1%
Ottawa County	74,600	128,800	153,200	18.9%
State of Michigan	60,600	110,300	121,700	10.3%

Source: U.S. Census Bureau and American Community Survey 5-year estimates

If value is a measure of demand, building permits issued are a measure of supply. Grand Haven Charter Township records the number of permits issued for rehabilitation and construction of housing and commercial units, and the cost of each project. Though an issued permit may not mean the project was complete, building permit records measure much of the investment occurring in residential and commercial properties. Total building permits issued for new construction are summarized in Table 9.5 and are current through September 2015.

Table 9.5 Total Permits Issued for New Construction, 2008-2015

	2008	2009	2010	2011	2012	2013	2014	2015
Commercial Building	7	3	0	2	5	0	0	3
Single Family Dwelling	32	11	16	37	51	68	68	57
Multi Family Dwelling	0	0	0	0	2	0	0	0

Source: Grand Haven Charter Township

From 2008 to September 2015, 340 building permits for new construction were issued. Nearly 95% of permits were for single family homes. The years 2013 and 2014 are tied for the years with the most permits issued (68 each year), and 2015 may end up being higher (57 permits issued between January and September of 2015).

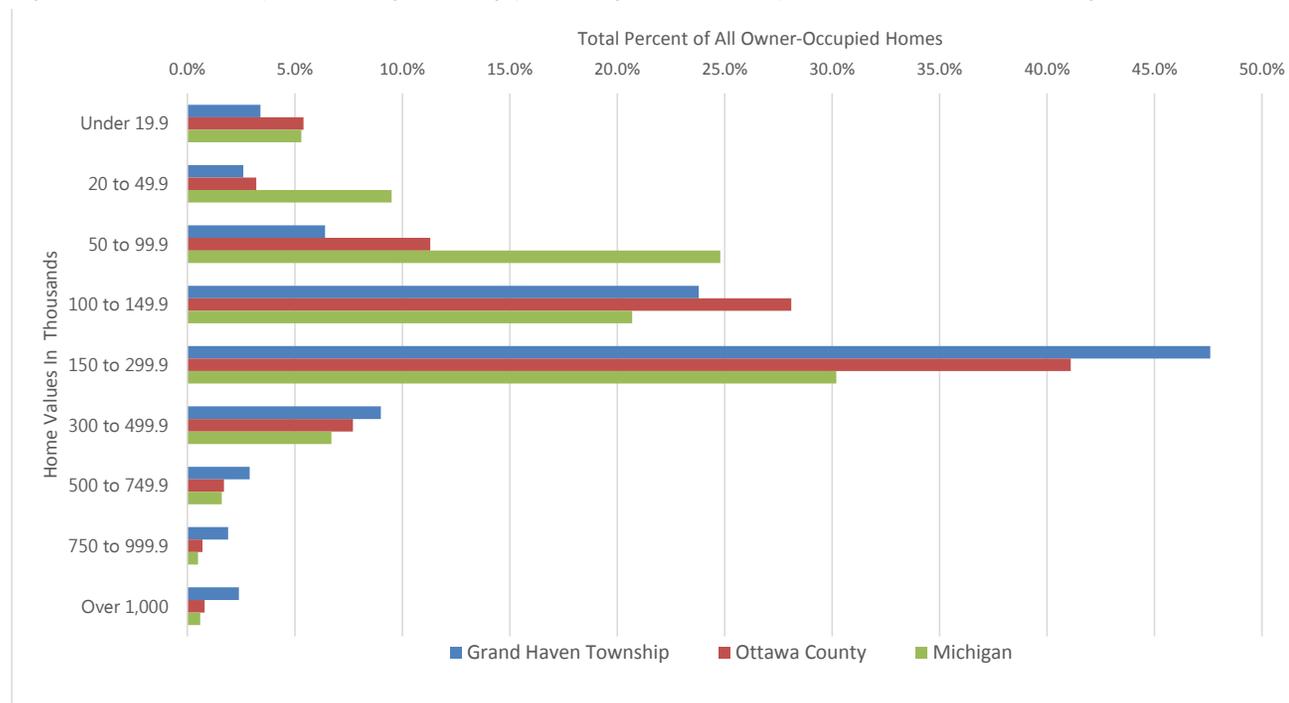
The cost associated with the construction projects averaged 300,000 dollars for a commercial building, 219,000 dollars for a single family dwelling, and 150,000 dollars for a multi family dwelling. Projects in 2015 tend to have a higher value than they have since 2008. The average value in the first three quarters of 2015 for single family dwellings is 248,156 dollars.

HOUSING AFFORDABILITY

Housing affordability is important for both owners and renters. In Grand Haven Township, the median household income is \$69,850 and the median value of an owner-occupied home is \$174,625. This suggests that a household making the median income can afford a home at median value, given national standards that a household should spend no more than 30% of their income on housing costs.

The blue bars in Figure 9.1 shows the percentage of owner-occupied units in each value range in Grand Haven Township, as indicated by the U.S. Census American Community Survey 5-year estimates from 2009 to 2013. When compared to Ottawa County (in red) and Michigan (in green), it is clear that the values of owner-occupied homes in Grand Haven Township are less evenly distributed, with the bulk of homes valued in the middle ranges.

Figure 9.1. Owner-occupied housing value, by percentage of total occupied units in each value range, 2009-2013



Source: American Community Survey 2009-2013 5-year estimates

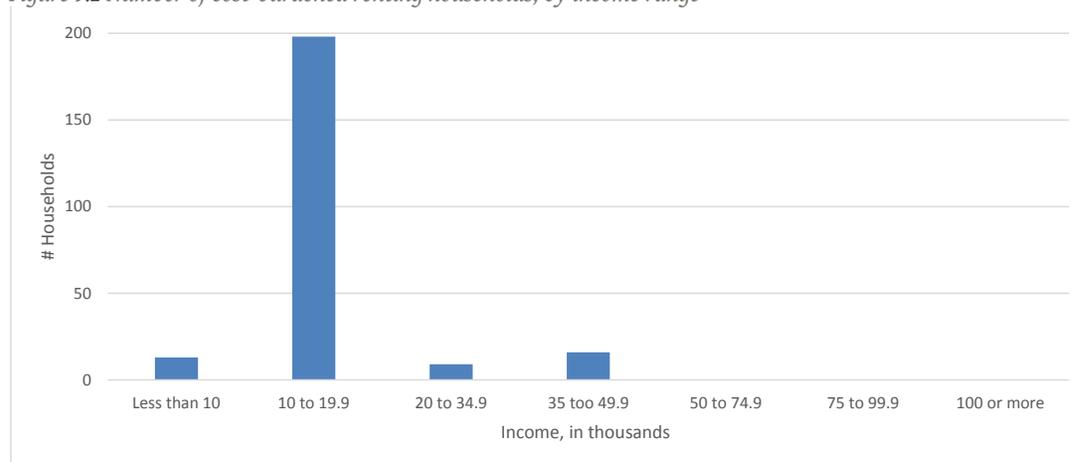
Rental affordability is frequently measured by the percentage of income spent on housing. The Department of Housing and Urban Development suggests that no more than 30% of a renting household’s income should be spent on housing. In 2013, about 280 renting households, or about 1.8% of total population, paid more than 30%

of their income on housing. Figure 9.2 shows that most of these households made between 10,000 and 19,999 dollars in 2013. Of the renting households that spend more than 30% of their income on rent:

- 14 are headed by a resident between 18 to 24 years old
- 97 are headed by a resident between 25 and 34 years old
- 146 are headed by a resident between 35 and 64 years old
- 23 are headed by a resident over 65

This analysis suggests the Township should focus on providing a variety of housing choices for younger singles and families, particularly those making between 10,000 and 20,000 dollars annually.

Figure 9.2 Number of cost-burdened renting households, by income range



Source: American Community Survey 2009-2013 5-year estimates

In 1990, the median gross rent was just 19.6% of household income in Grand Haven Charter Township. In 2000, median gross rent as a percentage of household income grew to 19.9%, just a 1.5% increase. By 2013, this number had grown to 26.8%, a 34.5% increase in just over a decade. Rising rents and housing costs are a national and statewide trend, but Grand Haven Township saw a slightly greater percent increase in the last 25 years than the State of Michigan. Table 9.6 shows the median gross rent from 1990 to 2013.

Table 9.6 Median Gross Rent

	1990	2000	2013
Grand Haven Township	473	573	836
Ottawa County	454	579	767
State of Michigan	423	546	768

Source: U.S. Census Bureau, American Community Survey 2009-2013

CHAPTER 10. BUILT SYSTEMS

This chapter provides an overview of the roads and infrastructure, utilities, public services, and land use in Grand Haven Township. Each of these areas are vital to the overall operation of the Township and its provision of services for residents, workers, and visitors. It also provides an assessment of future build-out potential in the Township.

TRANSPORTATION NETWORK

A good transportation network provides multiple ways for people to move around the Township and connect to surrounding communities and the larger region. A transportation network with a variety of transportation options has a number of community benefits. For example, a well designed system of streets can help disperse traffic congestion and ease the load of higher capacity streets. Trails, pathways and sidewalks can support active and healthier lifestyles. Public transit provides people without the ability or means to drive an environmentally friendly and affordable option to access work, school and other community amenities. The transportation network also plays a critical role in determining the nature and intensities of land uses that occur throughout the Township.

ROADS

The road network in Grand Haven Charter Township consists of about 161 miles of paved and unpaved roads that link the outlying areas of the Township. The primary and most central thoroughfare is US-31, which runs north and south through the Township. M-45, in the southern portion of the Township, is the primary east and west thoroughfare, connecting the Township with Grand Rapids. The Michigan Department of Transportation is currently building a two-lane limited-access roadway (often referred to as the “bypass”) just west of 120th Avenue that will connect M-45 north to the I-96/M-104/112th Avenue interchange near Nunica in Ottawa County. When complete, the new 7-mile roadway will be designated “M-231”. The roadway is scheduled to open sometime in late 2015. Due to the anticipated increase in traffic along this new corridor, it is very likely that areas near the intersections of M-45 and Lincoln Street will face development pressure. In fact, the Planning Commission will have an impact study performed on the Lincoln Street area in the coming year.

TRANSPORTATION NETWORK ROAD CLASSIFICATIONS

The Federal Highway Administration classifies roads based on the function they serve

Transportation Network

Public roadways, bridges and other transportation infrastructure are extremely expensive to build and properly maintain. As a result, Township officials (working with the Ottawa County Road Commission, neighboring jurisdictions and MDOT) need to plan investments carefully and in advance of need. On the other hand, unexpected development can place unplanned and uneven demand on road networks. Therefore, it will be important for Township officials to consider the existing condition and capacity of roads as community development projects materialize and land use decisions are made.



Local Roads

There are just over 18 miles of unpaved roads throughout the Township. Unpaved roads fit within the rural context of the Township and contribute to sense-of-place.



using the National Functional Classification system. Map 11.1 indicates classifications for all public and private roadways in the Township. The following are examples and definitions of those road classifications:

PRINCIPAL ARTERIAL ROADS

Principle Arterial Roads serve two functions. In rural areas they connect urban centers and are many times state and interstate highway corridors. In urban areas, principal arterial roads carry the highest traffic volumes, a large proportion of all area-wide travel and most traffic entering and leaving an urban area. Principal arterial roads can have partial or no access control. The only principal arterial road in the Township is US-31. US-31 serves both rural and urban functions and is categorized as an Other Principal Arterial because it is not a limited-access road.

MINOR ARTERIAL ROADS

Minor Arterial Roads in rural areas link cities and towns. They are spaced to provide good access to surrounding development and they typically serve high density areas. People using minor arterials typically make trips that are longer than those associated with collector roads. In urban areas, minor arterials carry traffic making moderately long trips, they serve to provide access to adjacent development rather than move high speed traffic and they are generally spaced from 0.1 miles apart in central business districts to three miles apart in suburban fringes. M-45, east of US-31, is a rural minor arterial road that connects northwest Ottawa County with metropolitan Grand Rapids. 168th Avenue north of US-31, Robbins Road between Lakeshore Drive and Mercury Drive, and Mercury Drive north of Robbins Road are all urban minor arterial roads.

COLLECTOR ROADS

Collector Roads carry moderate speed traffic making trips that are shorter than ones associated with arterial roads. In rural areas, collector roads serve developed areas that are not directly linked to roads of a higher classification. Urban collector roads provide access to adjacent development, they carry neighborhood traffic and they “collect” traffic from the local roads. Lakeshore Drive and sections of 144th Avenue, Comstock Street, Lake Michigan Drive, Lincoln Street, and Mercury Drive are classified as collector roads.

LOCAL ROADS

Local Roads include all other public streets. Their function is to provide access to adjacent homes and development and they carry traffic making relatively short trips. As seen on Map 10.1, most Township roads are local roads and in rural areas 18 miles of roads are currently gravel.

PRIVATE ROADS

Private Roads are developed and owned by individuals, developers or home-owner associations; however, their design is regulated by a Township ordinance. They are generally constructed to serve small scale residential developments, but can also be used in commercial and industrial applications

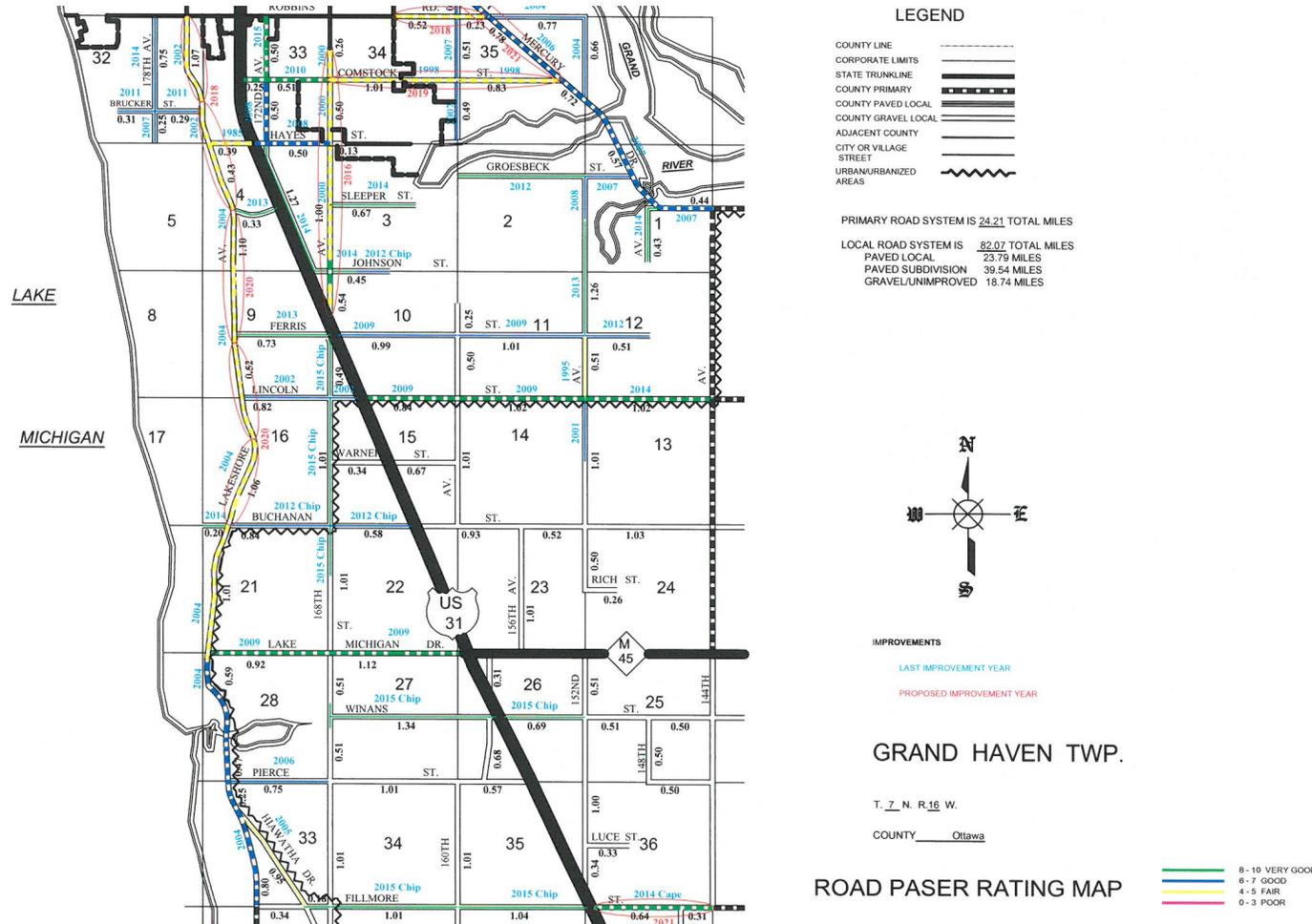
(e.g. a private road to service a cell tower). Owners and users of these roads must pay for all maintenance and plowing.

ROAD CONDITIONS

Federal aid eligible roads are rated for surface conditions under Michigan’s Asset Management Program. The process of rating roads involves a visual road surface evaluation based on surface condition and appearance. The rating (PASER) a road receives suggests where improvement measures are desirable or might be required.

Figure 10.1 below illustrates the PASER rating for roads in Grand Haven Township.

Figure 10.1 PASER Rating for Roads in Grand Haven Township



PASER Rating

A **Good** PASER rating indicates that a road surface was recently reconstructed or rehabilitated. “Good” roads show very little or no sign of distress and require only routine maintenance such as sweeping and light crack sealing.

A **Fair** PASER rating indicates a road is still structurally sound but the surface is beginning to deteriorate. “Fair” roads require preventative maintenance such as crack sealing, chip sealing or overlays.

A **Poor** PASER rating indicates that a road has failed structurally and needs to be rehabilitated or reconstructed.

Pathways

Over 26 miles of non-motorized trails connect Grand Haven Charter Township.



Harbor Transit

According to a recent Harbor Transit user survey, 37.9% of survey responders used Harbor Transit on a daily basis and 22% used Harbor Transit to get to work.

Resilient Activities - Harbor Transit

In an effort to move toward more environmentally friendly and sustainable practices Harbor Transit has purchased four liquid-propane buses and an on-site LP fueling station. These help reduce emissions by generating 12% less carbon dioxide, 75% less nitrogen oxide and 42% less carbon monoxide than gasoline buses.



NON-MOTORIZED TRANSPORTATION

Grand Haven Charter Township has roughly 26.7 miles of non-motorized pathways. The Township’s pathway construction program was established in 1990 after voters approved a millage to construct the first 12 miles of pathway. A second phase began in 1998 after voters approved another millage to construct an additional 11 miles of trail. Since then, another 3 miles of pathways have been added by private developers or the Township’s Downtown Development Authority (DDA). The Township Board is currently considering whether to place another dedicated millage for an additional 10 miles of pathway on the ballot in 2016.

PUBLIC TRANSPORTATION

HARBOR TRANSIT

Harbor Transit is a public demand-response transportation system that serves the Grand Haven Charter Township, the City of Ferrysburg, the Village of Spring Lake, Spring Lake Township and the City of Grand Haven. Harbor Transit operates a fleet of 23 buses, two vans and two seasonal trolleys traveling over 420,000 miles per year. In November of 2014, voters in Spring Lake Township approved 0.7 mills over 10-years to expand the dial-a-ride service into the Township. Grand Haven Township contributes the largest share - roughly 32% of the \$1.18 million collected in property taxes - of the five jurisdictions services by Harbor Transit.

According to Harbor Transit, ridership over the first six months of 2015 was 6.7% higher than the same period in 2014. If ridership numbers continue to rise, it will mark the fifth consecutive year Harbor Transit has increased its ridership. According to data provided by Harbor Transit in 2014, since its first full year of service in 2012, ridership within the Township has increased nearly 46%. In addition, the 46,563 rides originating in Grand Haven Township account for nearly 23% of the total number of rides provided by Harbor Transit.

According to Harbor’s Transit’s most recent *Annual Report*, overall ridership was up in all major categories, with the most significant increases coming from those riders 50+ years of age and students. Figure 10.2 compares the number of rides for specific riders. In addition, the vast majority of riders within the Township emanate from the “urban” areas of the Township. Figure 10.3 shows ridership, in both urban and rural areas of Grand Haven Township from 2012 to 2014.

Figure 10.2 Ridership Demographics

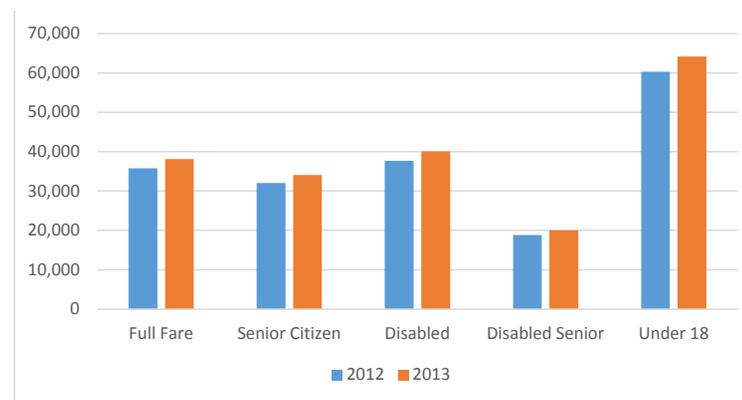
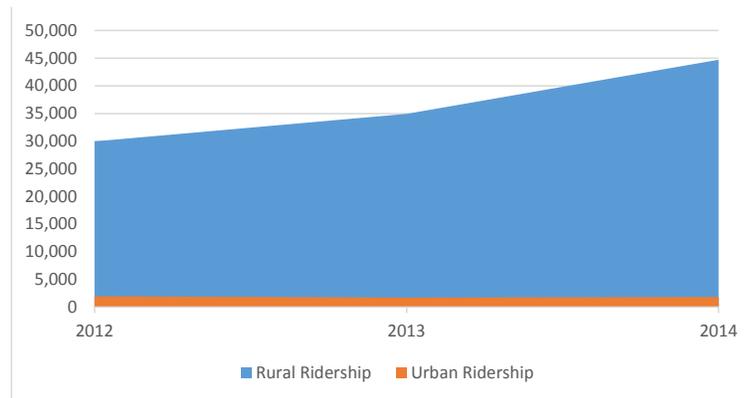


Figure 10.3 Ridership in Grand Haven Township



BUILD-OUT ANALYSIS

As part of the planning process for this master plan, a research team from the University of Michigan Taubman College of Architecture and Urban Planning research team performed a build-out analysis to supplement their work. Their full report focuses on the environmental and land use impacts of development in high risk areas, as found in Chapter 2. One input in this process was a build-out to answer the question, “If Grand Haven Charter Township keeps the same zoning ordinances, what might it look like in 25 to 50 years as development grows?”

METHOD TO DEVELOP A BUILD OUT ANALYSIS

CommunityViz is a scenario planning and mapping tool created for planners, and works in conjunction with ESRI’s ArcGIS computer mapping platform. The team used this mapping tool to calculate the development capacity of the land in Grand Haven Township using projected and zoning classifications. The team worked closely with the Township planning staff to clarify assumptions (e.g., where new development is likely to occur) and produce a realistic projection.

This build-out analysis should be understood to be what Grand Haven Township could look like if the community undergoes a full build-out of residential development according to their existing zoning ordinance. It is very important to note that this is not an exact picture of the development capacity in the Township, rather this work equates to an estimate of where development may possibly occur under the current zoning ordinance

For this reason, a 60% efficiency was used in the CommunityViz program, where the remaining 40% of land is not considered suitable for development for reasons like open space, driveways, streets, and yards. The model did not consider publicly-owned land or existing roads or buildings as space open to development. This build-out analysis considers an indefinite future scenario and does not account for changes to existing development.

What Is A Build Out Analysis

A build out analysis projects the amount and location of development that may ultimately occur in a given area as permitted by the zoning ordinance.



RESULTS

Map 10.2 shows the development capacity, by sections (defined using census blocks), in the Township. Clearly, the Township allows for significant growth under its current zoning ordinance, especially in the west (near Lake Michigan) and the northeast (near the riverine system). The total number of residential building units that could be added, given the above limitations, is nearly 4,600 units. It is important for the Township to carefully consider areas where development should be concentrated in order to maintain its rural character and natural/open space as it grows.

EXISTING LAND USE

The characteristics of the land in Grand Haven Township and the way people use the land, change over time. Trees grow and mature in areas that were once open fields. Lands that were once cultivated as farmlands become shrub-covered fields or new housing developments. Land use is a term that describes how a particular piece of property is being used, or will be used in the future. When grouped together, individual land uses can establish an overall development pattern of similar or like uses. Current land use patterns are important to understand because they can significantly shape a community's character

Grand Haven Township's total area is 18,304 acres, including bodies of water and road rights-of-way. The Township's land area not including water bodies and rights-of-way is 17,550 acres. In 2007, Township staff members conducted an existing land use inventory of all land located in Grand Haven Township. This inventory included a review of the Township's geographic information system (GIS) maps and databases, and aerial photographs. In addition, a "windshield" survey of Township land use was conducted. A similar process was used for this Master Plan using 2015 parcel data and recent aerial photographs. However, to make it easier to understand, some of the 18 existing land use categories identified in 2007 were combined into one category (for example, "commercial" and "commercial PUD" are combined into "commercial"). Map 10.3 illustrates the existing land uses within the Township.

The following pages describe each existing land use category in Grand Haven Township.

AGRICULTURAL

Agricultural land is the Township's second largest land use making up 23% of the total land area. This category includes land that is currently used for agriculture such as farming, nurseries, dairying, forestry operations, and other similar activities. Agricultural uses are generally found on large, vacant parcels; however they are distinct from the Vacant/Open Space classification in that they are actively being used for agricultural purposes.

On the Existing Land Use Map agricultural land was divided into two classifications: greater than 20 acres and less than 20 acres. It is important to identify the larger agricultural parcels of actively farmed agricultural land because they conform to the minimum acreage requirements for the Agricultural zoning classification, and they have a greater potential to change the character of Grand Haven Township should their land use be converted to a more intensive use such as a residential subdivision.

Agricultural Land Uses

Agricultural land makes up 23% of the Township's total land area.



Blueberries are one of the primary crops successfully grown in Grand Haven Township. They do well in the Township’s soils and the moist air from Lake Michigan. Christmas trees are also a major agricultural activity, a crop that grows well in sandy soils. Several large greenhouse operations that grow nursery plants and shrubs benefit from the Township’s lakeshore climate.

COMMERCIAL-HORTICULTURAL/AGRICULTURAL

There are a few agricultural sites in the Township which are unique from the other types previously described. Agricultural uses that maintain permanent commercial structures such as greenhouses and retail market buildings often generate larger volumes of daily truck traffic, engage in more intensive growing practices, and attract more frequent “customers”. These types of uses are considered Commercial–Horticultural/Agricultural uses, and they account for 2.9% of the Township’s total land area. Zelenka Nursery LLC, Autumn Leaves LLC, and Reenders Blue Acres LLC are all examples of these types of land uses.

LOW DENSITY RESIDENTIAL

Low Density Residential is the Township’s dominate land use in terms of acreage, occupying 28% of the total land area. Parcels that are classified as Low Density Residential are greater than one acre (43,560 per square foot) and contain a single-family home. These uses fall somewhere between a typical subdivision lot and a larger, more rural or agricultural residential use. Concentrations of low density residential can be found in the western portion of the Township (west of US-31).

MEDIUM DENSITY RESIDENTIAL

Medium Density Residential parcels are less than one acre (43,560 per square foot) but still contain a single-family home. This land use comprises 10.5% of total land area. Concentrations of Medium Density Residential uses can be found in the north half of the Township (i.e. north of Ferris Street), as well as along Lakeshore Drive. Similar parcels less than one acre with a single family home that were approved as a Planned Unit Development (PUD) are also classified as Medium Density Residential.

PUDs, or Planned Unit Developments, are the preferred residential development alternative within the Township. This trend can be expected to continue because PUDs often result in creatively-designed residential developments that preserve a portion of a site’s natural features. In addition, they also allow developers greater design flexibility and the possibility of incentives such as bonus densities. Given that lot sizes in a Medium Density area are typically smaller (sometimes less than allowed under standard zoning requirements), these developments often emphasize “cluster-type” patterns. Examples of Medium Density Residential PUDs include the Shores of West Olive, Lakeshore Woods, Hidden Creek and Forest Park East Subdivisions.

Commercial/Horticultural Ag. Land Uses

Commercial/Horticultural Ag. land makes up 2.9% of the Township’s total land area.



Low-Density Land Uses

Low Density land uses make up 28% of the Township’s total land area.



Medium Density Land Uses

Medium Density land uses make up 10.5% of the Township’s total land area.



Multi-Family Land Uses

Multi-family land uses make up just .9% of the Township's total land area.



Commercial Land Uses

Commercial land uses make up 1.3% of the Township's total land area.



Industrial Land Uses

Industrial land uses make up 2% of the Township's total land area.



MULTI-FAMILY RESIDENTIAL

Multi-Family Residential land uses account for a very small percentage (i.e. 0.9%) of Township's total land area, but they can have a much higher density. Multi-family housing includes any residential structure with two or more units. This category also includes mixed-use residential housing (i.e. single-family mixed with multiple-family) and multiple-family housing units approved as a PUD.

The majority of these units are renter-occupied or renter/owner occupied (i.e. the owner lives in one unit and rents out the other(s)). Pockets of Multi-Family Residential can be found in the northern half of the Township along Lakeshore Drive, 172nd Avenue, and other areas. Such residential developments include the Timber View Apartment Complex, Grand Haven Club Condominiums, Hunters Woods Subdivision, Bayou Point Condominiums, and Bignell Ridge Condominiums.

MANUFACTURED HOME PARK

This classification includes developments approved for multiple, manufactured housing units. River Haven Village is currently the Township's only Manufactured Home Park. This type of land use uniquely impacts the Township because of the high population density (i.e. units per acre) that is allowed. River Haven Village has 726 available manufactured home lots, of which about 638 are currently occupied. Assuming at least 1.9 residents per unit, the park could house at about 1,379 people if it were fully occupied. Based on a site area of 152 acres, the resulting density would be 4.8 units per acre, which is considered an extremely high density for single-family housing. Though greatly different in style, this land use classification has similar characteristics to that of Multi-Family Residential. River Haven Village accounts for 0.9% of the Township's total land area.

COMMERCIAL

Commercial land uses are primarily concentrated on the US-31 and Robbins Road corridors, but there are some exceptions. This classification includes personal services, retail sales establishments, offices, restaurants, and other non-residential/non-industrial uses.

Large-scale commercial uses such as Meijer and Walmart Super Center also fall under this category. Additionally, these two developments fall under the US- 31 Overlay District, and thus are subject to higher quality design standards than a typical commercial development. The commercial nodes in the Township provide needed goods and services for Township and neighboring residents, and for those traveling through the community. Future commercial growth will likely be fueled by an increase in area-wide population and the availability of commercial land suitable for development, which accounts for 1.3% of the total land uses.

INDUSTRIAL

Industrial uses include operations engaged in the manufacturing, fabricating, assembling, and treatment of products and materials. These uses may create excessive noise, release air pollution, generate truck traffic, and cause ground vibration more than other, less-intensive land uses. The majority of the industrial uses in the Township are located along the 172nd Avenue corridor between Comstock and Johnson Streets, as well as along Hayes Street.

As a relatively large segment of all land uses in the Township (i.e. 2.0% of the total land area), industrial uses can have a significant influence on the overall community. These uses require additional planning consideration such as the availability of adequate public services and their compatibility with adjacent uses.

PARKS, RECREATION, NATURAL AREAS

This category includes land used for recreation and social activities that are offered by public and private entities. These uses account for a considerable amount of the Township's total land area (i.e. 7.6%) and includes Township and county-operated parks (e.g. Pottawattomie and Kirk Parks), as well as privately owned and operated facilities such as the Grand Haven Golf Club, the North Ottawa Rod and Gun Club, and natural areas such as the Hofma Preserve. Designated open space within approved PUDs is also included within this classification. Plans are in place to acquire 40 acres of open space through the Michigan Natural Resources Trust Fund by early 2016. The Township is also in process of receiving a donation of 118 acres of land.

These uses contribute greatly to the quality of life in Grand Haven Charter Township. Many people choose to live and work in communities that offer quality parks and recreational opportunities and Grand Haven Township offers some of the best in the region. The Township's recreation amenities are discussed in more detail later in Chapter 11.

PUBLIC/QUASI-PUBLIC

Sometimes also referred to as "Institutional" uses, Public/Quasi-Public uses include schools, churches and community facilities such as the Township administrative offices and fire station. Each individual parcel in this category has a specific use and role for the community. Churches for example, though privately owned, are considered quasi-public because of their role as a community center for many people.

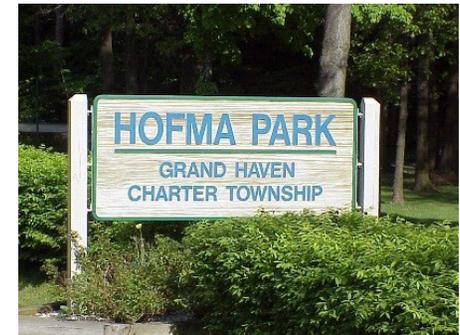
These types of uses can be found throughout Grand Haven Township and are closely tied to neighborhoods and are conveniently located for residents. Similar to the parks and recreational uses previously described these uses positively contribute to the quality of life for residents and businesses. They foster interaction between neighbors and they are important for the future stability of the community. Public/Quasi-Public uses account for 2.1% of the Township's total land area.

MINING

The sole mining operation in the Township is the Standard Sand mine located between Lake Michigan and Lakeshore Drive in the north part of the Township. Sand is an important natural resource, plentiful in the great lakes region, due to its raw material value for glass making, industrial molds, and concrete. The Standard Sand property is approximately 121 acres, which accounts for 0.7% of the Township's total land area.

Parks, Recreation & Nat. Area Land Uses

Land devoted to parks and recreation (including natural areas) make up 7.6% of the Township's total land area.



Public/Quasi-Public Land Uses

Land used by churches, schools and Township facilities make up 2.1% of the Township's total land area.



Vacant/Open Space Land Uses

Vacant or open spaces account for 19.7% of the Townships total land area.



Township Land Uses



VACANT/OPEN SPACE

This category includes sites that have no structures and are not used for any of the previously described activities. Close analysis of vacant sites is necessary to better understand the potential impacts of new development and to shape their future uses. This category currently accounts for 19.6% (approximately 3,396 acres) of the Township’s total land area, a significant amount of acreage.

Table 10.1 shows the change in land use from 2007 to 2015.

Table 10.1

Land Use	2007 Acreage	2007, % of Total Acreage	2015 Acreage	2015, % of Total Acreage	% Change, 2007 to 2015
Large Agricultural (Lot size >20 Acres)	3,469	19.8%	3,633	21.0%	4.5%
Small Agricultural (Lot size <20 Acres)	426	2.4%	443	2.6%	3.8%
Commercial/Horticultural	714	4.1%	501	2.9%	-42.5%
Low Density Residential (Lot size > 1 Acre)	4,803	27.4%	4,803	27.8%	0.0%
Medium Density Residential (Lot size <1 Acre)	1,897	10.8%	1,823	10.5%	-4.1%
Multi-Family Residential	124	0.7%	151	0.9%	17.9%
Manufactured Home Park	152	0.9%	152	0.9%	0.0%
Commercial	224	1.3%	227	1.3%	1.3%
Light Industrial	342	1.9%	347	2.0%	1.4%
Parks, Recreation, and Natural Areas	1,430	8.1%	1,321	7.6%	-8.3%
Public/Quasi-Public	351	2.0%	366	2.1%	4.1%
Mining	121	0.7%	129	0.7%	6.2%
Vacant/Open Space	3,497	19.9%	3,396	19.6%	-3.0%

CURRENT LAND DEVELOPMENT PATTERNS

The term “land development” refers to the conversion of land for the purposes of residential, commercial, industrial or other such uses. Land development can be described by the amount of land per type of use in an area, as well as by the characteristics of development (e.g. residential density). The process of developing land can have intermediate impacts that result in a variety of other changes to the physical environment. These impacts can potentially include the loss of sensitive habitats and wetlands, degradation of water quality due to increased runoff, and the loss of agricultural lands and open spaces.

Historically, development patterns in the Township were dictated by the layout and location of existing roads, which generally followed section lines and natural features such as the river and bayous. This created a land use pattern of individual homes that directly fronted onto main roads, or small scale residential neighborhoods were located near main roads. Large plots of agricultural lands and open spaces were maintained behind these “strips” of roadside residential development. From a

development perspective, this pattern is still a very efficient way to use land; main roads already exist, and growth can be phased over a long period with little or no additional cost to either the community or the developer. This pattern does not impose significant impacts as long as densities are low and individual homes are well spaced.

However, over the past twenty years the high rate of growth in the community has led to land development that has forever changed the face of the landscape. Urban growth has pushed outward from the cities of Grand Haven (immediately north) and Holland (12 miles south) into adjacent Townships. The result of this growth pressure is the loss of agricultural land and open spaces to residential development. Today, the different types of land uses can be identified as “patterns” when looking at the Existing Land Use Map.

Medium to high density residential development, which accounts for the majority of residential development within the past 20-30 years, is generally located in two main “regions” of the Township. It is found in the northeast quadrant, which includes such large subdivisions as Forest Park, Grand Oak, Forest Park East, and Dermshire Forest. The River Haven Village manufactured home park is also located in this region. The second “region” of residential development is along the lakeshore the full length of the Township. This development is primarily single family and includes some of the older, more established residential areas and neighborhoods.

Given the importance of good highway access, the majority of the Township’s commercial and industrial development is located along or near US-31 and M-45. However, Grand Haven Township is different than many other communities traversed by major highways, such as Holland and Muskegon, in that the amount of land currently used or zoned for commercial development is comparatively limited.

That leaves the remainder of the Township for rural residential and agricultural uses. This region represents the last remaining example of Grand Haven Township’s past. Most of the Township originally accommodated agricultural uses, but much agricultural land has since been developed for residential purposes, or has become vacant or fallow. As development pressure continues to grow, the Township will be faced with more proposals to convert this land to the uses seen elsewhere in the Township. The Township has recognized the need to preserve agricultural land, as evidenced in the Future Land Use Map in Chapter 7.

SOUTHWEST QUADRANT SUB-AREA PLAN

In 2004, Grand Haven Township adopted the Southwest Quadrant Sub-Area Plan as an amendment to the 1996 Master Plan. It covered the area south of Buchanan Street and west of US-31. This plan was created as a direct result of the development pressure that was occurring in this region (i.e. the proposed 80 acre Lakeshore Woods PUD development on Pierce Street).

Township “Regions”

The 2004 update included many goals and recommendations to help guide decisions about anticipated growth in the still-rural southwest quadrant of the community. Specifically, the plan recommended that many properties greater than 10 acres be “downzoned” as a way to delay development until appropriate infrastructure was in place to support higher densities. The Future Land Use Map in Chapter 8 reinforces the Southwest Quadrant Sub-Area Plan by continuing to “downzone” parcels in order to relieve development pressure.

ROBBINS ROAD SUB-AREA PLAN

In 2009, Grand Haven Charter Township, partnered with the City of Grand Haven to develop a joint plan for the Robbins Road Corridor. The Plan addresses land uses on both sides of Robbins Road and traffic issues between US-31 and Beechtree/168th Avenue. The Plan recommends a series of access management techniques to improve safety and traffic operations along the corridor. The Plan also recommends a series of zoning changes and the establishment of building design standards. The recommendations outlined in the Robbins Road Sub Area Plan can be found in the Appendix.

Robbins Road Sub Area Plan

The Robbins Road Corridor planning process included several walking tours and design charrettes.

UTILITIES AND PUBLIC SERVICES

WASTEWATER COLLECTION

Grand Haven Township’s wastewater collection system connects to over 600 homes and businesses. The system includes nearly 26.5 miles of sewer lines, several pumping stations, and 11 lift stations. The total capacity of the wastewater treatment plant that services the Grand Haven and Spring Lake area is 10 million gallons per day. However, the monthly average day capacity is about 6.8 million gallons per day.

Although more households and businesses have connected to the system in recent years, because of conservation efforts like installing low-flow fixtures and efforts by the Township to separate their storm-water and sanitary sewer systems, the flow rate per customer has gone down. The sanitary sewer plant is utilizing only about 59 percent of the hydraulic capacity of the plant. Local officials believe the treatment plant could accommodate an additional 1.1 million gallons of waste per day before expansion of the wastewater treatment plant would need to be considered. This equates to roughly 5,500 new households.

In regards to overall capacity issues of the waste water system within the Township, local officials concluded that ability to move waste water from areas within the Township that are growing (e.g., the Lincoln Street and Ferris Street corridors) to the 168th Avenue lift station was limited by capacity of the Hidden Creek lift station. As a result, the Township initiated work on a new Hidden Creek lift station in 2015, which will more efficiently move the current flow (and additional flow from over 200 residential units) to the 168th Avenue lift station. Eventually, the Hidden Creek lift station may be bypassed when the discharge from Hofma Park lift station is pumped to the west side of US-31 and into an existing gravity sewer line in fiscal year 2017 or 2018. The Township’s system of wastewater collection lines is shown on Map 11.4.

WATER DISTRIBUTION

All municipal water in the Township is obtained from Lake Michigan and provided by two sources, the North Ottawa Water System (NOWS) and the water treatment plant run by the City of Grand Rapids. All but the lower third of the Township receives their water from the NOWS, which is a joint municipal water system run by the municipalities in the Northwest Ottawa area. The Township has five direct connections to the NOWS water distribution system which can deliver up to 11 million gallons of water per day to the Township.

Water from Lake Michigan is obtained through two submerged intakes. The capacity of the two NOWS intakes is 28 million gallons of water a day while the NOWS water treatment plant has a capacity of about 23.5 million gallons of water a day. In 2015, the system has an average daily use of about 6.5 million gallons of water per day with a maximum daily use of about 16.8 million gallons of water per day. The maximum daily use of water typically occurs in the summer months, as approximately 34 percent of water is used for outdoor uses.

Even at these peak times, the water treatment plant uses only about 71.5 percent of its total capacity. In fact, based on very conservative numbers, local officials believe an additional 6,250 household could be added to the NOWS system before the plant would need to be expanded. The Township's system of water collection lines is shown on Map 10.4.

TOWNSHIP SERVICES

Grand Haven Charter Township is governed by an elected seven member Board of Trustees. However, under the direction of the Township Manager, daily municipal activities are carried out under six departments and more than 17 service areas. The following is a summarized list of the Township departments and their responsibilities.

1. ADMINISTRATION AND HUMAN RESOURCES DEPARTMENT

The Administration and Human Resources Department is responsible for all personnel matters, benefit coordination, risk management and liability insurance matters.

2. ASSESSING DEPARTMENT

The Assessing Department is responsible for determining the state equalized value for all real and personal property, processing land division applications and maintaining records.

3. COMMUNITY DEVELOPMENT DEPARTMENT

The Community Development Department is responsible for all building, electrical, mechanical, and plumbing permits and inspections and the processing of all special land use applications, zoning permits, long-term planning, and the Township's geographic information system.

Water Distribution

According to the EPA, the average American family uses 320 gallons of water per day, about 30 percent of which is devoted to outdoor uses. More than half of that outdoor water is used for watering lawns and gardens. Nationwide, landscape irrigation is estimated to account for nearly one-third of all residential water use, totaling nearly 9 billion gallons per day.



Township Services

Daily Township activities are carried out under six departments and more than 17 service areas.



4. FINANCE DEVELOPMENT DEPARTMENT

The Finance Department is responsible for local tax collection (i.e., the Schools, District Library, Council on Aging, Museum, and County), investments, and all financial transactions for the Township.

5. FIRE/RESCUE DEVELOPMENT DEPARTMENT

The Fire/Rescue Department is responsible for fire suppression, medical first response, technical rescues, and safety training.

6. PUBLIC SERVICES DEVELOPMENT DEPARTMENT

The Public Services Department is responsible for the water distribution system, sanitary sewer collection system, bike paths, parks, cemeteries, building and grounds and information systems management.

LAW ENFORCEMENT

Law enforcement in Grand Haven Township is currently provided by the Michigan State Police and the Ottawa County Sheriff's Department. The Township also contracts for an additional three Community Oriented Police Services (COPS) officers through the Sheriff's Department in order to provide additional safety for residents. The Township also has a full-time traffic enforcement officer. In an effort to bring law enforcement officers closer to the community, the Township made office space available for both the sheriff deputies and a detective. The result has been that officers are more familiar with the Township and are better informed of issues within the Township. According to the 2014 Ottawa County Sheriff's report, 4,773 calls for service were made to the Sheriff department. This marked a 3 percent decrease in the number of calls made to the Sheriff's office in 2013. The Township continues to remain relatively safe as most of the crimes committed were not violent.

FIRE PROTECTION

Fire protection in Grand Haven Charter Township is provided by a robust and skilled fire department that includes 7 full-time firefighters and 23 part-time firefighters.

Township firefighters are equipped with 2 engines, 1 tanker, a brush truck, a medical first responder truck and a paramedic rescue truck. The Township's Fire/Rescue Department is considered to be one of the premier departments in Northwest Ottawa County. In addition, because many firefighters are trained Paramedics, it is the only Fire/Rescue Department in West Michigan to operate with an Advanced Life Support Paramedic License.

As with many of the services in the Township, fire protection has seen an increase in demand and usually responds to over 1,020 emergencies annually. Fire protection is financed by a 1.9 millage. Because Grand Haven Township has an effective Fire/Rescue Department, Township property owners enjoy lower insurance rates.

Fire Protection

The Advanced Life Support (ALS) paramedic effectively saves lives. The Department's cardiac arrest save rate over the last five years was 47%. The national average of cardiac arrest saves is 3%.



EMERGENCY MEDICAL CARE

The nearest hospital to Grand Haven Township is the North Ottawa Community Hospital (NOCH) located in the City of Grand Haven. This medical center is a private non-profit 81-bed acute care facility which is also equipped with an emergency room. Grand Haven Township is also a member of a seven community group that contracts NOCH for ambulance services.

SCHOOLS

All of Grand Haven Township is located within the Grand Haven Area Public Schools District. Grand Haven High School and two of the district's elementary schools (i.e. Rosy Mound and Peach Plains Elementary School) are located within the Township. The Grand Haven Area Public Schools District is one of the primary reasons why families choose to live in the Township. Grand Haven schools have a proven track record as about 87% of students graduate and scores in the MEAP and ACT are consistently above county and state averages. In addition, about 66 percent of the graduating seniors go on to some type of college and almost half of the graduating seniors go on to a 4-year college or university.

Schools

66% of the graduating seniors at Grand Haven High School go on to some type of college.



CHAPTER 11. NATURAL SYSTEMS

Grand Haven Township is fortunate to have some of the most diverse and unique natural environments in Michigan. This chapter summarizes the water and land assets of the Township.

Grand Haven Township is located along the beautiful shores of Lake Michigan, in the northwest Ottawa County. The Township is bounded on the north by the City of Grand Haven and Spring Lake Township, on the east by Robinson Township, on the south by Port Sheldon Township and on the west by Lake Michigan. Because of Lake Michigan and the Grand River, Grand Haven is also home to beautiful sand dunes, wetlands, native vegetation, and rich soils.

GRAND HAVEN CHARTER TOWNSHIP'S WATER ASSETS

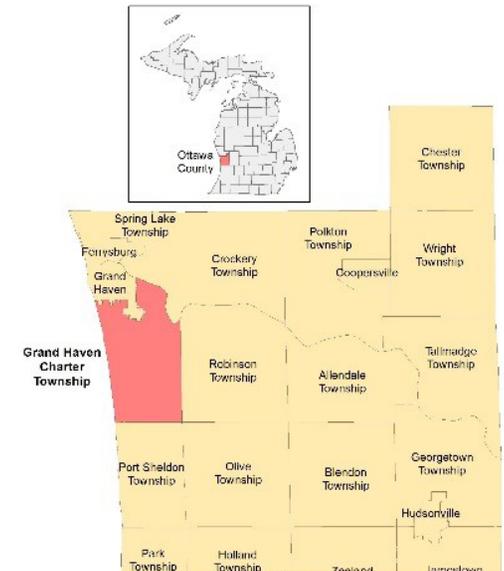
LAKE MICHIGAN

Grand Haven Township's identity is partially formed around Lake Michigan and the Grand River. Lake Michigan and the Great Lakes are truly one of the most special and unique natural resources on the planet and Grand Haven Charter Township is fortunate to sit right on its doorstep! Home to 18 percent of the world's supply of freshwater and 90 percent of the United States' supply of freshwater, the Great Lakes has been, and continues to be, the foundation of Michigan's DNA and our most defining feature. Native Americans and early settlers used the Great Lakes to transfer food and goods to settlements and distant trading posts. In the 18th and 19th century, the Great Lakes powered the lumber mills that helped build our cities and the factories that built the goods which formed the foundation of our economy.

Today, the Great Lakes are center stage for the state's tourism industry and the Pure Michigan campaign. In addition, leaders from around the state are working to utilize the Great Lakes to further the "Blue Economy" – an economy where the Great Lakes provide for clean energy, promote sustainable systems, and create new food and mobility systems.

According to a report from the Michigan Economic Center and the Grand Valley State University Annis Water Resource Institute, "Michigan can be that unrivaled playground if the water is clean and our communities reconnect to it. It's our 'blue' alongside our 'green'. Innovation in water makes us the world center of education, research, invention and new "smart water" technologies and business development, the World's Freshwater and Freshwater Innovation Capital. It can propel a new era of economic growth and job creation." Chapter 2 of this plan discusses coastal processes and shoreline management strategies in detail.

Grand Haven Township



Water Assets

Grand Haven Township is located on Lake Michigan, one of the unique and prominent features on earth.



The Grand River

The Grand River supports a wide variety of recreational boating activities.



THE GRAND RIVER

The Grand River is Michigan’s longest river winding 256 miles from Jackson to Grand Haven, and spans 19 counties with 12 major tributaries. The river forms part of the eastern and northern borders of the Township, before passing through the City of Grand Haven and into Lake Michigan.

Much of the Grand River along the Township is bordered by large riverine wetland areas. These wetlands and bayou areas have helped to limit intense development in close proximity to much of the riverbank within parts of the Township.

The Grand River supported the development of the region by providing a means of conveying logs to sawmills located on the banks of the Grand River. Steamboats ferried finished products between Grand Rapids and Grand Haven. In addition, gypsum, limestone, sand, and gravel were mined from the banks of the Grand River, and clams were harvested for commercial button production. After large-scale logging ceased in the 1890s, the City of Grand Rapids became a significant manufacturing center, discharging industrial and municipal wastes into the Grand River. Environmental legislation, initiated in the late 1960s, provided the impetus for cleanup of the Grand River and its tributaries.

Today, the portion of Grand River flowing through Grand Haven still serves Great Lakes shipping, providing coal to the local power plant and shipping sand and aggregate from local businesses to markets elsewhere. However, this economic use of the river requires continued maintenance and, at times, dredging to keep shipping channels open. Further up-stream, the portions of the Grand River along Grand Haven Township are used for recreational activities like boating, paddling and fishing.

THE GRAND RIVER WATERSHED

The Grand River watershed covers 5,660 square miles and drains portions of Muskegon, Newaygo, Mecosta, Montcalm, Gratiot, Ottawa, Kent, Ionia, Clinton, Shiawassee, Barry, Eaton, Ingham, Livingston, and Jackson counties. The watershed also includes several major sub-tributaries including the Lower and Upper Grand Rivers, Maple River, and Thornapple River. Local watersheds directly affecting Grand Haven Charter Township are illustrated in Map 11.1.

Water quality within The Grand River watershed is directly related to the land management practices in the region. For example, if new development creates a large amount of impervious surface (i.e. asphalt) and stormwater is not properly managed on site, flow from the run-off into the creek, stream, or river deteriorates water quality and quickens erosion on stream banks.

Approximately 53 percent of the land within the Grand River watershed is agricultural, 27 percent is urban, and 20 percent is forested. Since Grand Haven Charter Township lies near the mouth of the Grand River, activities that occur upstream have a significant impact on the quality of the river and riparian areas in the Township. While local officials in Grand Haven Charter Township should continue to work towards improving the water quality of the lower Grand River, this task will require cooperation from numerous upstream stakeholders, including agencies and governmental units.

What is a Watershed?

A watershed is a region of land that is drained by a particular river or river system. Typically, these systems include many smaller tributaries such as creeks and streams that feed into a larger river and are influenced by the land’s elevation



SAND DUNES

Michigan's dunes are one of the most striking environmental features in the world. Together, they represent the largest freshwater dune ecosystem in the world. The dunes provide unique habitats for rare and endangered species and hold enormous environmental and recreational value.

There are about 250,000 acres of sand dunes in Michigan. Of that, the Michigan Department of Environmental Quality classifies 70,000 acres of dunes as Critical Dune Areas (CDAs). Development on CDAs is regulated by the state, and a property owner must receive a permit for many activities that either alter the appearance or contours of a CDA.

Grand Haven Charter Township has 1,056 acres of Critical Dune, which encompass approximately 6% of the Township's total land area. They are located along just about the entire Lake Michigan coastline. The inland extent of the dune areas is quite substantial in the northern portions of the Township. Critical dune areas are illustrated on Map 11.2. For more information on current regulation and maps of Critical Dunes in Grand Haven Charter Township, please see Chapter 2.

WETLANDS

Wetlands play a critical role in regulating the movement of water within watersheds. Wetlands are also incredible flood absorbers. The water-holding capacity of a specific wetland varies by the size, slope, type of vegetation, location relative to flooding path, and the water levels in the wetland prior to flooding. Coastal wetlands also control the severity of erosion along a shoreline during a storm. Perhaps more than any other environmental asset, wetlands absorb high energy waves and break the flow of currents. Michigan has coastal, tree, and shrub wetlands, each covered either all or part of the year.

This diversity of wetlands was misunderstood as European settlement began, and many wetlands were dredged, drained, and converted to serve industry. Today, less than half of the state's wetlands remain, and in a time of changing climate, the need to conserve and restore wetlands is paramount.

In Michigan, development in some wetlands is regulated through a permitting process. Generally, a wetland is regulated if it is connected to or within 1000 feet of a Great Lake shoreline, is connected to or within 500 feet of an inland lake, pond, or river, or is at least 5 acres in size.

Grand Haven Charter Township contains roughly 3,226 acres of wetlands. Wetlands are found throughout the Township along traditional riverine areas. It is important to note that available data on existing wetlands is collected at a high-level and may not be fully accurate. This map is intended to illustrate the general location of wetlands that were identified by the National Wetland Inventory project. The exact location of any wetland should be determined through a field site inspection by a qualified scientist. Map 11.3 illustrates the location of wetlands in the Township.

For more information and detailed analysis on wetlands regulation and wetland analysis specific to Grand Haven Township, see Chapter 2.

Sand Dunes

Grand Haven Township has 1,056 acres of Critical Dunes



Wetlands

Grand Haven Township has 3,226 acres of wetlands, which account for about 18% of the Township's total land area.



SIGNIFICANT VEGETATION

Natural vegetation, along with other natural features, contributes to the high quality of life and beauty of Grand Haven Charter Township. The areas containing significant vegetation in Grand Haven Charter Township include the Rosy Mound Natural Area, the Hofma Preserve, Kirk Park, and the Hiawatha Forest. Whenever possible, existing mature vegetation should be preserved as development occurs, and additional plantings may be added in selected areas where aesthetics do not meet the standards established elsewhere in the community. For maps and a discussion of Grand Haven Charter Township's tree canopy, see Chapter 2.

SOIL TYPES

Grand Haven Charter Township contains several different classifications of soils and varying slopes. The majority of the soils with steep slopes are found generally in the north-western portion of the Township where the sand dunes are located. Overall, the Township contains soils in twelve different classifications, which are described below and illustrated on Map 11.4, according to the Soil Survey of Ottawa County.

The Adrian-Houghton classification consists of very poorly drained soils that occur together as a complex. Available water capacity for both soils is very high and the surface runoff on both soils is very slow or ponded. These soils have a seasonal high water table at or near the surface from November to May.

The AuGres-Saugatuck classification are somewhat poorly drained soils occur together as a complex. The available water capacity is low and the surface runoff is slow. These soils have a seasonal high water table from .5 to 1.5 feet below the surface from December to June.

Blown-out land consists of sandy soils that were cleared of their original forest cover and left exposed to the erosive action of water and wind. Some areas have been stabilized, while others are actively eroding.

The Chelsea classification is a somewhat excessively drained soil. Permeability is very rapid. Available water capacity is low. Runoff is slow to medium depending on slope.

The Croswell and AuGres classification are sandy soils that occur together as a complex. Croswell soils are moderately well drained and AuGres soils are somewhat poorly drained. Permeability is rapid, surface runoff is slow and available water capacity is low. These soils have an apparent seasonal high water table between .5 and 5.0 feet from November to May.

The Deer Park classification is described as an excessively drained sandy soil. Permeability is rapid and the available water capacity is low. Surface runoff is slow to rapid, depending upon slope, and the natural fertility is very low.

The Granby classification is described as a poorly drained sandy soil. Permeability is rapid and the available water capacity is low. Surface runoff is very slow or ponded. The seasonal high water table is

Soil Types and Development Implications

Soil drainage or permeability measures the rate at which water moves through soil and is an important factor when deciding between a septic tank system or another type of on-site wastewater treatment system.

Poorly drained soils, like the Adrian-Houghton and AuGres-Saugatuck classifications, provide challenges for septic systems and do not generally support homes with basements. Whereas septic systems in well drained soils, like the Chelsea and Deer Park classifications may not adequately filter effluent.

near or above the surface from late fall to early spring.

The Rubicon classification is described as an excessively drained sandy soil. Permeability is rapid and the available water capacity is very low. Surface runoff is slow and the natural fertility is low.

TOPOGRAPHY

The northwestern portions of Grand Haven Township are dominated by dunes that reach over 800 feet above the Lake Michigan Shoreline. Comparatively, the sea-level elevation along the Lake Michigan shoreline is 557 feet. The remaining portions of the Township are relatively flat. Areas along the Grand River and other tributaries are fairly low-lying. Map 11.5 illustrates the topography of Grand Haven Charter Township.

MANAGEMENT EFFORTS

The following management efforts are in place to protect and safeguard the resources within the greater Grand Haven Community. The following is not an exhaustive list of environmental management strategies in place. Rather, selected policies and plans are outlined that have significance to the goals and objectives in Chapter 4.

FLOODPLAIN MANAGEMENT

A river, stream, lake, or drain may occasionally overflow its bank and inundate adjacent lands, and the land that is inundated by water is defined as a floodplain. Floodplains also serve as water recharge areas and natural water retention basins during periods of heavy precipitation or spring snow thaws. Development within the 100-year floodplain requires an exhaustive permit process.

The National Flood Insurance Program (NFIP) is an optional program managed by the Federal Emergency Management Agency where communities can receive flood insurance for disaster relief by agreeing to regulate floodplain development. Most coastal communities participate in the NFIP, including Grand Haven Charter Township.

Flood Insurance Rate Maps (FIRMs) are created and released by the Federal Emergency Management Agency (FEMA), using event-based modeling and lake level elevations determined by a single storm event, for various return periods. It is important to note that individual property owners can petition to change the flood zone designation for their property, so FIRMs may not be fully scientifically derived.

The FIRMs for Ottawa County, were adopted in 2011 by Grand Haven Charter Township, as seen in Map 11.6. For an analysis of properties and environmental features that fall in floodplains based on the FIRMs, see Chapter 2.

Add Floodplain Graphic

GREAT LAKES COASTAL FLOOD STUDY

In 2010, FEMA and the United States Army Corps of Engineers (USACE) began the Great Lakes Coastal Flood Study. The project seeks to update existing FIRMs to account for revised lake levels, wave setup, and wave energy. The process to create the drafted maps differs significantly from the process to create existing FIRMs. The existing FIRMs are based on event-based modeling, where the projected flooding impacts are based on the influences of a selected historical storm. The updated approach is statistical-based, where the influences of wave energy and wave setup are modeled using refined 100-year lake level elevations provided by the USACE.

The Great Lakes Coastal Flood Study is scheduled to release maps for public comment and adoption in 2016. Preliminary draft maps are available for Ottawa County and are used in the analysis further described in Chapter 2.

THE LOWER GRAND RIVER WATERSHED MANAGEMENT PLAN

In 2011, the Grand Valley Metropolitan Council updated the 2004 Grand River Watershed Management Plan. The Plan is a broad document to build and expand improvement efforts in the watershed, focusing on water quality. The Plan holistically considers the ecosystem of the entire Grand River Watershed as it casts a vision and strategies for the future of the Watershed.

The plan developed goals for the watershed that are based on improving or restoring the designated uses of the Watershed and attaining compliance with established total maximum daily loads. Those goals are:

- Restore and maintain water bodies for...
 - Recreational use
 - Indigenous aquatic life and wildlife use
 - Cold water and warm water fisheries
- Protect and preserve water bodies for...
 - Agricultural, navigational, industrial, and public use
- Conserve existing high quality areas
- Promote and support desired uses identified during the planning process
- Example: Encourage proper septic tank management to reduce nutrients into the water
- Educate stakeholders about protection efforts for the Watershed

PARKS AND RECREATION

Parks, trails and recreation facilities play an integral role in the community. Parks and open space often link natural areas and help improve both water and air quality. Numerous studies have also shown that when people have access to parks, they exercise more. This increased level of physical activity can reduce the risks for chronic diseases and help manage mental health. Perhaps most importantly, parks and recreation facilities can help build and strengthen a community and contribute to quality-of-life and sense-of-place.

Grand Haven Charter Township has a number of well-loved parks. In addition, the Township manages several public access sites, providing boaters, paddlers and fisherman access to the Grand River and its bayous. In 2015, the Township Board adopted Explore the Grand Region: A Community Parks and Recreation Plan in Northwest Ottawa County, a new community-wide Parks and Recreation Plan developed in partnership with the City of Grand Haven, the City of Ferrysburg, Spring Lake Township and the Village of Spring Lake. The Plan includes a list and description of each park and recreation facility within the five communities. The Plan also outlines specific goals and objectives for parks and recreation facilities for each participating jurisdiction as well as a number of action statements. See Map 11.7 for a map of parks and recreational amenities in Grand Haven Township.

PARK AND RECREATION AMENITIES

152ND ACCESS & SHIAWASSEE ACCESS

Location: 152nd and Shiawassee Drive

Size: 0.25 acres (each)

Both of these access sites are located at the end of 152nd Avenue and Shiawassee Drive providing public access to Pottawattomie Bayou. Neither site has designated parking, although parking is allowed within the public right-of-ways along the streets. These two sites predominately serve the adjacent neighborhoods and persons utilizing the nearby non-motorized pathway system. The 152nd Access was completed in 2013 and the Shiawassee Access was completed in 2014. Both provide ADA accessible walkways, benches and bayou viewing.

BIGNELL PARK

Location: Bignell Drive

Size: 0.5 acres

Bignell Park is a small one-half acre park located on the Millhouse Bayou of the Grand River. Although small, the park provides public access to the bayou. As the park provides informal access to the bayou, its service area includes the entire Township and neighboring City of Grand Haven. The park is undeveloped with informal pull-off parking from the street with room for three to four cars. The area of the park at street level is approximately 15' above Millhouse Bayou with a sloping bank to the water's edge. The park is currently utilized by ice fishermen in the winter and for passive viewing of the bayou. Park is 100 yards west of the Township's Non-Motorized Pathway System which is an accessible walkway.

BRUCKER STREET AND BUCHANAN STREET ACCESS

Location: Brucker St & Buchanan St

Size: 0.5 Acres Each

These two small sites, of approximately one-half acre each are public right-of-way land areas at the end

Parks

Hofma Park and Preserve allows visitors an opportunity to enjoy a variety of wetland and upland wooded ecosystems.



of Brucker and Buchanan Streets that extend into Lake Michigan. These road ends provide public access within the road right-of-ways to the sand beach and Lake Michigan. These two sites predominately serve the adjacent neighborhoods and persons utilizing the nearby non-motorized pathway along Lakeshore Drive.

HOFMA PARK AND PRESERVE

Location: 15581 Ferris Street (16295 Sleeper St)

Size: 447 Acres

Hofma Park and Hofma Preserve are located adjacent to each other on the Pottawattomie Bayou encompassing approximately 447 acres. An additional 113 acres, known as the Witteveen Property, has been placed in trust for the Township and will become available in January 2016 for public recreation use. The Michigan Natural Resources Trust Fund Board has approved the Township’s receipt of \$276,500 in grant funding to acquire an additional forty acres of contiguous land abutting the west property line of Hofma Park. The acquisition is expected to be completed in 2016. The Ferris Street Park entrance provides access and parking areas for the active sports area. A trailhead is located at the north end of the parking lot providing access to the Preserve.

The Ferris Street Park entrance has direct access to the Non-Motorized Pathway System. There is a second parking area and trailhead at the Hofma Preserve entrance on Sleeper Street which also has access to the Non-Motorized Pathway System.

With its extensive size and quality of natural areas, the Park serves a larger population than Township residents, including visitors from not only Ottawa, but surrounding counties. The Park and Preserve contain several miles of trails, including a boardwalk which traverses Pottawattomie Bayou and surrounding wetlands. The trail system allows visitors to enjoy a variety of wetland and upland wooded ecosystems.

Park Amenities and Facilities

- Soccer Field (used for league play)
- Adult Softball Field (used for league play)
- Picnic Tables
- Play Equipment
- Restroom
- Basketball Court

Preserve Amenities and Facilities

- Play Equipment
- Picnic Tables
- Restrooms
- Foot trails
- Boardwalk

MERCURY PARK

Location: 16715 Mercury Drive

Size: 6.71 Acres

Mercury Park is the oldest Township Park located on the northern edge of the Township adjacent to the City of Grand Haven. It is located within a residential neighborhood and serves as a neighborhood

park as well as a regional park providing local recreational facilities. The park facilities include a softball field and in-line hockey rink both utilized for league and open play, a restroom building, play equipment, picnic tables and shelter, and a parking lot. The park has direct access to the Non-Motorized Pathway System.

ODAWA/BATTLE POINT BOAT LAUNCH

Location: 14091 144th Avenue

Size: 2.5 Acres

This 2.5 acres park is located on the Grand River. Completed in 2001, the boat launch facilities include two launches, vehicle and trailer parking, and a restroom facility. The Grand River provides waterway access into Lake Michigan to the west or towards Grand Rapids to the east. The launch is a very busy site and attracts boaters from throughout the West Michigan area. The launch site has direct access to the Non-Motorized Pathway System.

POTTAWATTOMIE PARK

Location: 15600 Comstock Street

Size: 20.83 Acres

Pottawattomie Park is a twenty-one acre park located on the Pottawattomie Bayou of the Grand River. The park, a former 4-H camp, was donated to the Township in 1989. The park serves as a neighborhood park as well as a regional park providing large group picnic facilities and soccer facilities. The non-motorized path was extended into the park from Comstock Street to link the park with the pathway network. The park is also a very popular site for access by ice fishermen in the winter onto the Bayou.

Amenities and Facilities

- Three Picnic Pavilions
- Restrooms
- Boardwalk Fishing Pier
- Play Equipment
- Wading Beach
- Parking
- All Purpose Field
- Sand Volleyball
- Drop-in Canoe & Kayak Area

Parks

Pottawattomie Park features a boardwalk and fishing pier.



Trails

Grand Haven Township has roughly 26 miles of trails



TRAILS

As noted previously in Chapter 10, Grand Haven Charter Township has roughly 26.7 miles of non-motorized pathways. The Township Board is currently considering whether to place another dedicated mileage for an additional 10 miles of pathway on the ballot in 2016. A list of pathway priorities is listed at the end of this chapter.

EXPLORE THE GRAND REGION RECREATION PLAN

The following goals, objectives and action statements from the Explore the Grand Region Recreation Plan reflect significant public input and provide useful information about plans for additional and improved recreation facilities. They are included in this Master Plan because they play a significant role in future decisions on capital improvements and the allocation of resources.

GOALS AND OBJECTIVES

Goal 1. To provide multi-generational recreational opportunities within the community as the Township is comprised of persons of all ages.

Objectives:

- a. To provide activities for each of the major age and activity groups.
- b. To provide for activities and experiences that can be enjoyed together with persons of multiple ages.
- c. To allow for all persons of multiple generations, extended family groups, and large groups to universally gather and enjoy the parks.

Goal 2. To provide recreational facilities for persons of all abilities both mentally and physically.

Objectives:

- a. To develop new facilities that will expand recreational opportunities for all residents.
- b. To develop and upgrade new and existing facilities that will meet the Americans with Disabilities Act, (ADA).
- c. To develop new facilities that integrate ADA accommodations in such a way that they are seamlessly used by all residents within the community and to not cause separation of users based on abilities.

Goal 3. To retain all existing park lands for the use and enjoyment of residents.

Objectives:

- a. To retain existing recreational lands for recreational use.
- b. To maintain, to the best of its ability, the existing park facilities.

- c. To enhance and make improvements to the parks based on the Community Recreation Plan.

Goal 4. As residential growth continues within the Township, the natural areas owned by the Township continue to grow in significance and face increased public usage. The Township will continue to provide diversified natural experiences for the residents.

Objectives:

- a. To protect and plan for the best usage of natural areas within all of the Township's parks, recreational facilities, and natural preserves.
- b. To seek property acquisitions in order to expand the existing parks, recreation facilities, and natural preserves within the Township, as well as create new parks, recreation facilities, and natural preserves.
- c. To develop a plan that will encourage gifts of land to the Township or the Land Conservancy of West Michigan for additional park lands and preserves.

Goal 5. To continue to provide, as much as possible, free use of the parks and facilities.

Objectives:

- a. To continue to allow for open use of the park lands and to not charge admission into the facilities to provide public recreational opportunities for all residents regardless of economic status.
- b. To minimally charge, as required, for the boat launch operation, special events, facility usage and athletic field maintenance to keep the facilities available for public use.

Goal 6. To continue the development of the Non-Motorized Pathway System within the Township for the purpose of providing for healthy lifestyles through exercise, enjoyment of the environment, and as a non-motorized transportation system linking homes, schools, parks, and commercial areas.

Objectives:

- a. To continue to expand the system providing additional linkages.
- b. To link the system whenever possible to other planned county and regional non-motorized systems including linkages shown on the Ottawa County Non-Motorized Pathway Study prepared by the Ottawa County Planning and Grants Department in 2008. The study shows proposed regional routes along Lake Michigan Drive, and Mercury Drive along the Grand River as well as more newly proposed US 35 Bicycle Route from Sault Ste. Marie to Natchez Trace, MS.
- c. To support future ballot issues for additional funding for pathway system development and maintenance.
- d. To maintain a master plan for pathway development which includes both the Township System

and regional proposed pathways.

Goal 7. To continue to support Northwest Ottawa Recreation Authority (NORA) which is jointly supported by the regional governmental agencies and public schools. Encourage non-profit organizations to provide recreational programming, maintenance and special events within the community.

Objectives:

- a. To assist, as funds allow, the non-profit organizations through the development and maintenance of recreational facilities that support the athletic leagues and special events.

Goal 8. Seek cooperative efforts with adjoining governmental units in providing public parks and recreation facilities.

Goal 9. To support the efforts of the Ottawa County Parks and Recreation Commission and continue to nurture the relationship between the Township and the County.

Objectives:

- a. To support the County's acquisition and development of public recreation lands along Lake Michigan known as the North Coastal Greenway. Within Grand Haven Charter Township, these parks currently include Rosy Mound Natural Area and Kirk Park. The County parks along Lake Michigan provide lake access to all Township residents as well as attract users from throughout the larger West Michigan community.
- b. To support the County's acquisition and development of public recreation lands along the Grand River known as the Grand River Greenway.
- c. To support the County efforts to retain Hiawatha Forest, a 365 acre site east of Kirk Park, as a natural area with hardwoods and pines.

Goal 10. To support and encourage the discussion of an expanded regional recreation authority with neighboring cities, Townships, and school districts.

Objectives:

- a. To plan and provide for active and passive recreational facilities based on regional need and use through the authority.
- b. To provide programming staff and community recreation programs through a regional recreation authority.
- c. To provide funding to support the regional recreation authority.

Goal 11. To increase public awareness and knowledge of the recreational opportunities which exist for the Township residents and visitors.

Objectives:

- a. Develop promotional brochures and materials with information on the parks.
- b. Utilize the Township’s website to provide access to electronic versions of information.

Goal 12: To be a community that celebrates and promotes recreational tourism.

Objectives:

- a. To encourage the public use of facilities for special recreational events.
- b. To encourage promotion of recreational bicycle and water trail tourism.

THE ACTION PLAN

The potential project list provides a list of each of the projects identified within the Explore the Grand Region Recreation planning process in a priority order, with the projects of highest priority listed first. This list will assist the Township in the identification of needed funds for the development of park facilities and recreational opportunities and is meant as a guideline that may be adjusted to meet changing recreational goals and objectives.

POTENTIAL LAND ACQUISITIONS

1. Grand Haven Charter Township continues to focus on the acquisition of lands adjacent to Hofma Park and Hofma Preserve in order to expand the natural based recreational resources within this unique and naturally rich area of the Township.
2. Parklands in southwest quadrant of Township are desired as the Township currently does not own any parklands in this area of the Township. As this area is currently the least developed, it is anticipated that overtime demand for greenspace in this southwest area will increase.

POTENTIAL PROJECT LIST

1. Hofma Park Stabilization along Entrance Drive

Installation of a retaining wall on the west side of the entrance drive will reduce erosion and stabilize the vegetation along the drive.

2. Mercury, Bignell, & Pottawattomie Parks Tree Plantings

Each of these three parks has large older trees providing an existing shady canopy. As these trees age, and die, there are currently limited trees to take their place to maintain the shade canopy. The grass is currently mowed, eliminating new seedlings from growing naturally. Each of these parks requires new tree plantings to insure the future of the shade canopy.

3. Hofma Preserve Update of Grills

New updated grills with ADA accessible surfaces will be installed at the pavilion to provide better grilling opportunities. The current grills are out dated and are not ADA accessible.

4. Boat Launch Power Off/On Enforcement Signs

Install signage to increase the awareness regarding the damage to the launch caused by boat owners powering their boats on and off their trailers. Signage will also include the required rules prohibiting these actions.

5. Hofma Park Additional and ADA Parking at Soccer Field

Construct additional parking at Hofma Park to accommodate athletic field use. Currently park users are parking off the roads into the natural areas in undesignated parking areas due to the lack of adequate parking. This unauthorized parking also creates access issues along the road by narrowing the travel area on the road surface. Provide ADA accessible parking within the redesign of the site parking.

6. Hofma Preserve Larger Sign at Sleeper St. Entrance

Install a larger more visible sign at the Sleeper Street entrance to provide better public visibility and access to the park.

7. Hofma Park and Pottawattomie Park Barrier Free Picnic Tables

Provide barrier free picnic tables on an accessible surface to provide expanded picnic facilities within the parks. The current individual tables are not accessible tables.

8. Pottawattomie Park Barrier Free Access to Play Equipment

New, barrier free play equipment with transfer stations was installed approximately 5 years ago. This will provide barrier free access from the parking area to the play equipment. Proper landings around the transfer stations will also be included.

9. Hofma Park and Preserve: Barrier Free Accessible Trail Loop

Create a barrier-free trail loop within the preserve connecting to existing parking and restroom facilities. Currently there are not any barrier-free trails within Hofma Park and Preserve. Additional benches are needed along all of the trails for resting as well as offering opportunities to view wildlife and plants. An expansion to the existing Hofma Park parking is required to provide for concurrent uses of the trail areas as well as the active sports areas.

The current parking has also increased from vehicles coming to use the park as a trailhead for the larger non-motorized pathway system that runs along the south boundary of the park.

10. Baby Changing Stations in Park Restrooms

Baby Changing Stations will be added to the park restrooms at Mercury, Pottawattomie, and Hofma Preserve and Park to provide the public with a location to change baby diapers.

11. Park Brochures

Park brochures for each of the parks or for the parks as a whole would be useful in communicating to the residents what facilities and recreational opportunities are available in each of the parks. These brochures could be posted in the parks, printed as handouts, and available as PDF's on the Township's website.

12. Hofma Park Additional Winter Parking

Additional Winter Parking Additional parking during the winter months is needed due to increased usage of the trails. The current area is small due to current snow plowing practices. Solutions need to be reviewed and planned.

13. Hofma Park Re-stripe Parking for Angled Parking

The current drive is configured as one-way traffic. Restriping the parking for angled parking could increase the number of parking spaces within the park and increase the ease of vehicle circulation.

14. Hofma Park Ferris Entrance Drinking Fountain and Picnic Table

The Township's Non-Motorized Pathway runs through the park along Ferris Street. Creating a rest stop along the pathway will provide residents an opportunity to find water as well as a place to rest and picnic along the pathway. There are no other rest stops along this pathway in this area of the Township.

15. Signage at Park Entrances Identifying Amenities

Additional signage at all of the park entrances identifying the park facilities and recreational opportunities will provide residents better knowledge regarding the parks and the potential that they may visit the parks more often.

16. Pottawattomie Park Additional Parking

Pottawattomie Park is a very popular and busy park within the Township providing; three large rental pavilions, access to Pottawattomie Bayou, fishing, picnic facilities, play areas, and a soccer field. The intensive overlapping facility use often fills the parking lots to overflowing. Additional parking will provide for the growing use and keep vehicles from spilling over into the natural areas or blocking drives.

17. Hayes Street Drop-in Boat Launch

This project will require a joint effort with the City of Grand Haven and will provide a new boat launch for small drop in water craft such as kayaks and canoes. Public access is limited to the Grand River, and this site would provide a unique location for small boat launching. This project has been listed in three previous plans and remains a project of interest.

18. Hofma Park and Preserve: Interpretive Center & Signage

This proposed project would be the construction of an interpretive center within the preserve to provide outdoor educational opportunities at the park. To further this project, a study needs to be completed regarding facilities that are desired, programming and staffing requirements, as well as funding alternatives. This center could be as simple as a series of outdoor signs or a nature center building. The Hofma Preserve provides over six miles of nature trails and is the primary natural area within the central area of the Township. It is the primary natural area owned by the Township which contains a variety of ecosystems and native plant areas. Interpretive signage will provide educational opportunities as residents explore the natural areas along the existing trail system.

19. Shiawassee Avenue, Brucker Street, & Buchanan Street - Street End Improvements

The northern end of Shiawassee Avenue right-of-way provides access to Pottawattomie Bayou. The current public access will be renovated to provide an ADA accessible pathway and seating within the right-of-way for residents to gain access to the southern side of the Pottawattomie Bayou. The access is utilized primarily by the surrounding neighborhood to gain access to viewing the Bayou or fishing. Both Brucker and Buchanan Street ends provide public access to the Lake Michigan beach. Both currently have limited development, but are popular public access points. Both beach sites will benefit from better access and the public will benefit from increased ADA accessibility. Preliminary site design will determine the actual proposed development at these sites.

20. Multi-Use Fields and Park (Location Undetermined)

The development of a larger multi-use sports park has been desired as a need to support the Northwest Ottawa Recreation Authority programs as well as the local non-profit athletic associations for baseball, softball, soccer, lacrosse, and football. The current area-wide facilities Explore the Grand Region 2015-2019 Adopted February 2015 167 are inadequate to meet the current and growing athletic needs. The facility will most likely be funded as an area wide facility, and is therefore rated as a lower priority when prioritized directly with Township development priorities.

21. Disc Golf Course (Location Undetermined)

As part of the recreation planning process it was determined that the construction of a new disc golf course is desirable. However, there currently are not any public disc courses in the area, with the nearest in either Muskegon or Grand Rapids. The facility can be open to the public at most times, and will not require an admission fee, thereby furthering the goals to provide multi-generational opportunities, recreation for all ages, and at low or no cost to the visitor. A possible location for the course is the sixty acre property adjacent to Hofma Preserve which will become the property of the Township through a trust. Construction of a course in this location would allow for the utilization of existing parking, restroom, and picnic facilities.

22. Dog Park (Location Undetermined)

Increased pressure is being placed on the Township parks by both resident and non-residents dogs as other parks within the area continue to ban dogs. This increased usage has developed an interest in further investigating the development of a dog park within the community.

23. Mercury Park Lighting of Softball Field

The existing softball field at Mercury Park is utilized by adult softball league play. The lighting of the field will allow for extended seasonal play in the spring and fall for after work leagues.

24. Mercury Park Higher Fences Around Player Areas

Higher fences around the player areas will provide additional protection to the players from foul or miss thrown balls.

25. Update On-Line Reservation System

Updating the On-Line Reservation System on the Township's Website will allow for better public access to information regarding shelter availability, ability to place a rental reservation, as well as pay for the rental. It will also help to reduce staff time in assisting persons with reservations.

26. Hofma Park Softball Field Lighting

The existing softball field at Hofma Park is utilized by adult softball league play. The lighting of the field will allow for extended seasonal play in the spring and fall for after work leagues.

27. Pottawattomie Park Historical Interpretation Signage

The history of Pottawattomie Park has a historical background which includes Native Americans, early fur traders, settlers, and Girl Scouts prior to becoming a public park. Interpretive signs will provide public information and education regarding these previous land uses.

28. Pottawattomie Park Kayak and Canoe Launch

The existing park facilities and the park's location on the Pottawattomie Bayou provide a good location for the installation of an ADA accessible Canoe and Kayak Launch. The launch would provide access to the Bayou, the connecting Grand River, the developing Grand River Water Trail, as well as extended paddle trips even out to Lake Michigan. The launch would be for non-motorized hand launched water craft.

29. Memorial Viewing Platform under the Mercury Drive Bayou Bridges

Construct and dedicate a memorial viewing platform under both bayou bridges along Mercury Drive.

30. Non-Motorized Pathway Retaining Wall Stabilization along Lakeshore Drive

Stabilize the existing retaining wall on the east side of the non-motorized pathway along Lakeshore Drive. This will reduce further erosion and stabilize the pathway.

Parks

Higher fences around the player areas in Mercury Park will provide additional protection to the players from foul or miss thrown balls.



GRAND HAVEN CHARTER TOWNSHIP NON-MOTORIZED PATHWAY PLANNING

The existing Non-Motorized Pathway System is an extremely popular and important transportation system within the Township. The pathway system serves both as a recreational resource for activities such as walking and biking, but also as a transportation network, as the Township does not have public sidewalks. Planning discussions included looking at priorities for future expansion of the system.

Priorities from the Parks and Recreation Committee include:

1. Adding a pathway on 144th Avenue from Mercury Drive south to Lincoln Street.
2. Adding a pathway on Buchanan St from US-31 west to Lakeshore Drive.
3. Adding a pathway connector on 152nd Avenue between Ferris Street and Lincoln Street.
4. Adding a pathway connector on 168th Avenue between Buchanan Street and Ferris Street.
5. Adding a pathway on Groesbeck Avenue from 152nd Avenue west to the end.
6. Adding a pathway on Sleeper St from 168th Avenue to Hofma Preserve.
7. Adding a pathway on Lincoln Street from Lakeshore Drive west US-31.
8. Adding a pathway on Lincoln Street from US-31 east to 144th Avenue
9. Adding a pathway connector on US-31 between Ferris Street and Lincoln Street.
10. Adding paved shoulders on M-45 from Lakeshore Drive east to US-31.

In addition to these pathway extensions, the Explore the Grand Region Plan outlines a series of land acquisitions to expand pathways in nearby Spring Lake Township, including:

Eagles Campground on Little Black Lake for additional waterfront park land and a possible public campground

Land parcels to be determined along M104 to provide a viewshed to Lloyd's Bayou and to provide a trailhead parking area.

Land Parcels to be determined along the Grand River and Spring Lake to provide additional waterfront access to pocket park opportunities along the multipurpose pathways.

rebounding from the Great Recession, or if other competitive advantages are driving changes in the West Michigan economy.

The U.S. Bureau of Labor Statistics provides information on the employment and wages for the Holland-Grand Haven Metropolitan Statistical Area. This data is only comparable through 2014, as the U.S. Bureau of Labor Statistics has changed the MSA definitions for West Michigan. Table 12.1 shows that the Holland-Grand Haven MSA has continued to grow in terms of employment and jobs from 2010 to 2014.

Table 12.1 Holland-Grand Haven MSA Economic Overview, 2010 to 2014

	2010	2011	2012	2013	2014
Total Employment	98,600	100,000	102,770	105,430	113,270
Average Hourly Wage	18.67	18.83	18.63	19.26	19.58
Average Annual Wage	38,840	39,160	38,750	40,070	40,720

Source: Bureau of Labor Statistics

Again, the cause of job and wage growth is not clear. However, it is clear that a number of industries have a stronger presence in the Grand Haven regional economy than in the country overall. This is measured by use of location quotients, as shown in Table 12.2 and discussed below.

A location quotient represents the share of jobs an occupation has in the regional economy, compared to the United States economy overall. In other words, if an industry’s location quotient is above 1.00, it means this industry is more represented in the Grand Haven regional economy than it is in the United States as a whole. The industries in Table 12.2 have a high location quotient, meaning that the Grand Haven region specializes in producing those products or services, is more inclined to attract these industries, and likely has a competitive edge in these areas.

Table 12.2 Industries with High Location Quotients in 2014

Industry	2014 Location Quotient	% Increase in Employment, 2010 to 2014
Production Occupations	2.94	30.6
Architecture and Engineering	2.42	36.5
Building Grounds, Cleaning and Maintenance	1.44	22.7
Transportation and Material moving	1.24	2.7
Installation, Maintenance, Repair	1.05	30.3
Healthcare Support Operations	1.01	36.3

Source: Bureau of Labor Statistics, 2010 to 2014

Table 12.2 shows that there are a wide variety of manufacturing, architecture, transportation/construction, and healthcare professions with a strong presence and job growth in the Grand Haven Regional Economy (defined as the Holland-Grand Haven MSA). While it is not clear if these industries are regaining jobs lost in the Great Recession or if jobs are growing for other reasons, but it is clear these industries have a stronger presence in the Grand Haven regional economy than they do in the National economy overall.

TOP EMPLOYERS IN THE GRAND HAVEN REGION

The Grand Haven Chamber of Commerce produces annual reports showing the largest employers in the area. The top employers in the region in 2014 are shown in Table 12.3.

Table 12.3 Top Employers in the Grand Haven Region, 2014

Employer	Number of Full Time Equivalent Employees
Shape Corporation	1,500
Herman Miller	1,300
Grand Haven Area Public Schools	766
North Ottawa Community Health Systems	478
GHSP	387
Automatic Spring Products	315
Casting Technology Company	270
Meijer	250
West Michigan Molding	250
Engine Power Componenets	188
Brilliance Publishing	153

Source: Grand Haven Chamber of Commerce, 2014

BUSINESSES IN GRAND HAVEN CHARTER TOWNSHIP

According to ESRI Business Analyst data, there were 786 businesses employing 4,483 people in the Township in 2014, most of which was concentrated in the service industry. This includes professions like hotels and lodging, automotive services, motion pictures & amusements, health services, legal services, educational services, and other services. The number of businesses and their share of the labor force is shown in Table 12.4.

Grand Haven Charter Township has a mix of small and large businesses. Industries that, on average, employ between 20 and 50 people include Utilities, Education Services, Agriculture, and Manufactur-

ing. Retail trade and public administration industries employee between 10 and 15 people, on average, per business. Many other industries employ less than 5 people, on average per business. While these businesses may employ less people per business, they make up an integral and large part of Grand Haven Township’s economic base. In fact, 637 businesses are in industries that employ less than 5 people per business on average, making up over 80% of the Township’s businesses. About 40% of those who work in the Township work in a business that likely employ less than five employees.

Retail Trade overall employees about 14 people per business in Grand Haven Charter Township, but this number is perhaps misleading. Four large general merchandise businesses employ a total of 830 people, while the remaining retail sectors employ fewer people. A network of smaller retail shops can be very important to the health of a local economy. Grand Haven Charter Township has a mix of car shops, furniture stores, electronics stores, sporting goods and clothing shops, and food, health, and beverage stores.

Table 12.4 Top Industries in Grand Haven Charter Township, 2014.

Industry	# of businesses	% of all businesses	% of all employees
Services	389	49.5	26
Construction	98	12.5	5.2
Retail Trade	85	10.8	24.3
Finance, Insurance, Real Estate	55	7	2.9
Agriculture & Mining	44	5.6	14.1
Wholesale Trade	43	5.5	5.1
Manufacturing	37	4.7	18.3
Transportation	24	3.1	1.6
Communication	6	0.8	0.2
Government	4	0.5	1.2
Total	786	100	100

Source: ESRI Business Analyst, 2014 Reports

WORKFORCE LOCATIONS

Where do residents of Grand Haven Township find work? According to the Longitudinal Employer-Household Dynamics published by the U.S. Census Bureau, in 2013, out of all 6,389 primary jobs, about 26% (1,698) of Grand Haven Township’s workers commuted to the City of Grand Haven for work. About 10% (629) worked in Grand Haven Township, 8.5% (538) worked in Grand Rapids, and fewer numbers worked in Holland Township, the City of Holland, Muskegon, and Spring Lake Township.

This is reflected in a low commute time of 23 minutes for Grand Haven Township residents, and holds implications for transportation and regional collaboration that may be needed in the future.

Those under age 30 tend to find more work in the Township than the overall labor force that lives in Grand Haven Township. Grand Haven Township's manufacturing firms also have an impact on local commute patterns as Township residents that hold primary jobs are more likely to work in Grand Haven Township if they work in the manufacturing industry than if they work in another industry.

A second way to analyze regional commute patterns and the Township's labor force is to ask: Who is working in Grand Haven Township and what kinds of jobs does Grand Haven Township have? Data for this section comes also from the Longitudinal Employer-Household Dynamics published by the U.S. Census Bureau for the year 2013. First, over half the jobs (54.5%) held in the Township in 2013 were in the manufacturing industry. Manufacturing jobs are concentrated in the northern area of the Township, close to the Airport. Agricultural industries also have a strong number of jobs (612) in the Township, about 13% of the total jobs. Regionally, this industry is growing at a very fast pace, suggesting that this industry may continue to grow in the Township. Retail comprises an additional 9.4% of jobs.

Who hold jobs in Grand Charter Haven Township? Data for this section comes also from the Longitudinal Employer-Household Dynamics published by the U.S. Census Bureau for the year 2013. About 90% of Grand Charter Haven Township's workers are white, with Black, Asian, and other non-white populations holding the remaining 10% of jobs. The American Community Survey 5-year estimates from 2009 to 2013 show that 6% of Grand Haven Township's population is non-white, which means the worker population is slightly more diverse than the residents as a whole. About 12.4% of the worker population self-identifies as Hispanic or Latino. Though median income is higher than surrounding communities, the majority (58.1%) of the workforce in Grand Haven Township does not hold a college degree.

About 16% (629) of Grand Haven Township's jobs are held by Township residents. About 300, or 6% of those working in the Township live in Muskegon, about 270 or 5.7% live in the City of Grand Haven, with smaller numbers of commuters coming from Spring Lake Township (244), Norton Shores (231), Holland Township (225), and other nearby areas.

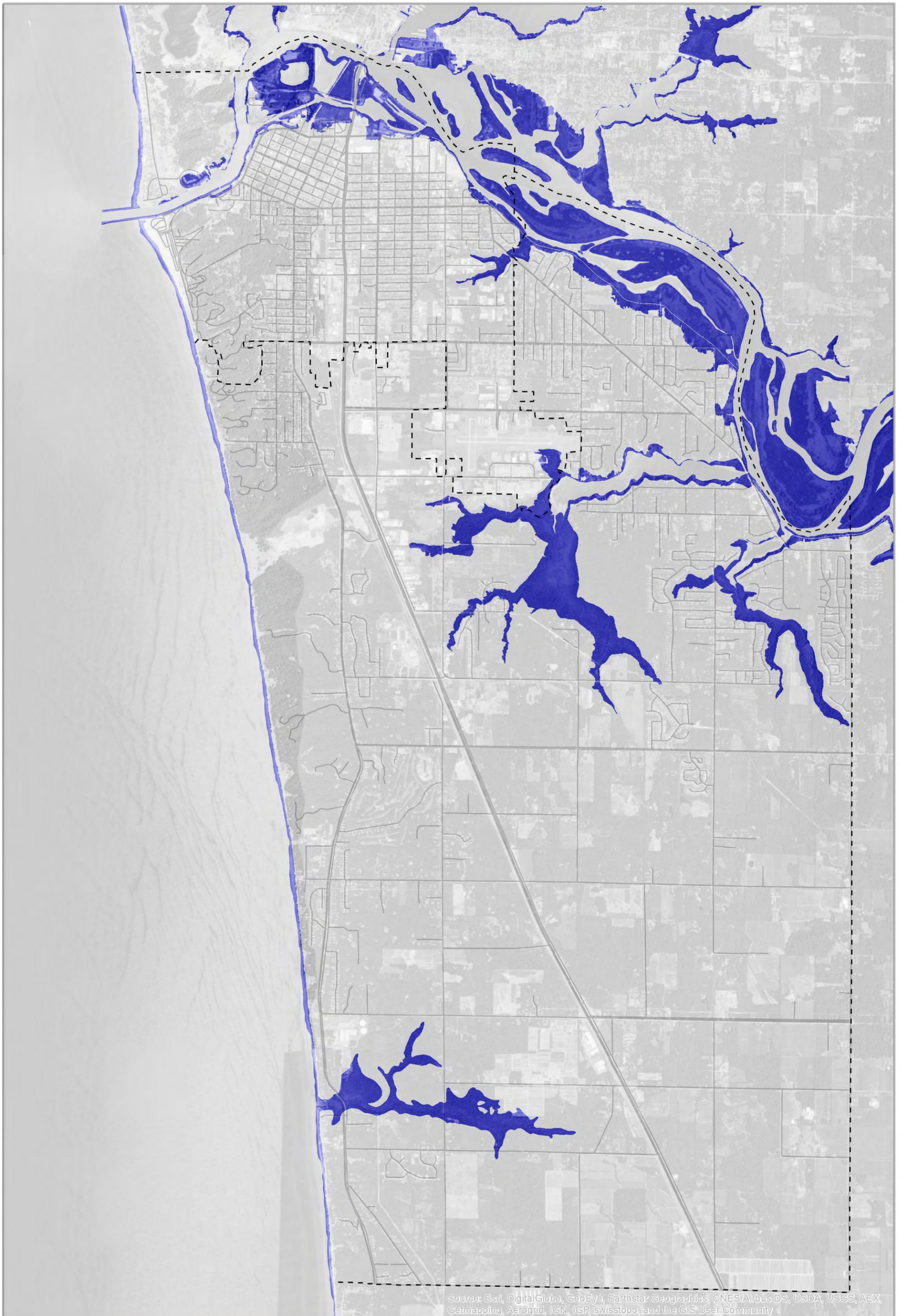
SUPPORTABLE RETAIL

Grand Haven Charter Township, like many places throughout the state, have a growing need for retail services. ESRI business analyst highlights areas that have the highest likelihood of being supported in the Township. This analysis involves measuring the available supply of a retail product matched to the demographic demand. The results of this analysis for Grand Haven Township suggest that the Township's growing population largely depends on commercial centers outside of the Township to

meet demand for many retail goods and services.

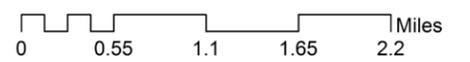
Many goods and services are easily provided just outside the Township's borders in the City of Grand Haven. Among the most under-supplied retail industries in the Township are automobile dealers and car-related industries, home furnishings, electronics, clothing stores, and restaurants. Many shops selling specialty products like jewelry, luggage, books, and garden equipment are also under supplied.

Map 2.1 "Lucky" Climate Future



 "Lucky" Flood Scenario

1:42,000

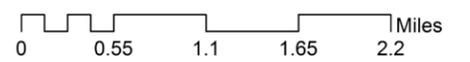
 Miles

2.2 "Expected" Climate Future



 "Expected" Flood Scenario

1:42,000

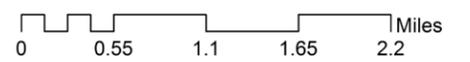
 Miles

2.3 "Perfect Storm" Climate Future

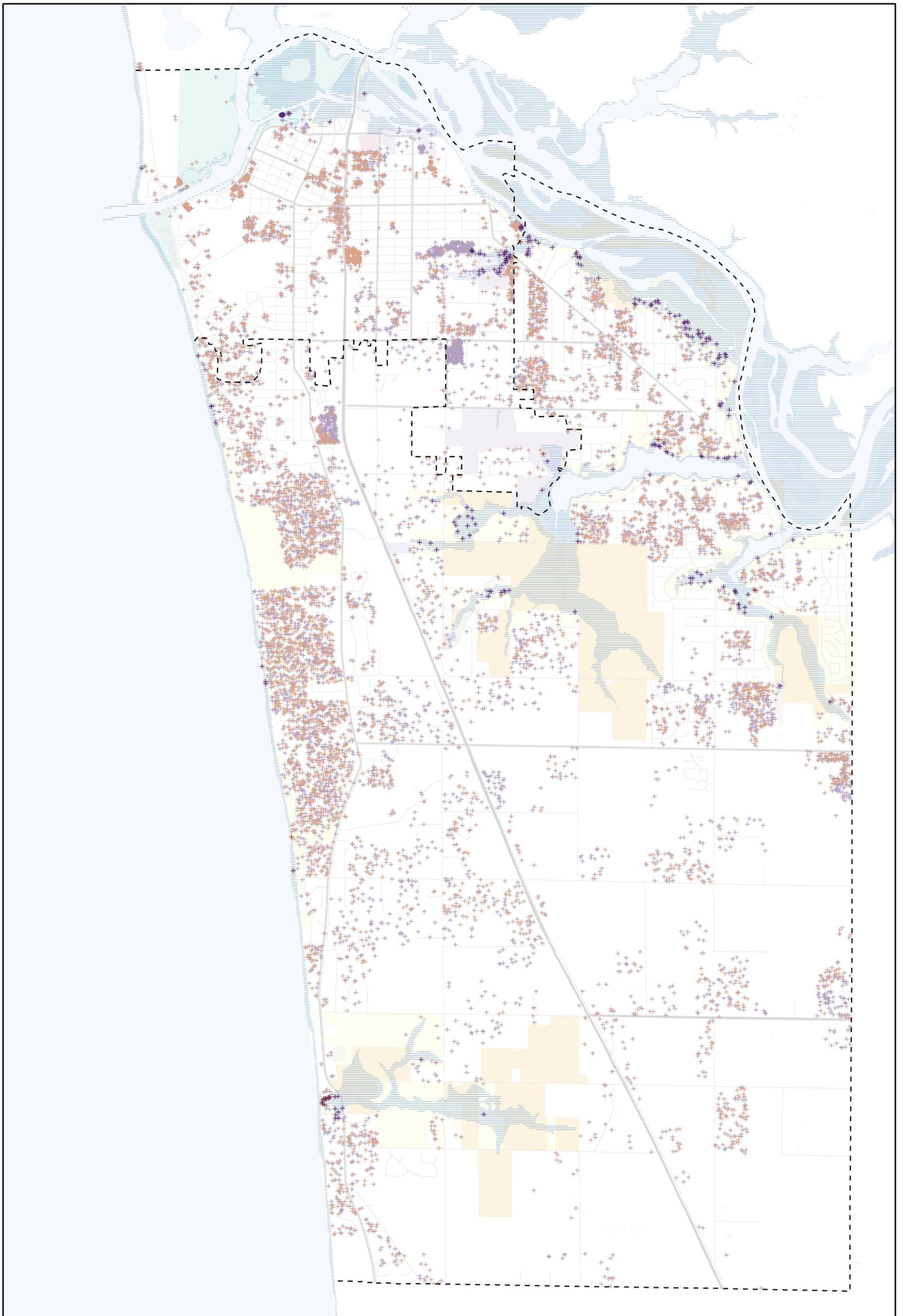


 "Perfect Storm" Flood Scenario

1:42,000

 Miles
0 0.55 1.1 1.65 2.2

2.4 Build-out management options under “Lucky” Climate Future

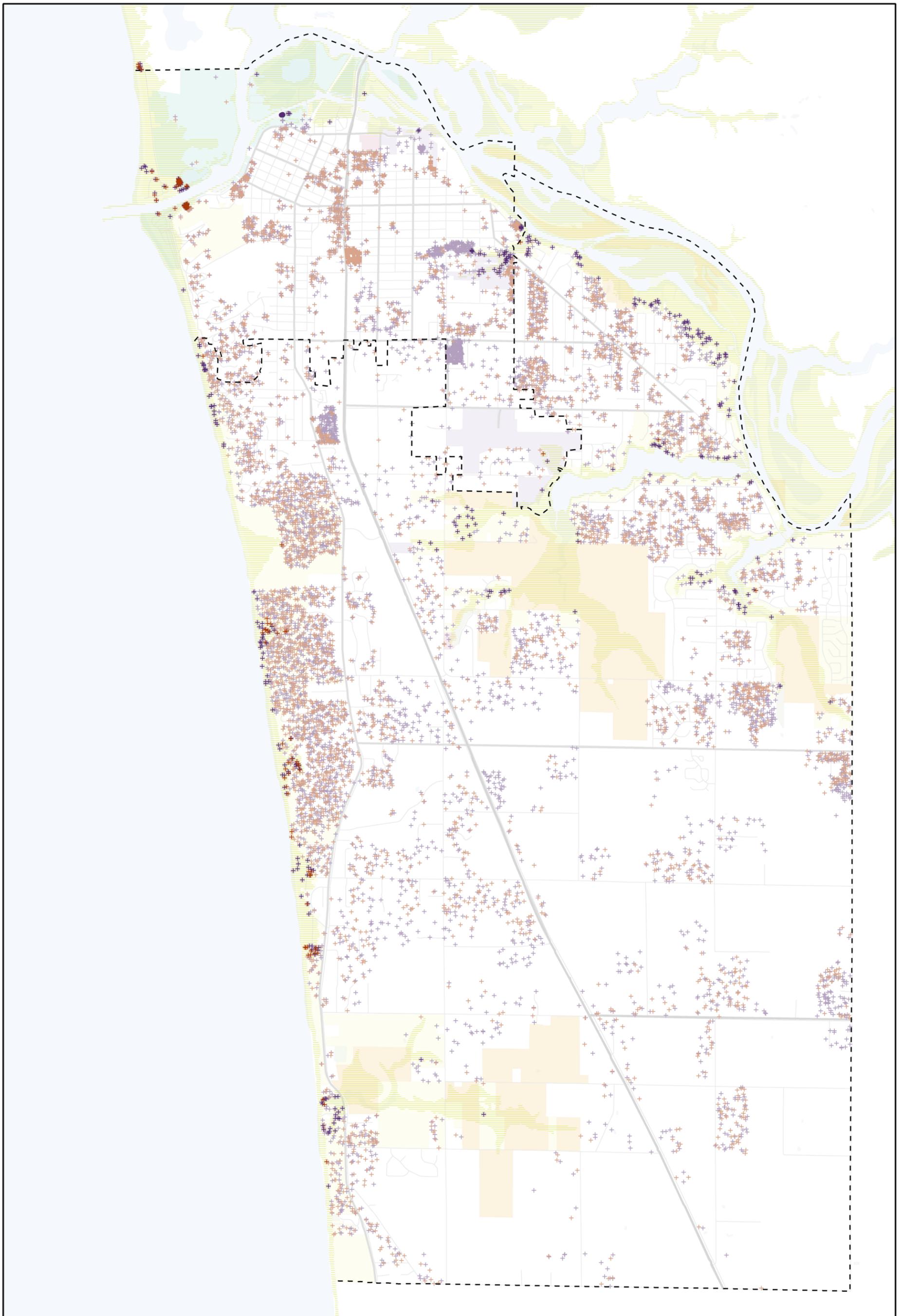


- + BMP Build-outs
- + Final Build-outs
- + BMP Build-outs in inundated area
- + Final Build-outs in inundated area

1:42,000

0 0.55 1.1 1.65 2.2 Miles

9.5 Build-out management options under “Expected” Climate Future

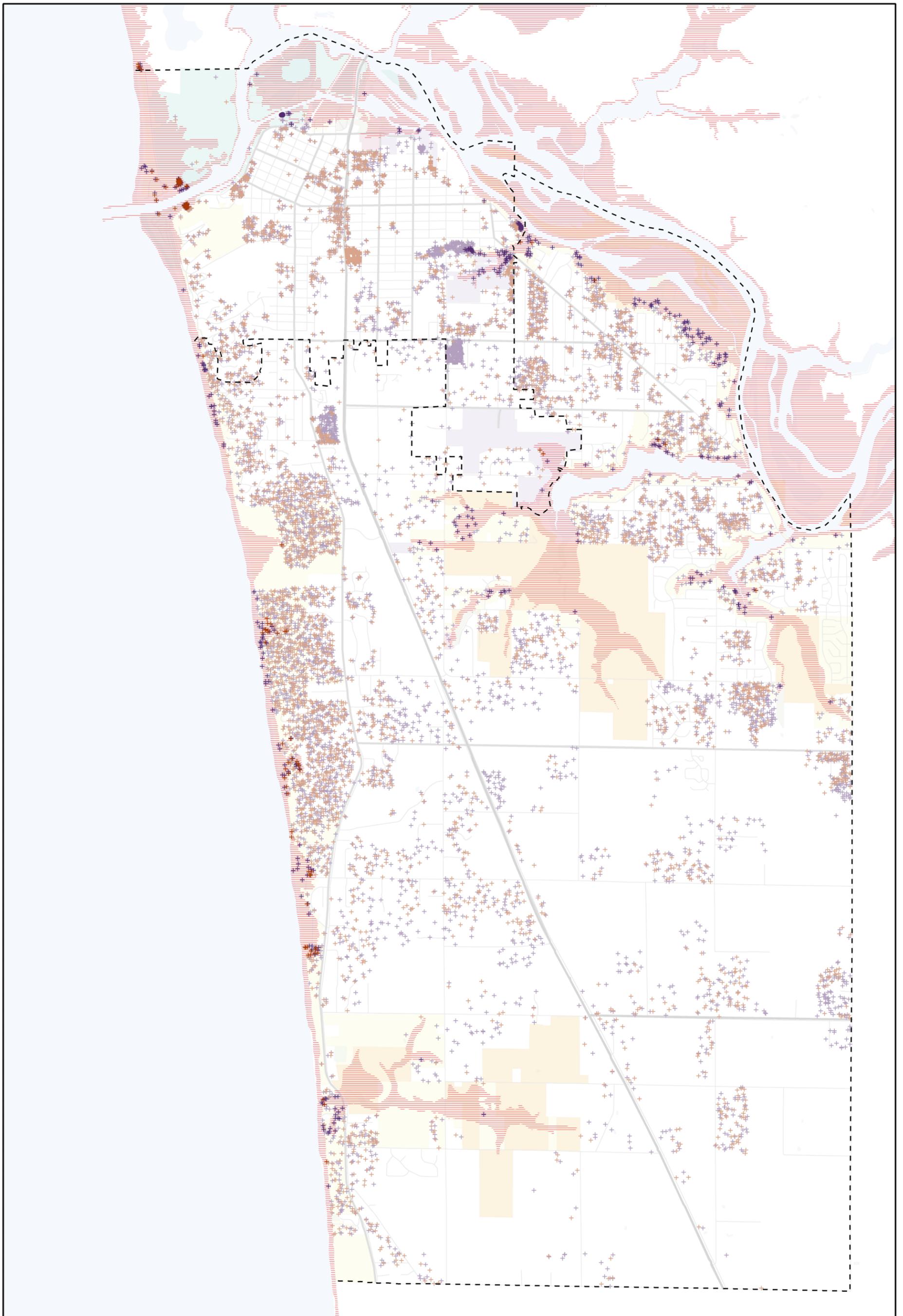


- + BMP Build-outs
- + Final Build-outs
- + BMP Build-outs in inundated area
- + Final Build-outs in inundated area

1:42,000

0 0.55 1.1 1.65 2.2 Miles

2.6 Build-out management options under “Perfect Storm” Climate Future

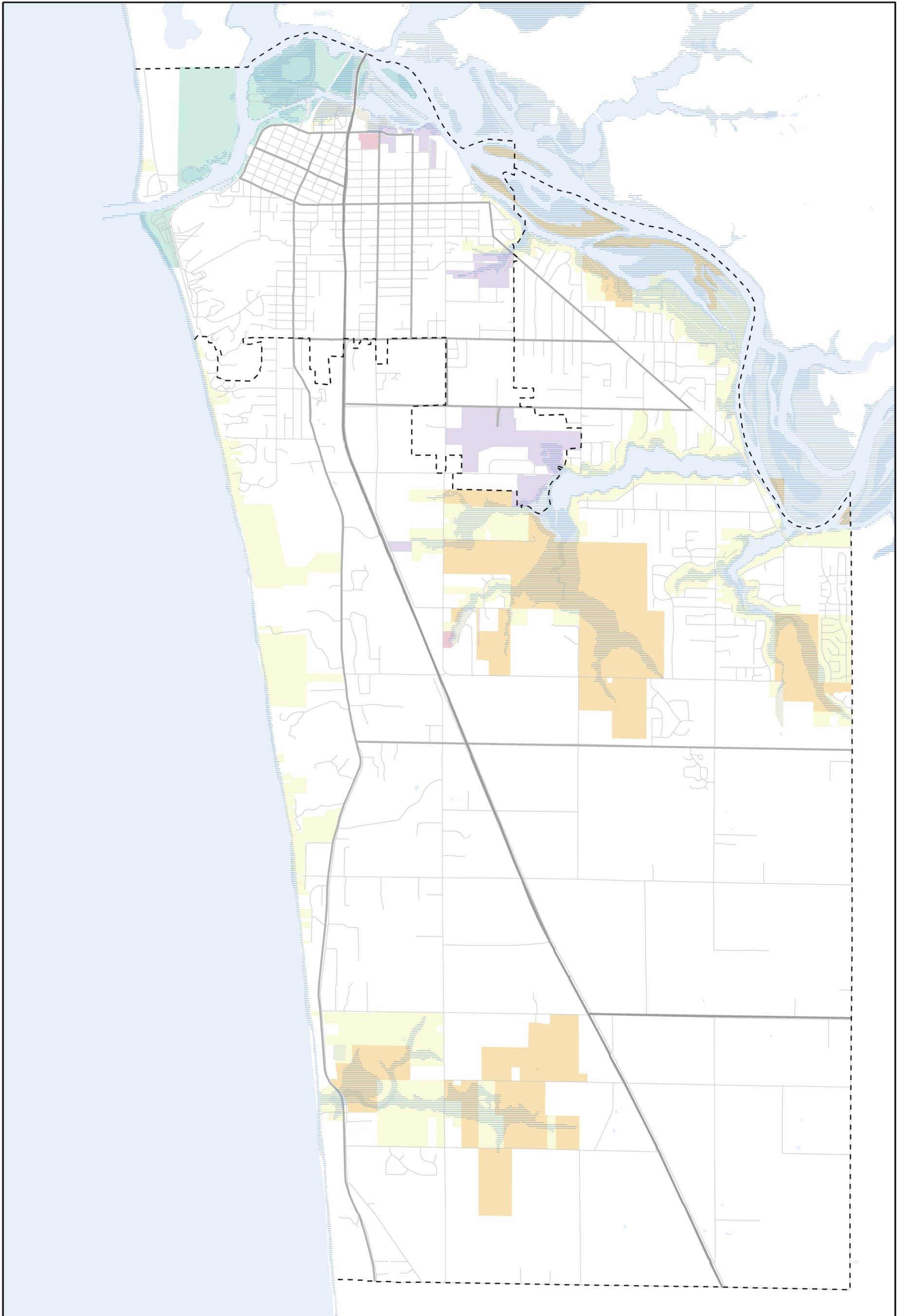


- + BMP Build-outs
- + Final Build-outs
- + BMP Build-outs in inundated area
- + Final Build-outs in inundated area

1:42,000

0 0.55 1.1 1.65 2.2 Miles

2.7 Parcels Affected under the “Lucky” Climate Future, by current zone

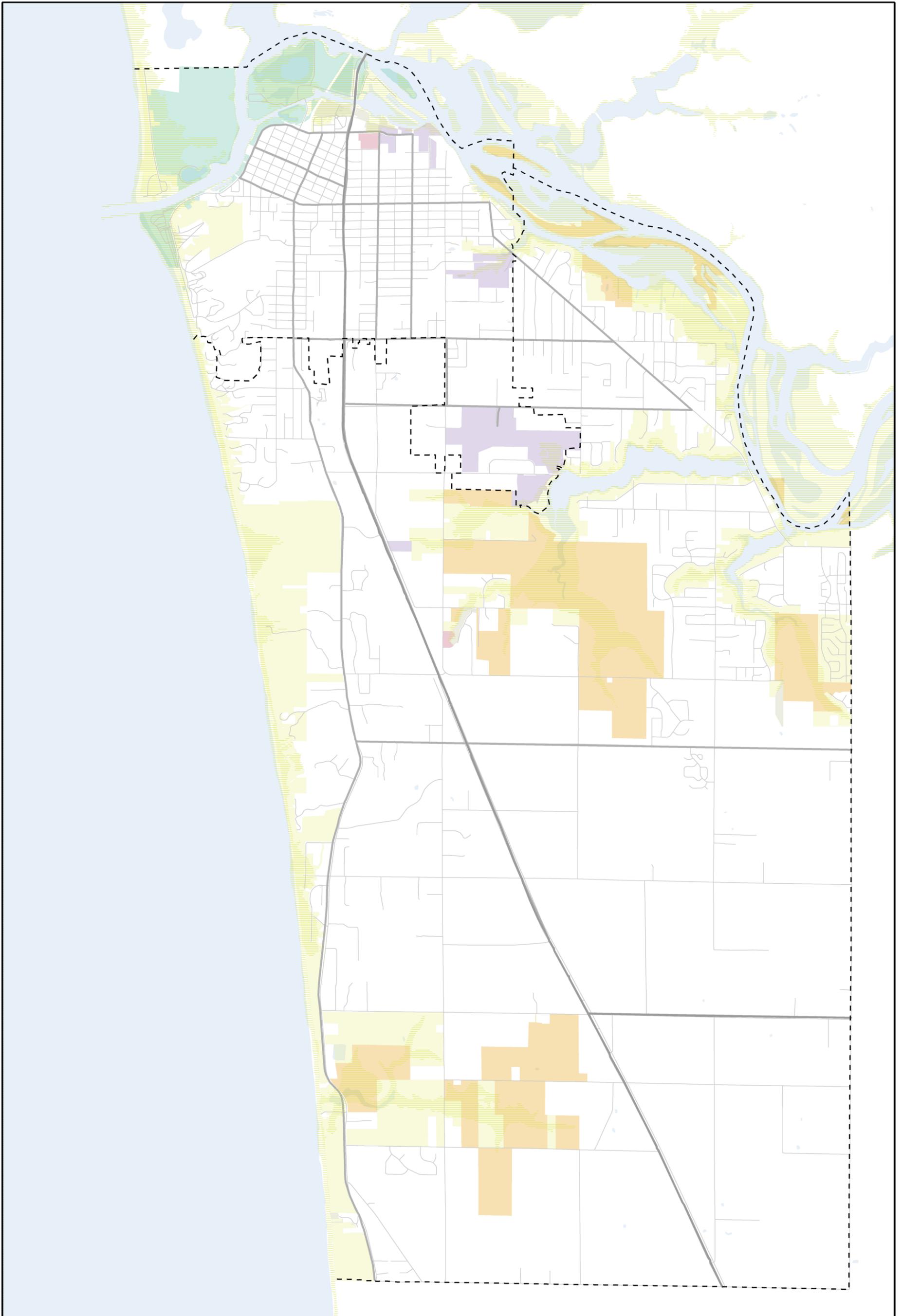


PUD Parcels Waterfront Parcels "Lucky" Flood Zone
Agriculture Parcels Commercial Parcels
Industrial Parcels Residential Parcels

1:42,000

0 0.55 1.1 1.65 2.2 Miles

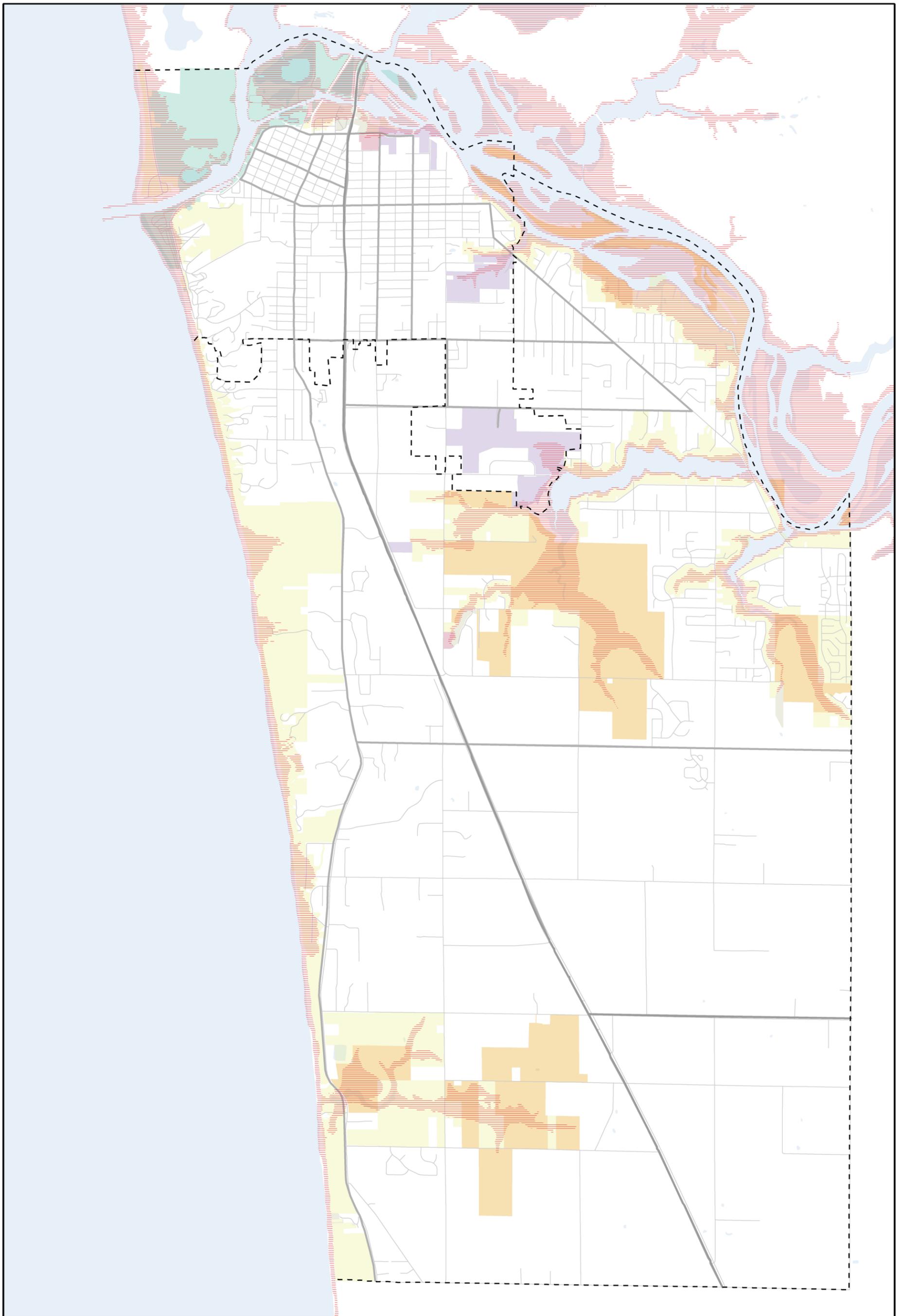
2.8 Parcels Affected under the “Expected” Climate Future, by current zone



PUD Parcels
Agriculture Parcels
Industrial Parcels
Waterfront Parcels
Commercial Parcels
Residential Parcels
"Expected" Flood Zone

1:42,000 0 0.55 1.1 1.65 2.2 Miles

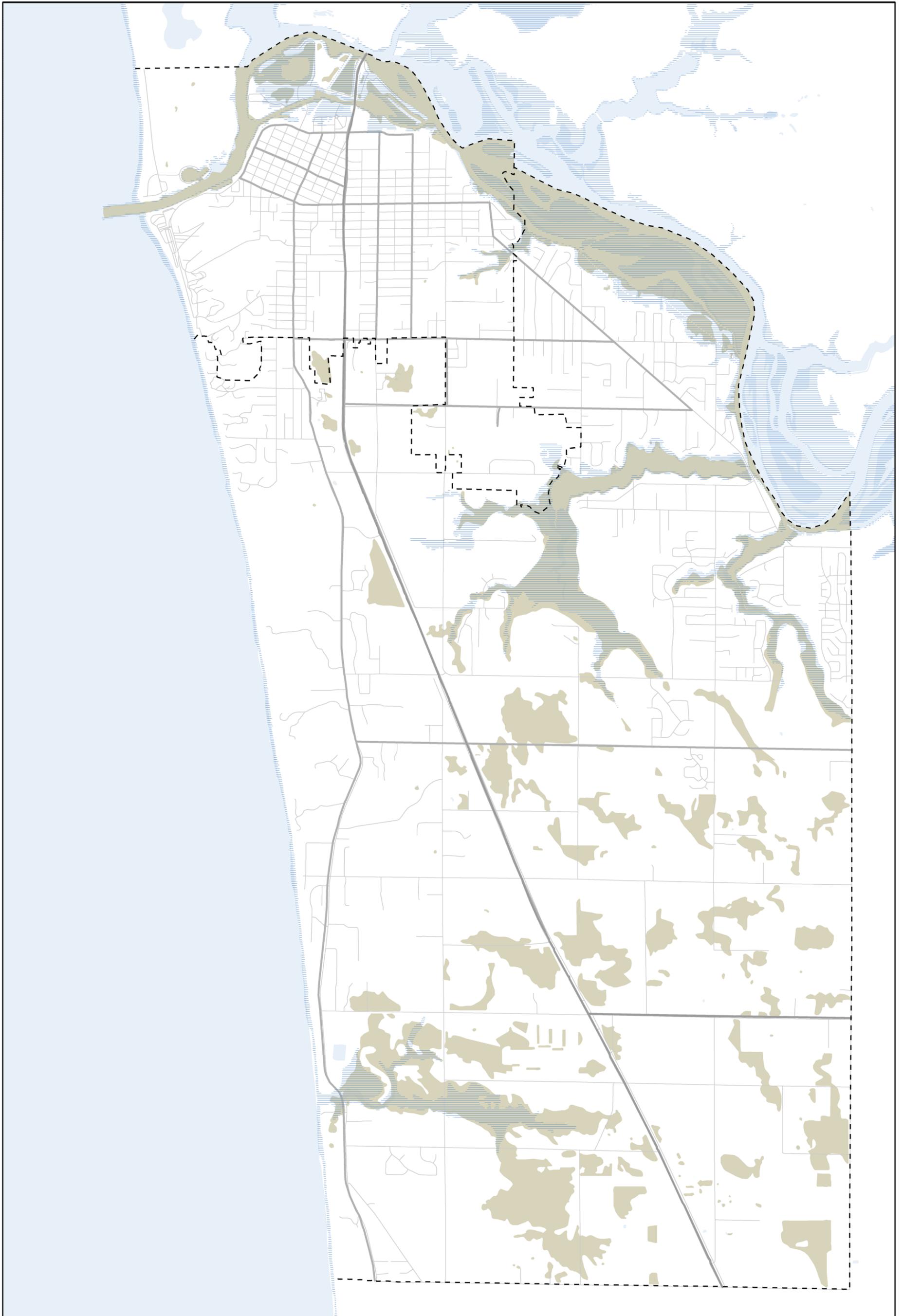
2.9 Parcels Affected under the “Perfect Storm” Climate Future, by current zone



PUD Parcels
Agriculture Parcels
Industrial Parcels
Waterfront Parcels
Commercial Parcels
Residential Parcels
"Perfect Storm" Flood Zone

1:42,000
0 0.55 1.1 1.65 2.2 Miles

2.10 Existing Wetlands under “Lucky” Climate Future



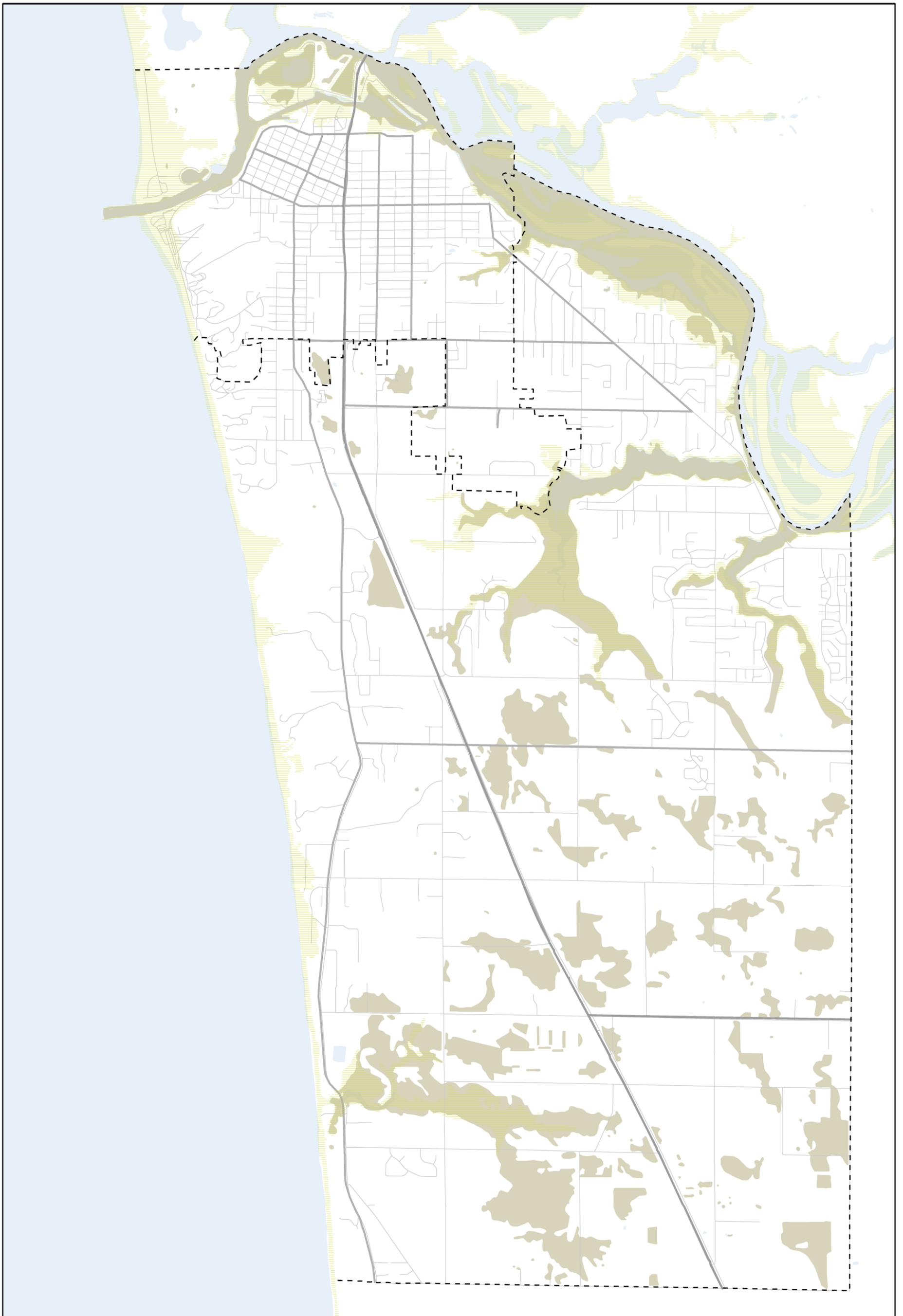
“Lucky” Flood Zone

Existing Wetlands

1:42,000

0 0.55 1.1 1.65 2.2 Miles

2.11 Existing Wetlands under “Expected” Climate Future

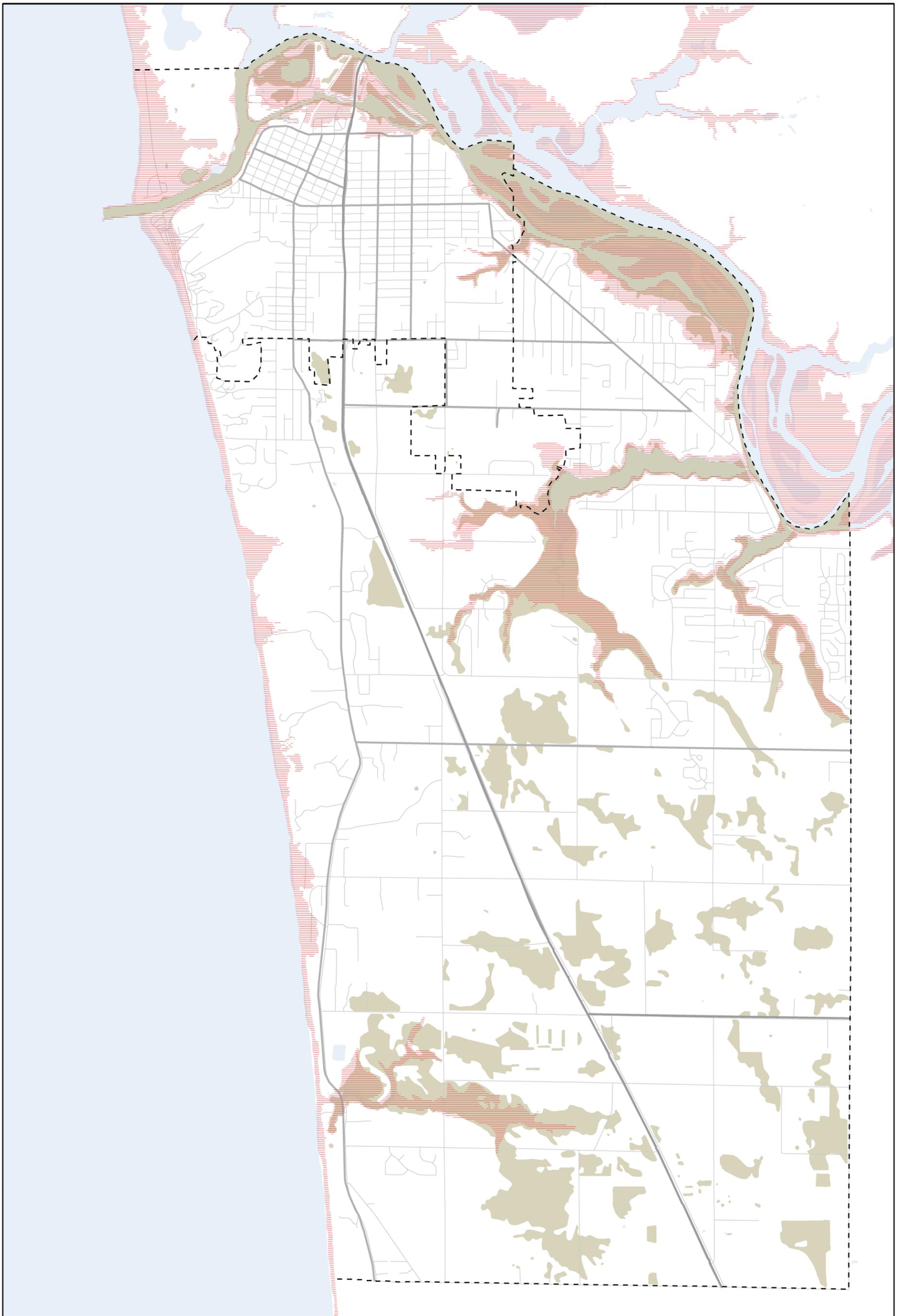


Expected Flood Zone Existing Wetlands

1:42,000

0 0.55 1.1 1.65 2.2 Miles

2.12 Existing Wetlands under “Perfect Storm” Climate Future

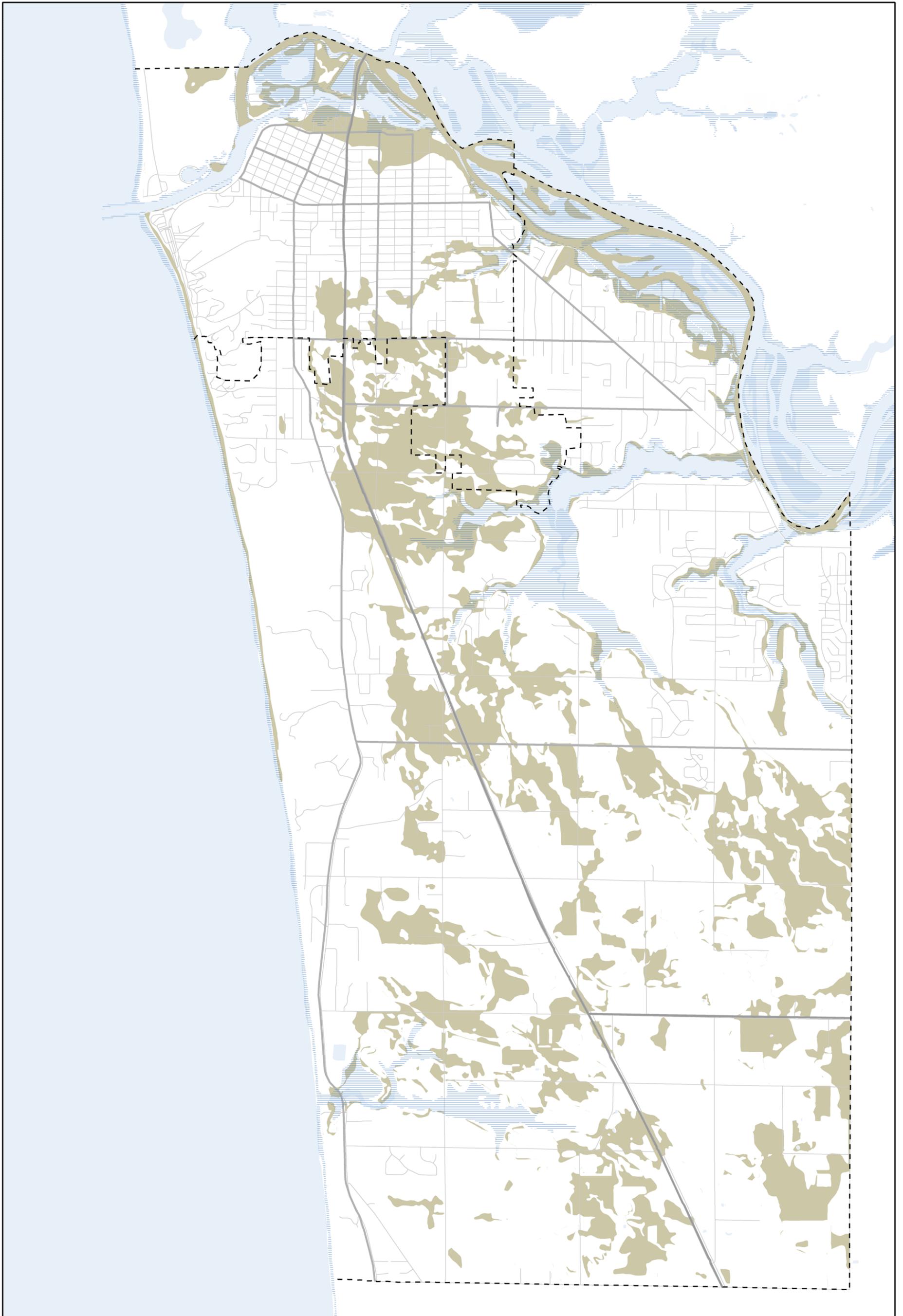


Perfect Storm Flood Zone Existing Wetlands

1:42,000

0 0.55 1.1 1.65 2.2 Miles

2.13 Potential Wetlands under “Lucky” Climate Future



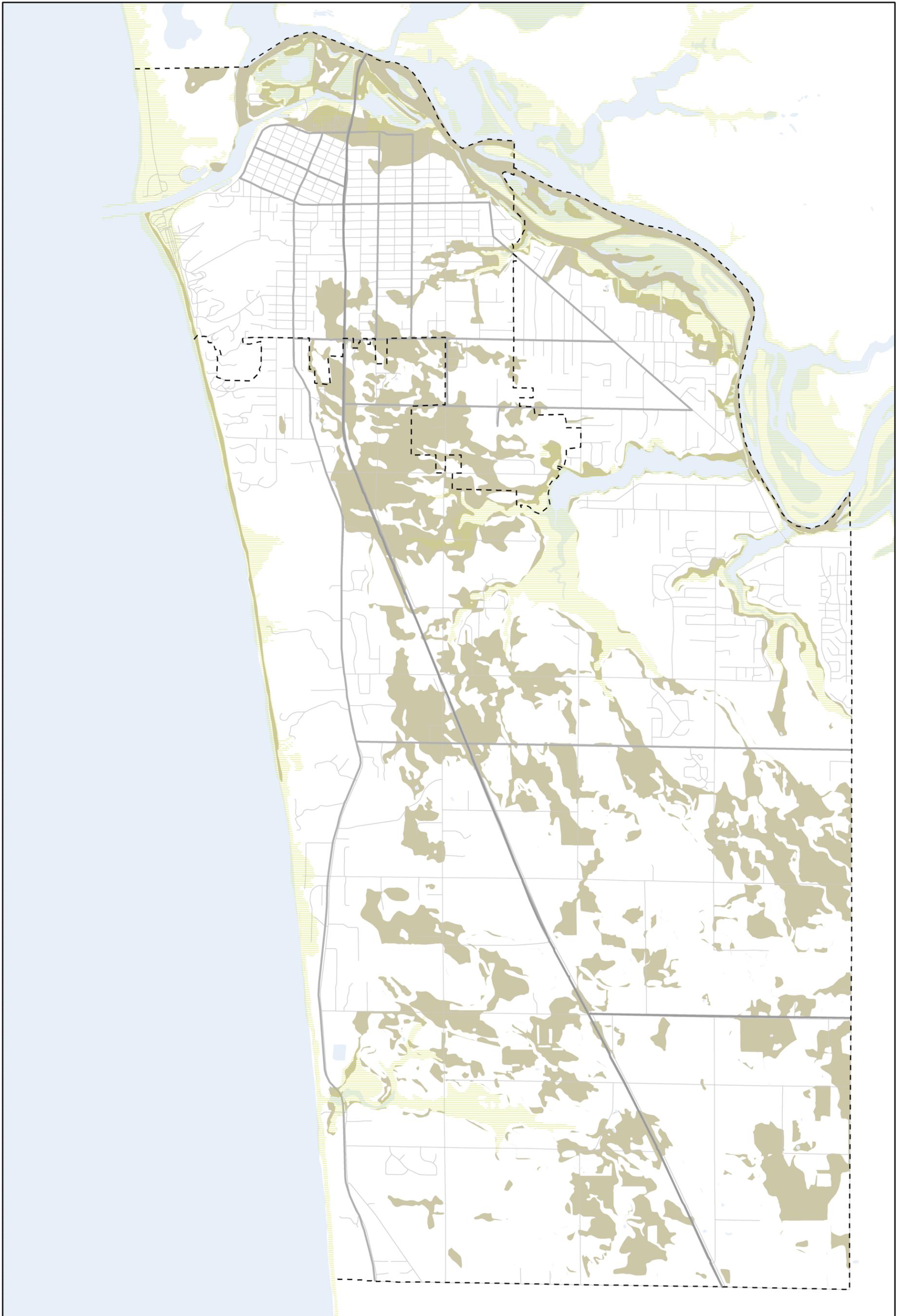
“Lucky” Flood Zone

Potential Wetlands

1:42,000

0 0.55 1.1 1.65 2.2 Miles

2.14 Potential Wetlands under “Expected” Climate Future

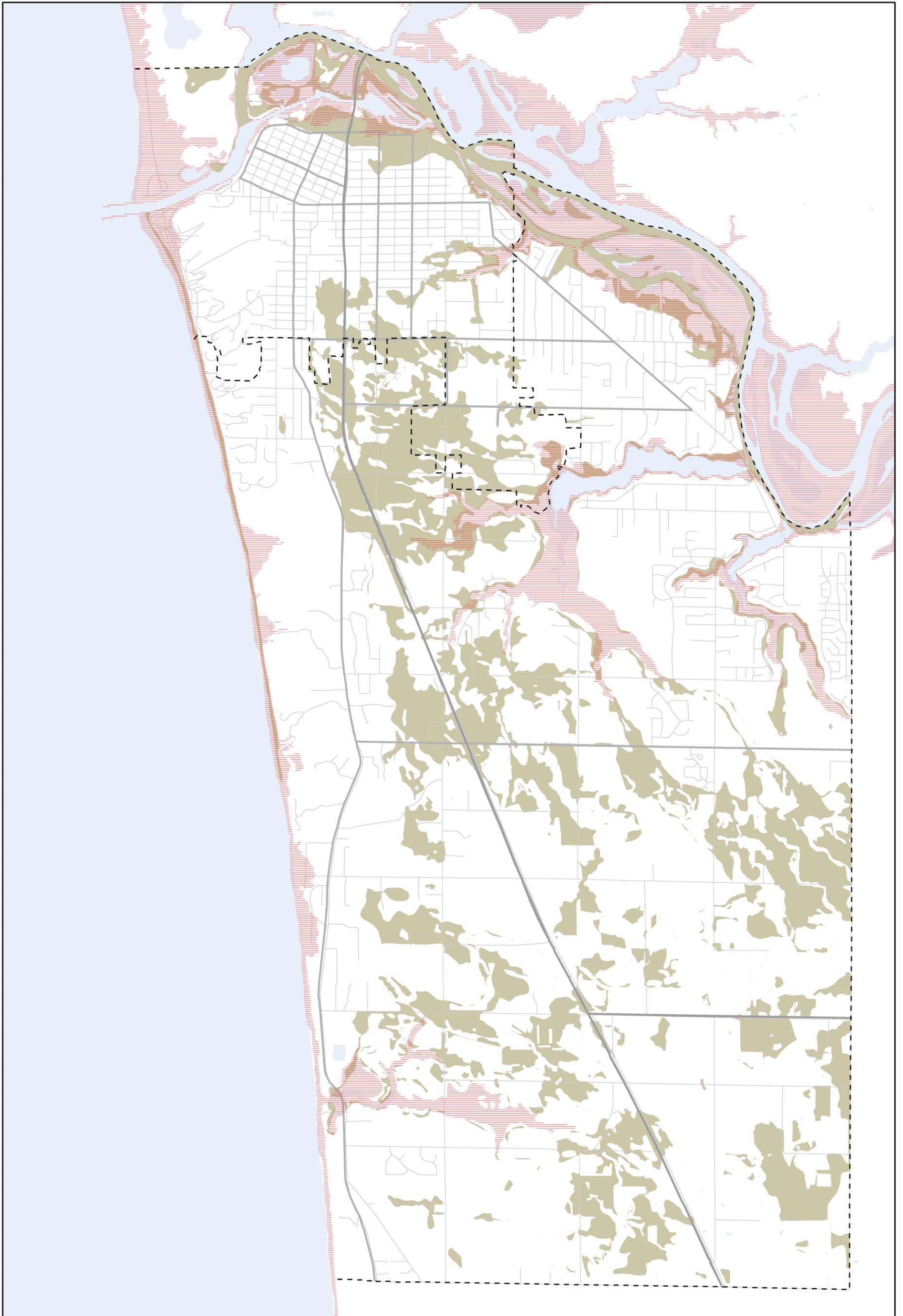


Expected Flood Zone Potential Wetlands

1:42,000

0 0.55 1.1 1.65 2.2 Miles

2.15 Potential Wetlands under “Perfect Storm” Climate Future

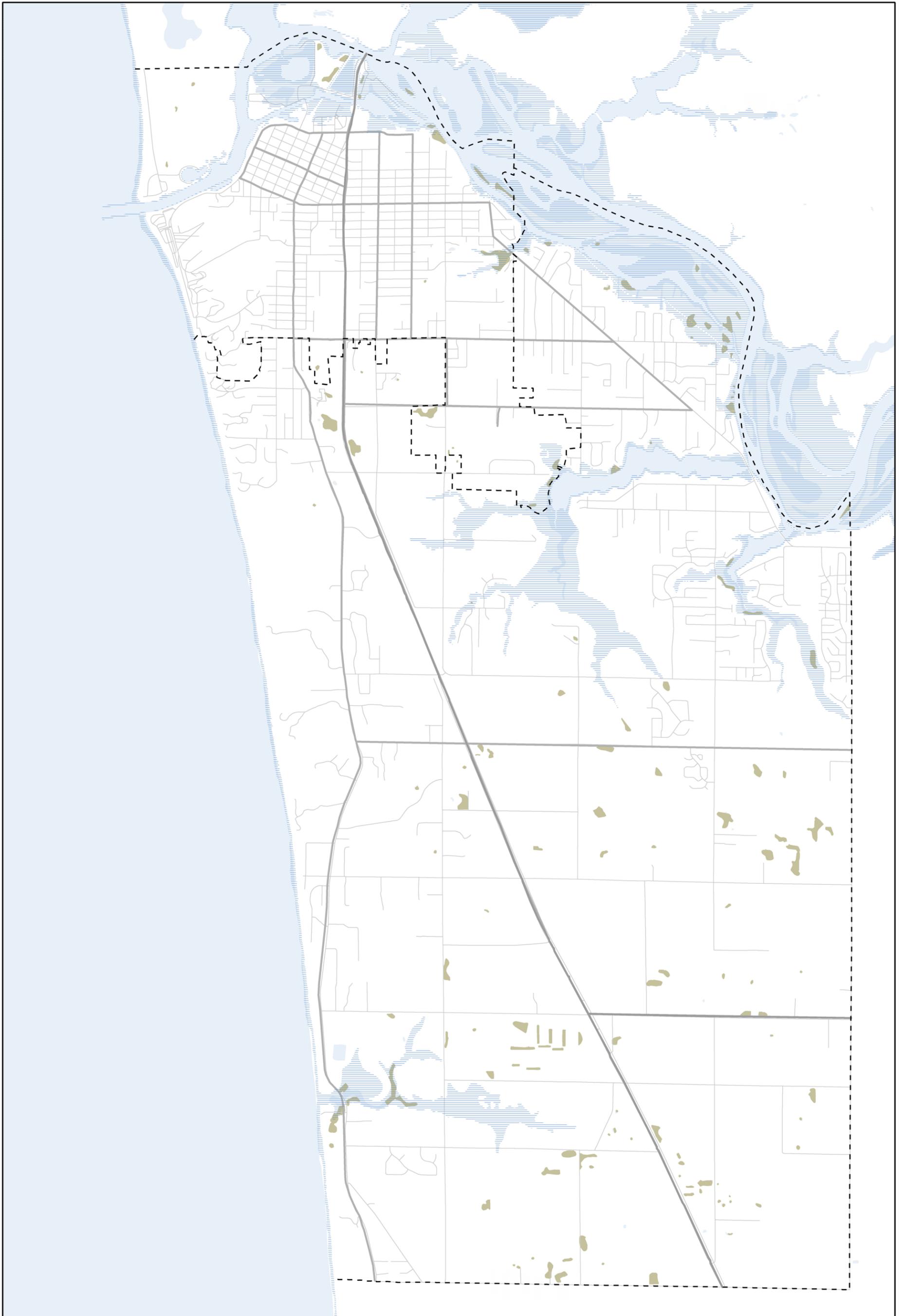


Perfect Storm Flood Zone Potential Wetlands

1:42,000

0 0.55 1.1 1.65 2.2 Miles

2.16 Existing Wetlands under 5 Acres under "Lucky" Climate Future



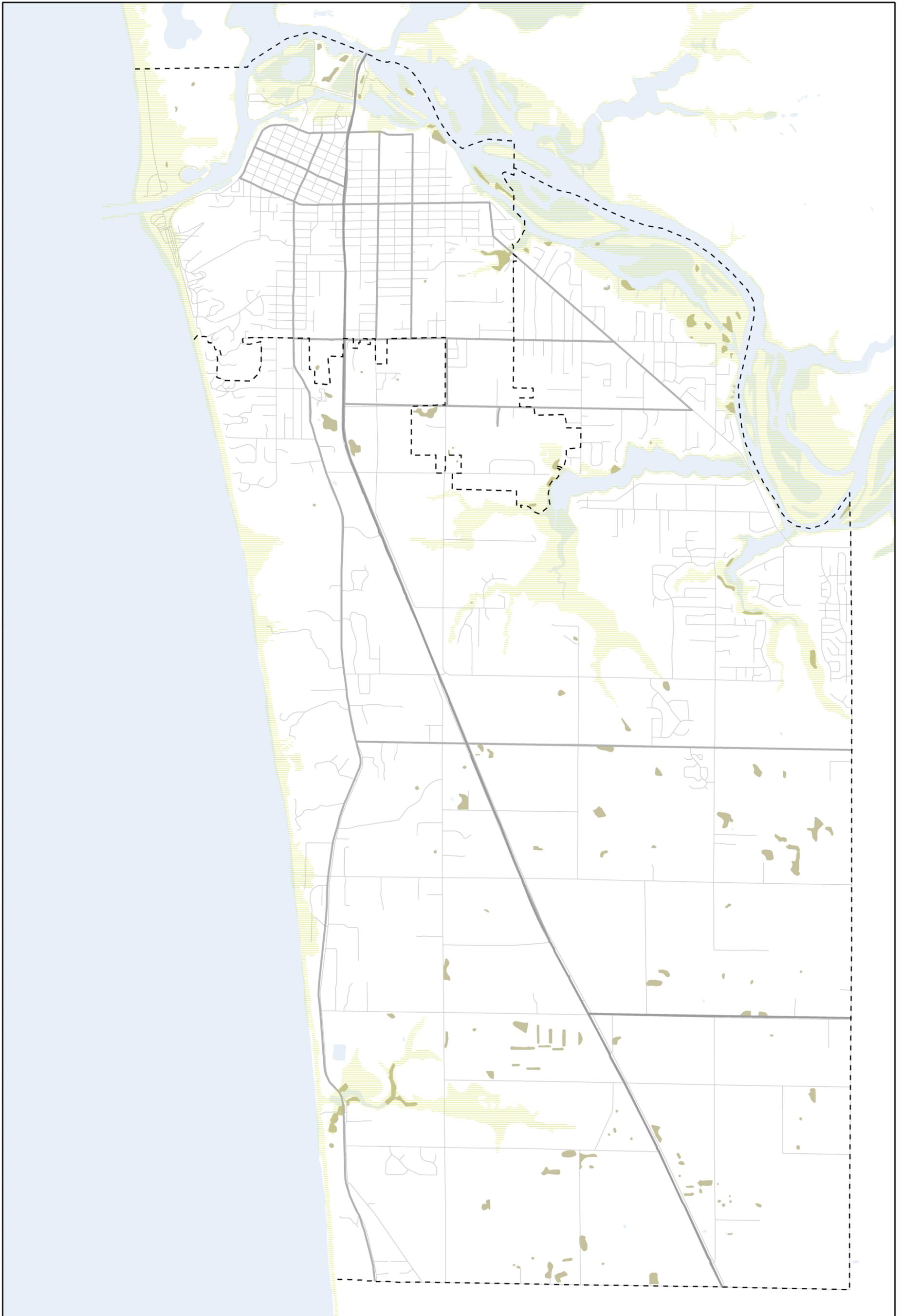
☐ "Lucky" Flood Zone

☐ Existing Wetlands under 5 Acres

1:42,000

0 0.55 1.1 1.65 2.2 Miles

2.17 Existing Wetlands under 5 Acres under “Expected” Climate Future

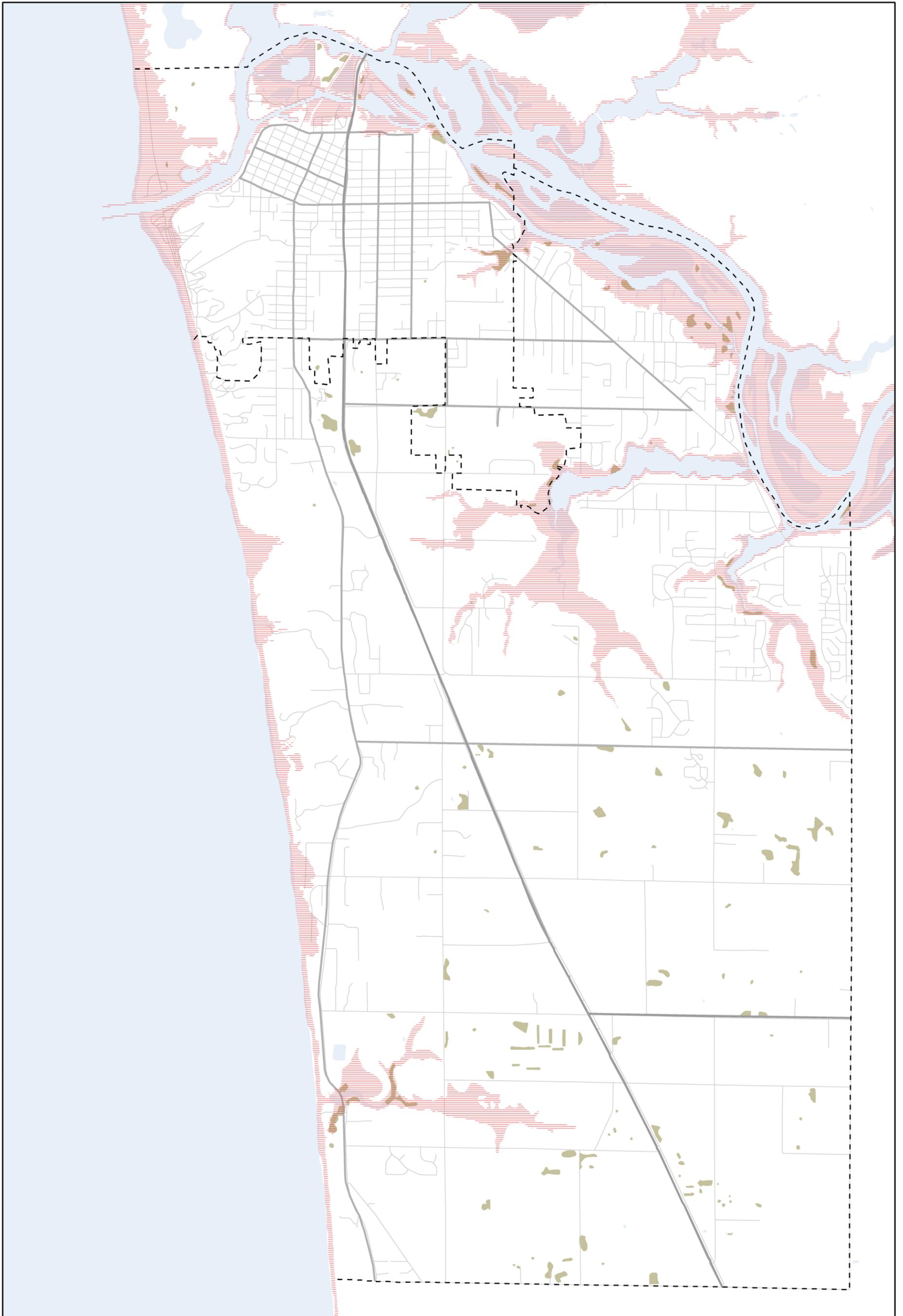


Expected Flood Zone Existing Wetlands under 5 Acres

1:42,000

0 0.55 1.1 1.65 2.2 Miles

2.18 Existing Wetlands under 5 Acres under "Perfect Storm" Climate Future

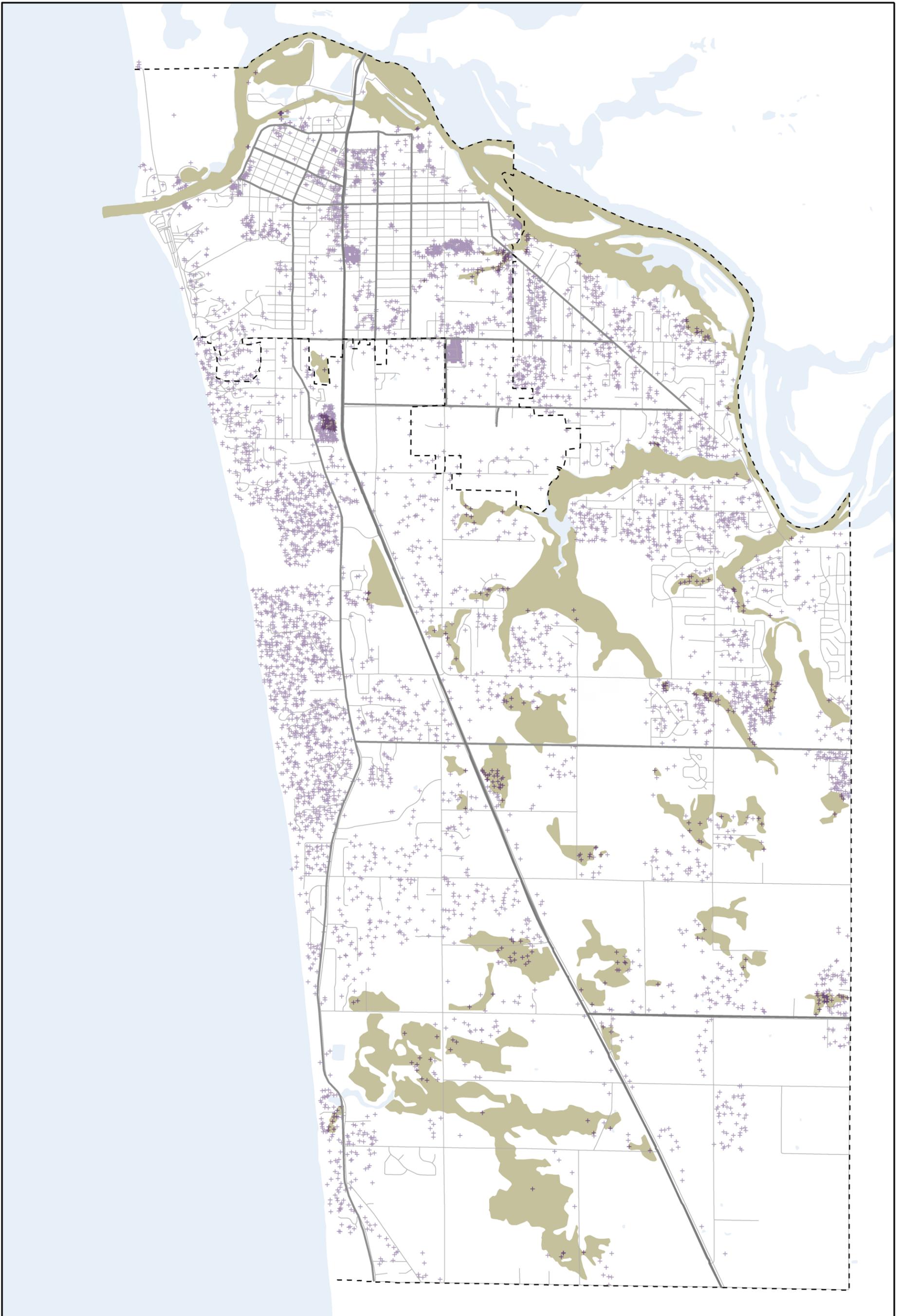


Perfect Storm Flood Zone Existing Wetlands under 5 Acres

1:42,000

0 0.55 1.1 1.65 2.2 Miles

2.19 Build-out According to Current Zoning and Existing Wetlands



+ Final Build-outs

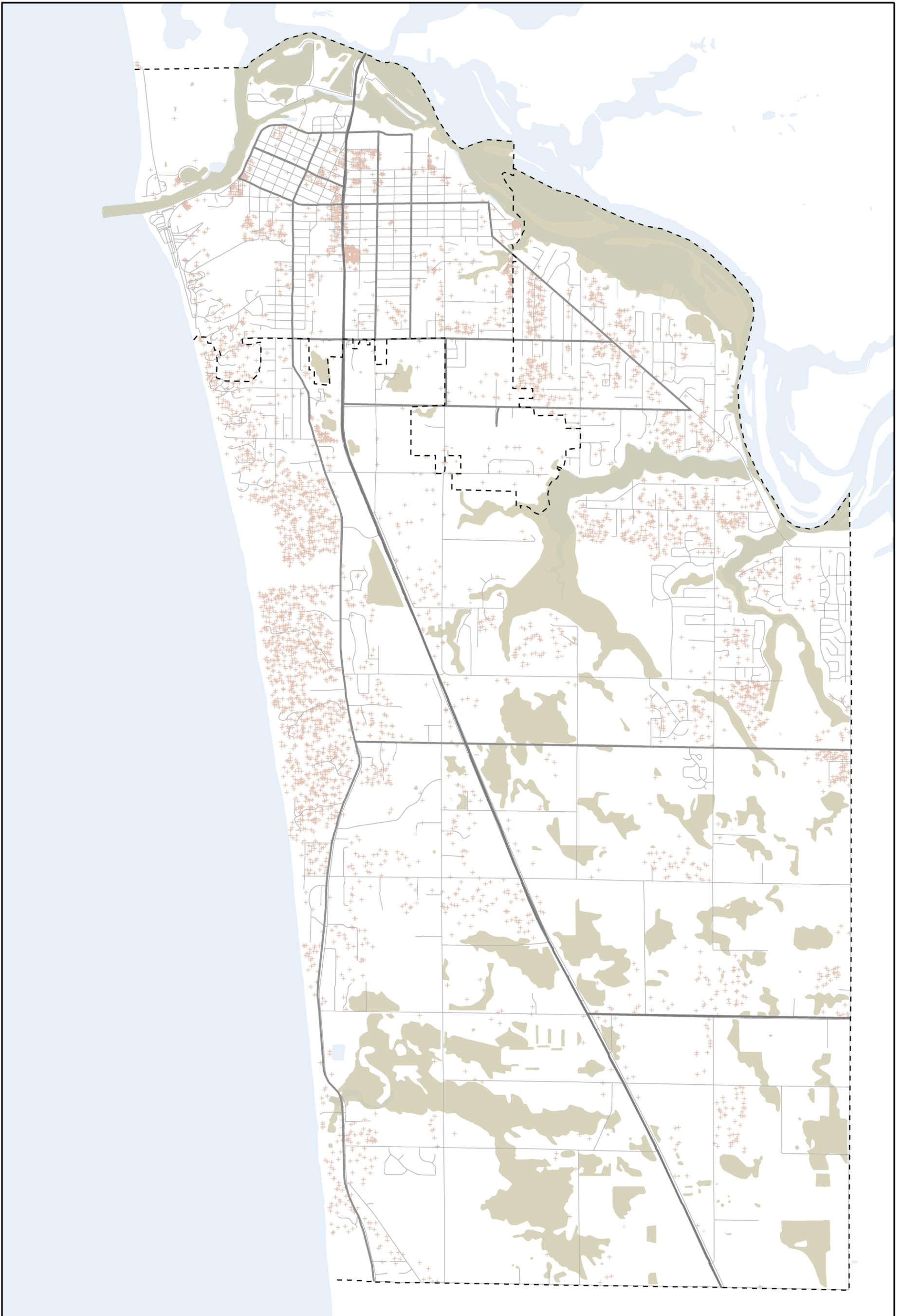
+ Final Build-outs on Existing Wetlands

Existing Wetlands in Build-out Zones

1:42,000

0 0.55 1.1 1.65 2.2 Miles

2.20 Build-out according to Best Management Practices and Existing Wetlands



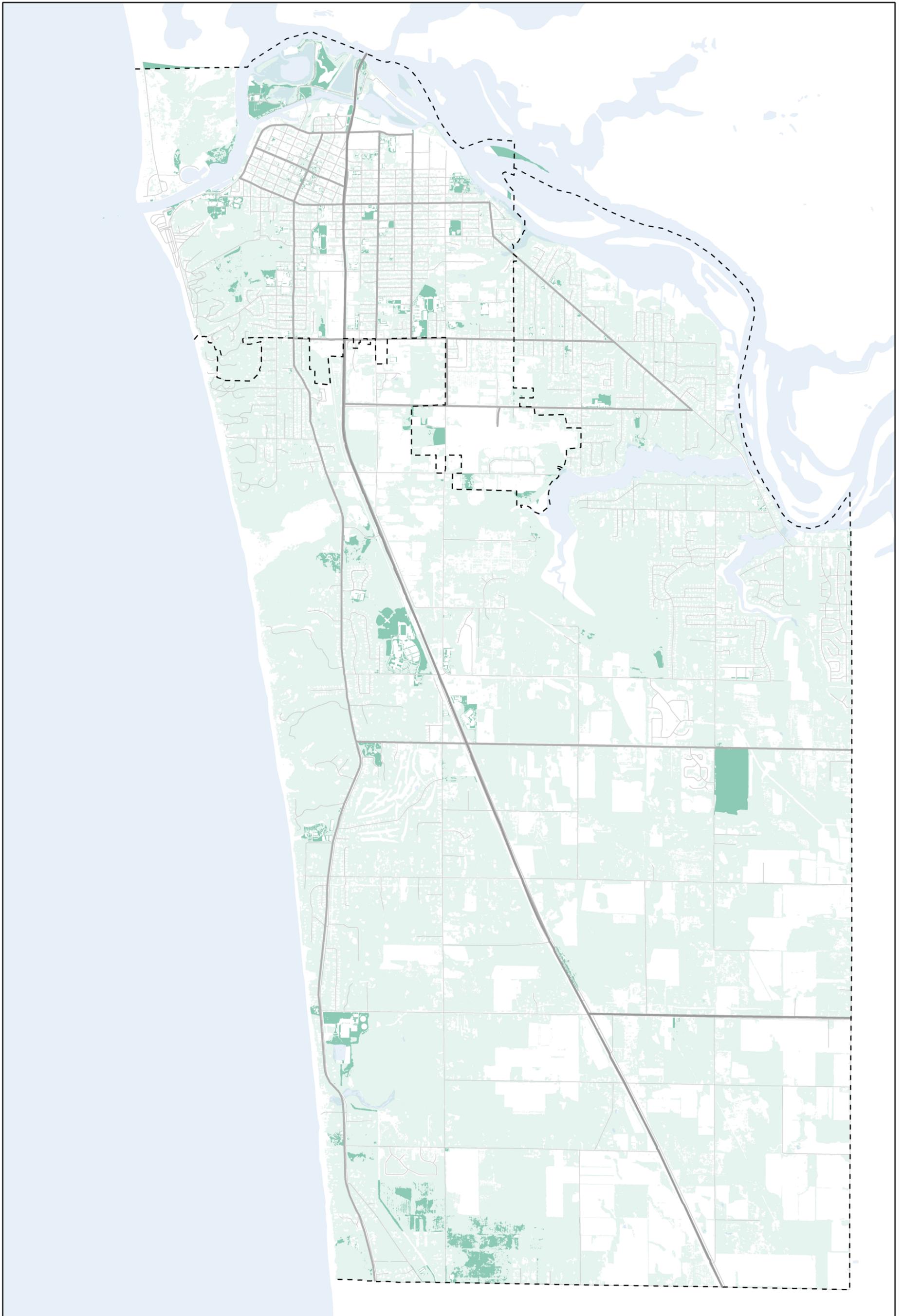
- + BMP Build-outs
- + BMP Build-outs on Existing Wetlands

Existing Wetlands in Build-out Zones

1:42,000

0 0.55 1.1 1.65 2.2 Miles

2.21 Existing and Potential Tree Canopy

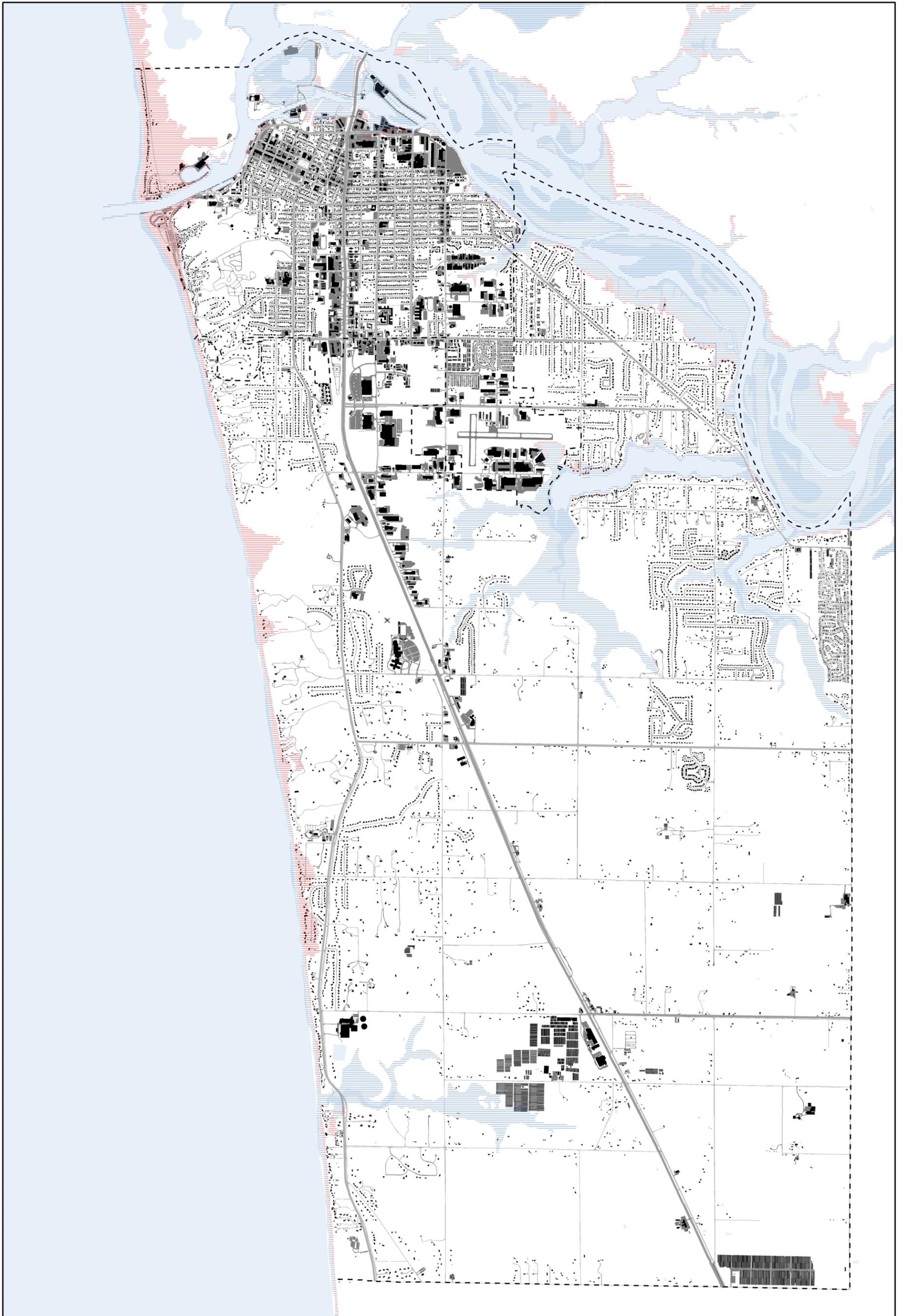


Potential Tree Canopy Existing Tree Canopy

1:42,000

0 0.55 1.1 1.65 2.2 Miles

2.22 Impervious Surface Under Climate Future Scenarios



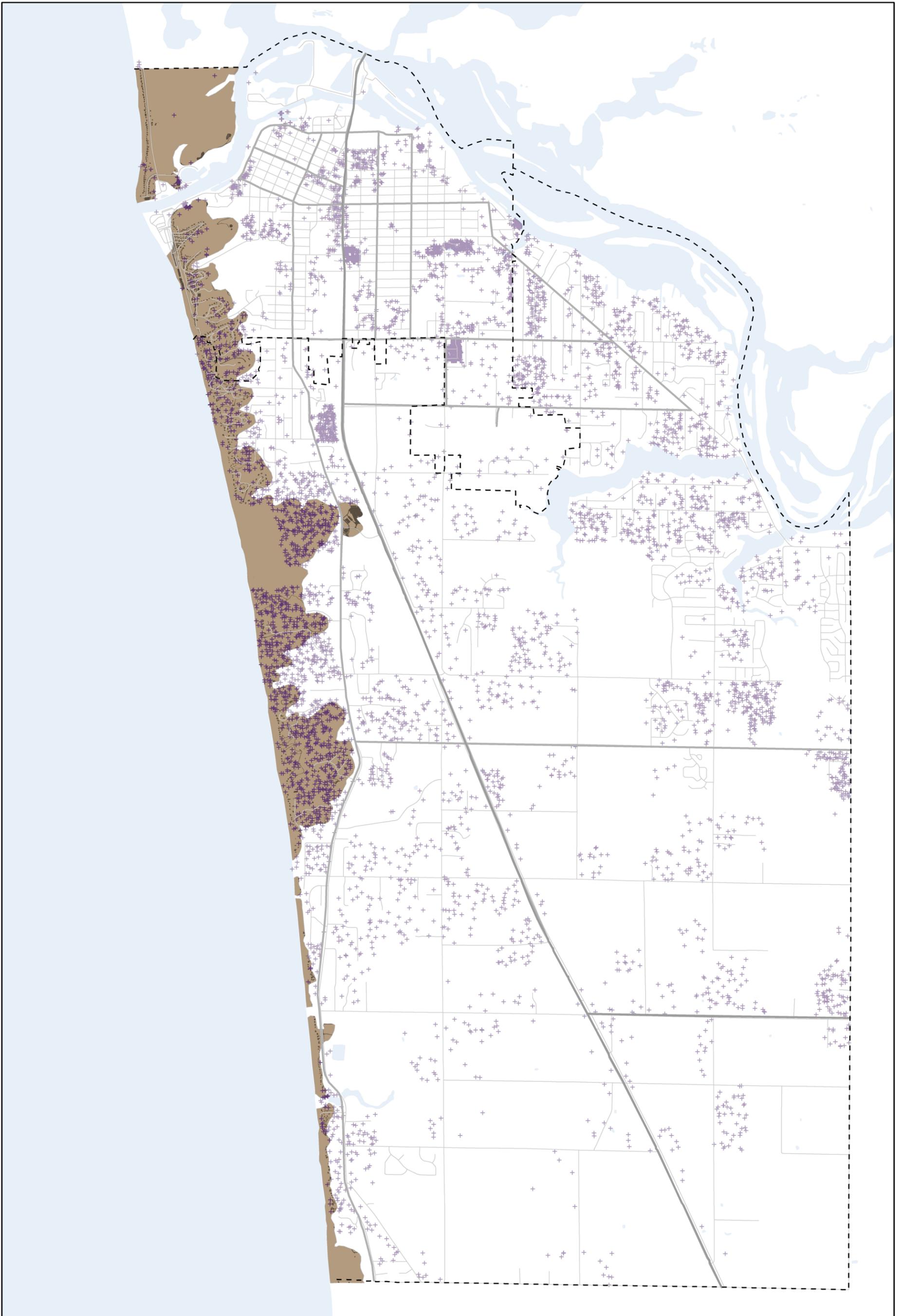
Legend:

- "Lucky" Flood Zone
- "Expected" Flood Zone
- "Perfect Storm" Flood Zone
- Building Footprints
- Impervious Surface

1:42,000

0 0.55 1.1 1.65 2.2 Miles

2.23 Build-out According to Current Zoning and Critical Dune Areas



Critical Dunes

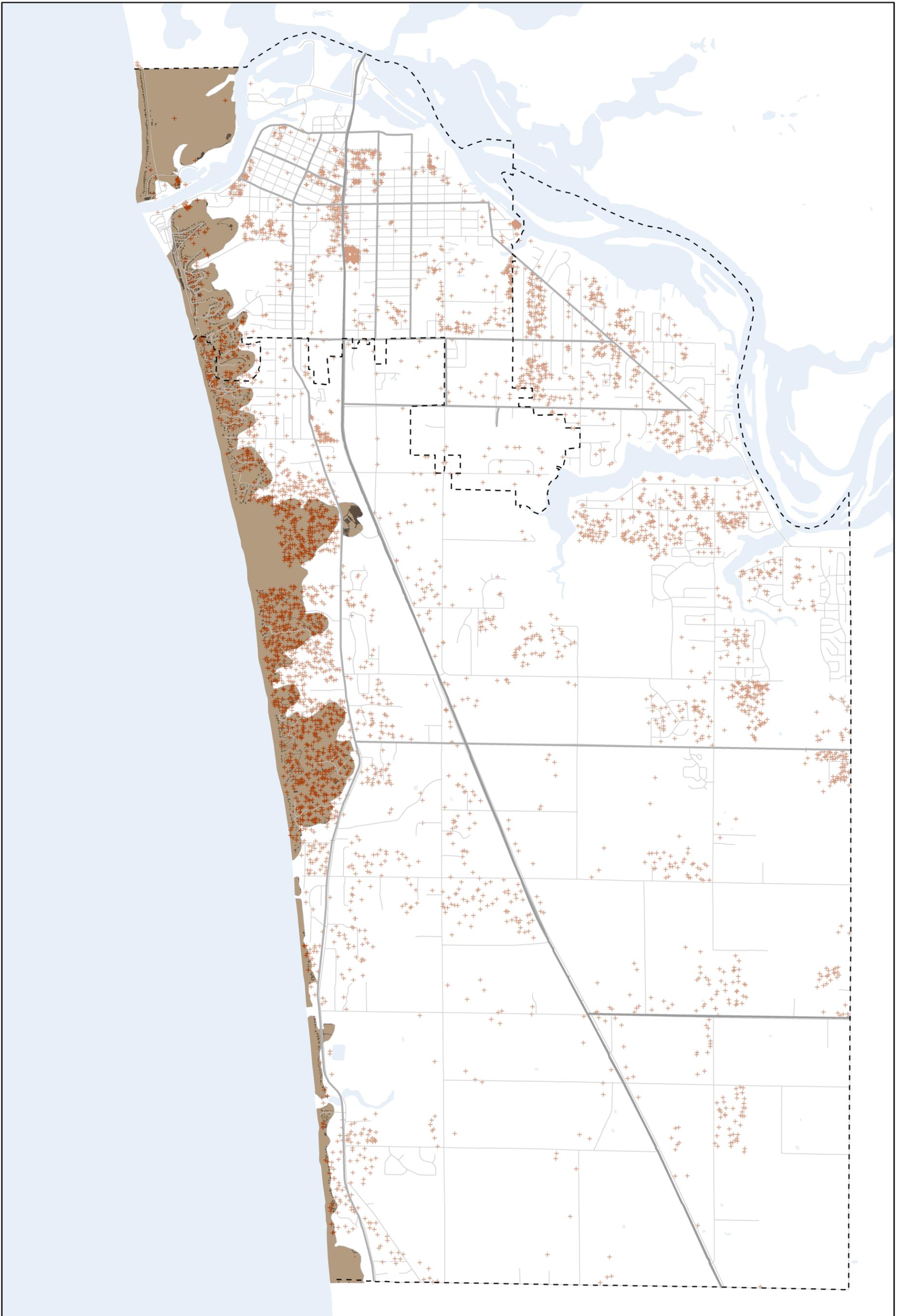
+ Final Build-outs

+ Final Build-outs in Critical Dunes

1:42,000

0 0.55 1.1 1.65 2.2 Miles

2.24 Build-out According to Best Management Practices and Critical Dune Areas



■ Critical Dunes

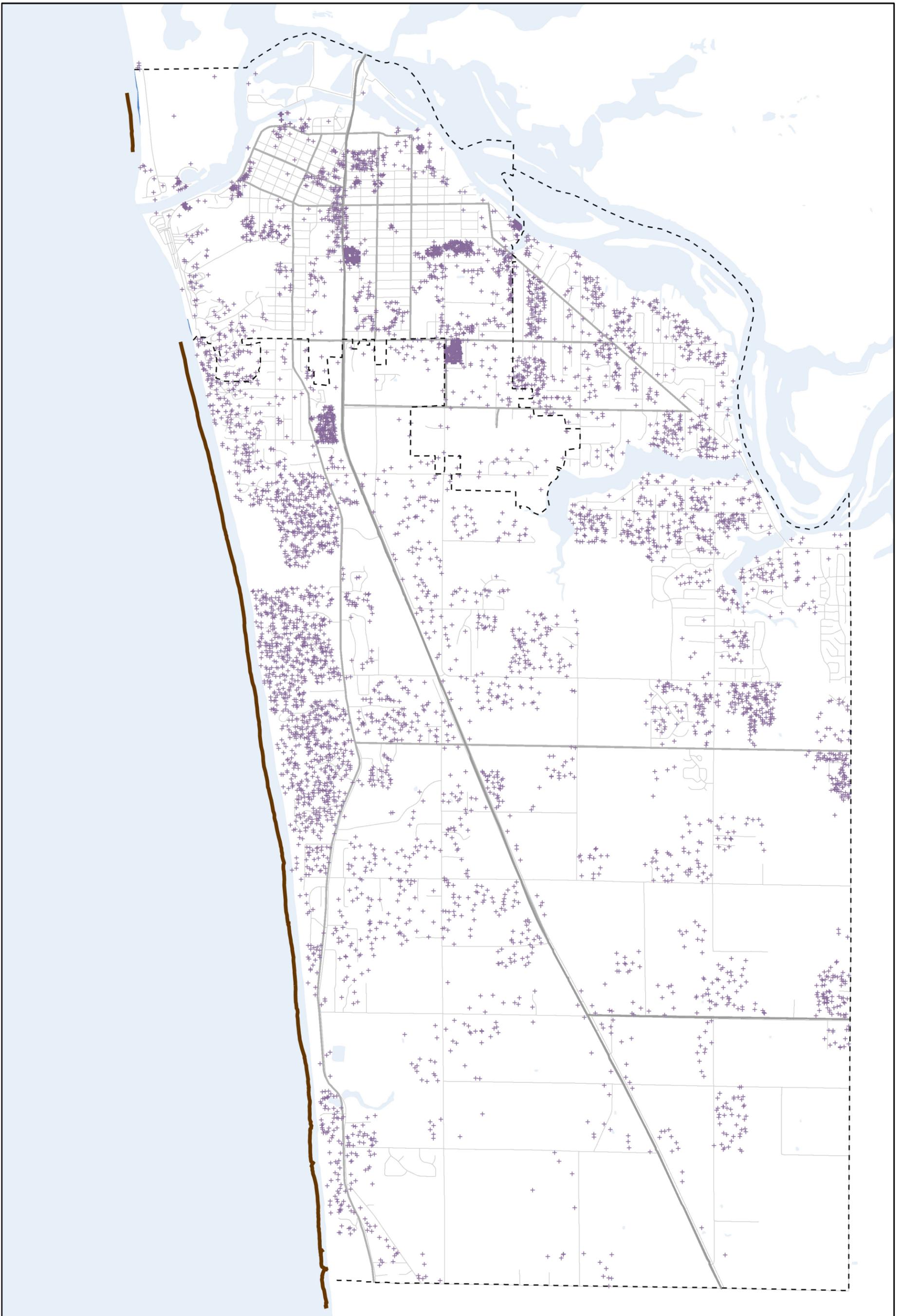
+ BMP Built-outs

+ BMP Built-outs in Critical Dunes

1:42,000

0 0.55 1.1 1.65 2.2 Miles

2.25 Build-out According to Current Zoning and High Risk Erosion Areas



— Offset Line Illustrating the Extend of the Shoreline Affected

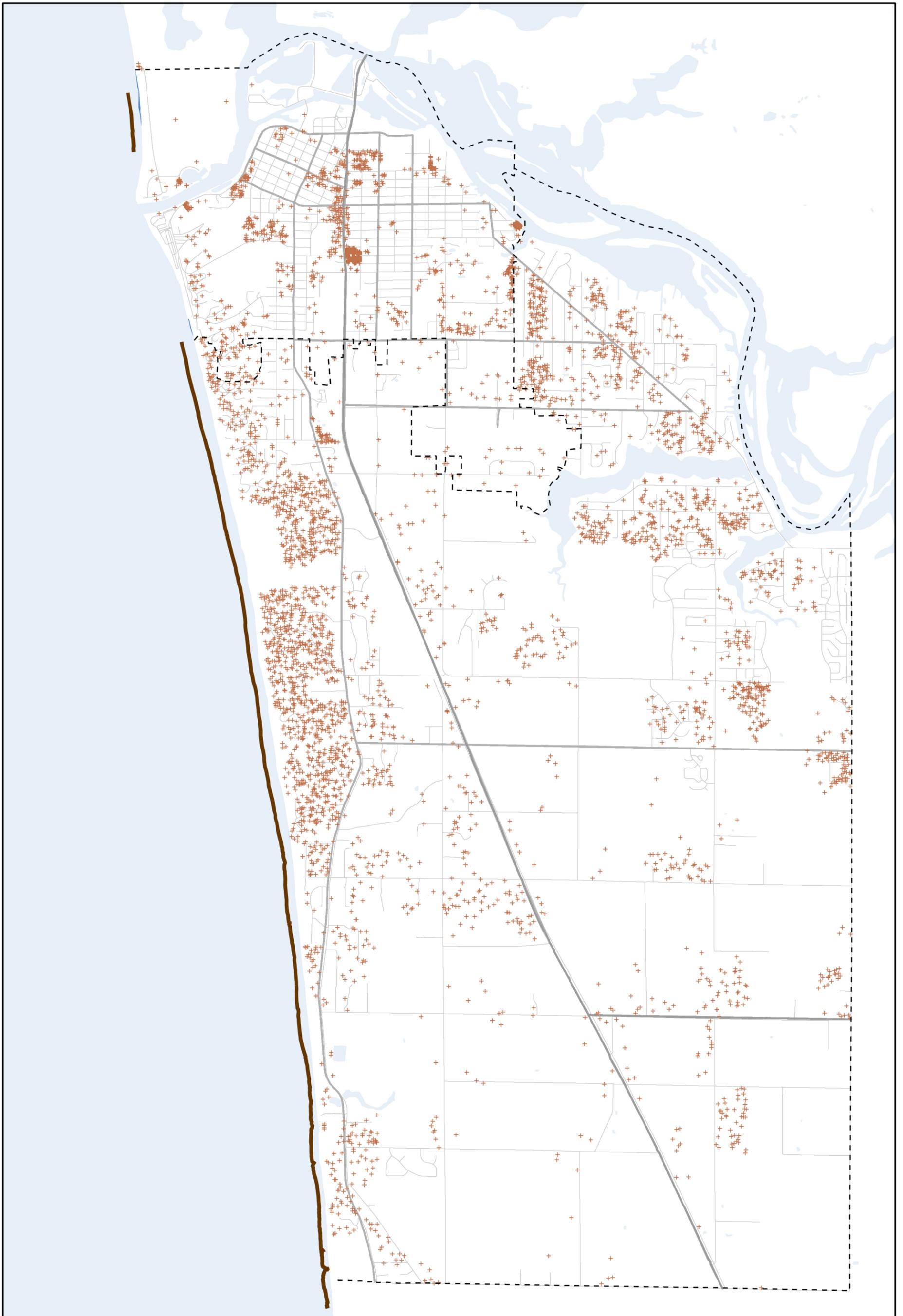
+ Final Build-outs

HERA Proposed VE Zone

1:42,000

0 0.55 1.1 1.65 2.2 Miles

2.26 Build-out According to Best Management Practices and High Risk Erosion Areas



— Offset Line Illustrating the Extend of the Shoreline Affected

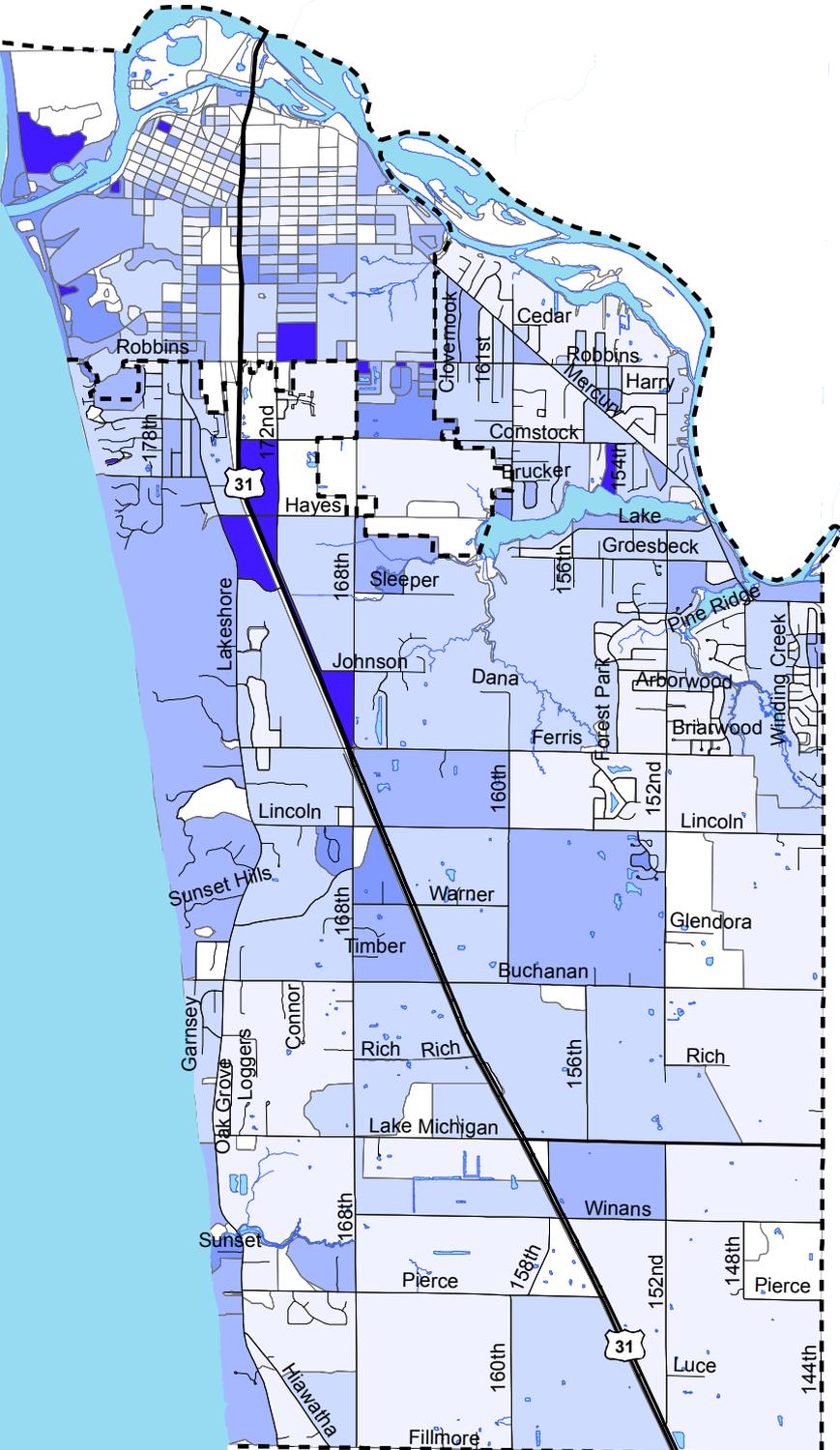
+ BMP Build-outs

HERA Proposed VE Zone

1:42,000

0 0.55 1.1 1.65 2.2 Miles

Grand Haven Charter Township Percent of Population 65 Years and Older (male and female) Map #3.1



- 61.55 - 100.00% (5)
- 33.34 - 61.54% (4)
- 19.29 - 33.33% (3)
- 9.56 - 19.28% (2)
- 1.22 - 9.55% (1)
- Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams



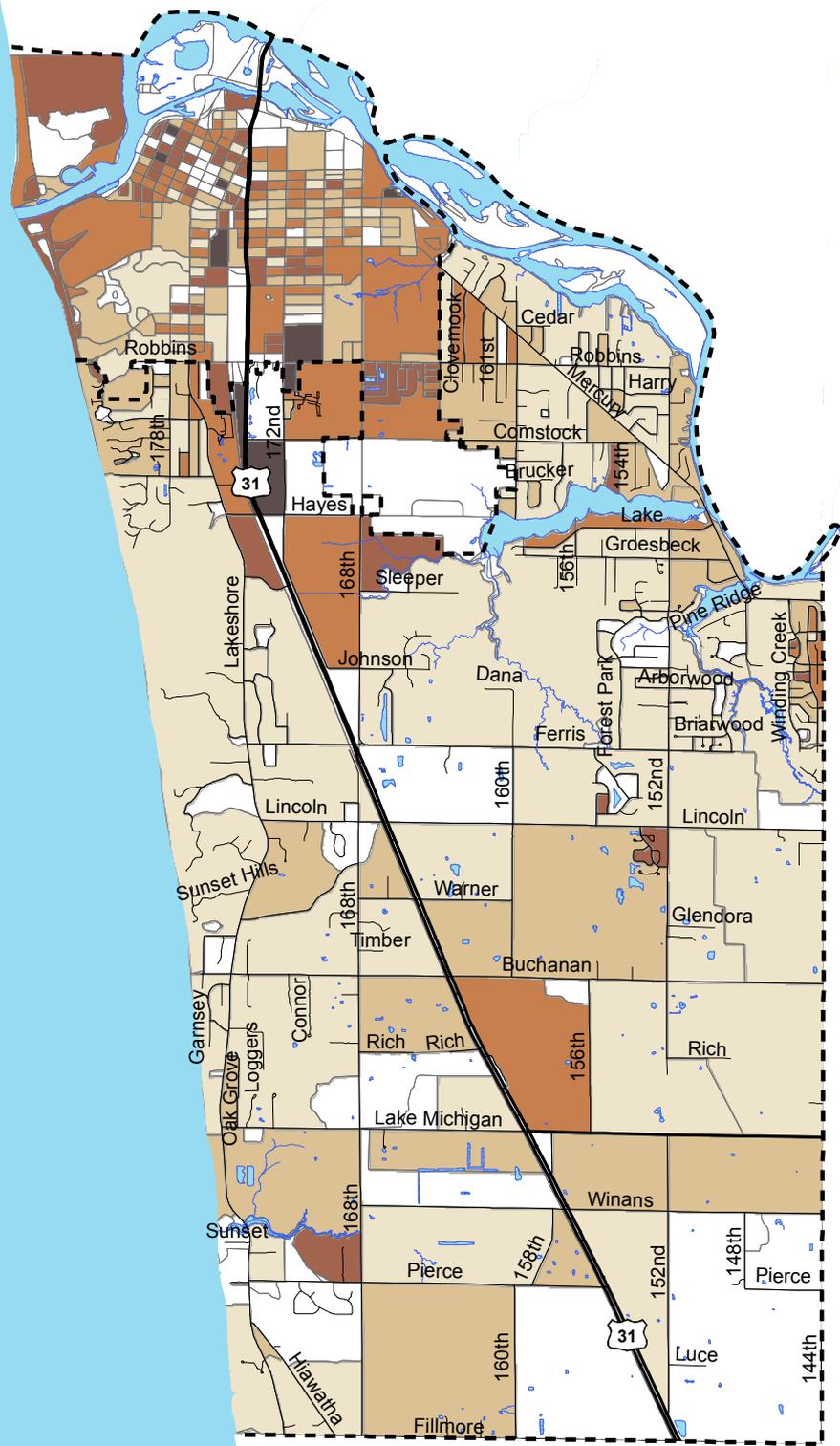
Data Sources:
 U.S. Census Bureau, Block Level Data (2010),
 ACS data (2009-2013)
 Grand Haven Charter Township
 Michigan Geo. Data Library
 Ottawa County GIS



Prepared August 2015 by:



Grand Haven Charter Township Percent of Households with People Living Alone Map #3.2



- 72.23 - 100.00% (5)
- 45.46 - 72.22% (4)
- 30.01 - 45.45% (3)
- 17.40 - 30.00% (2)
- 3.03 - 17.39% (1)
- Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams



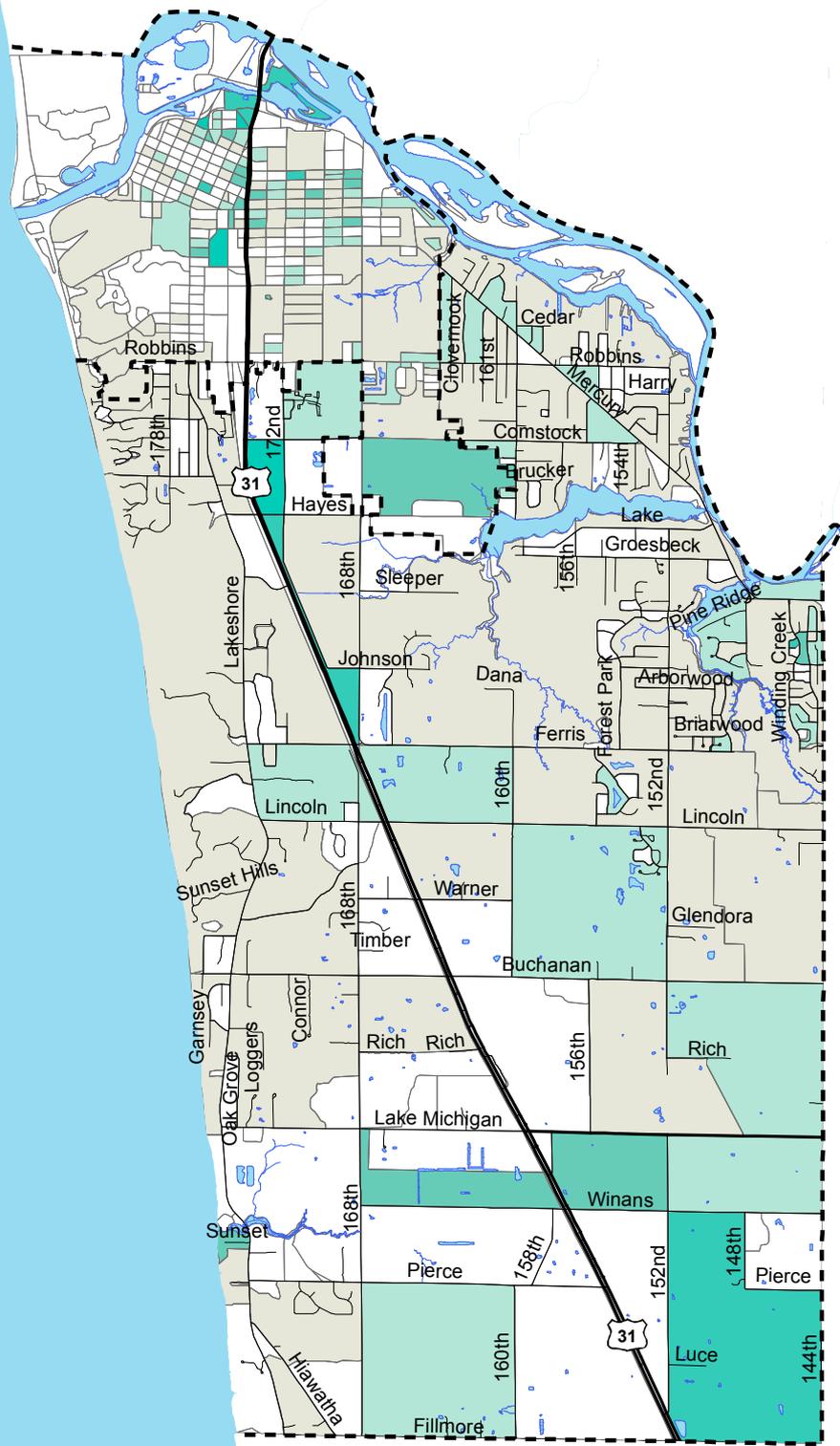
Data Sources:
 U.S. Census Bureau, Block Level Data (2010),
 ACS data (2009-2013)
 Grand Haven Charter Township
 Michigan Geo. Data Library
 Ottawa County GIS



Prepared August 2015 by:



Grand Haven Charter Township Percent of Non-white Population Map #3.3



- 50.01 - 100.00% (5)
- 31.68 - 50.00% (4)
- 15.80 - 31.67% (3)
- 6.91 - 15.79% (2)
- 0.80 - 6.90% (1)
- Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams



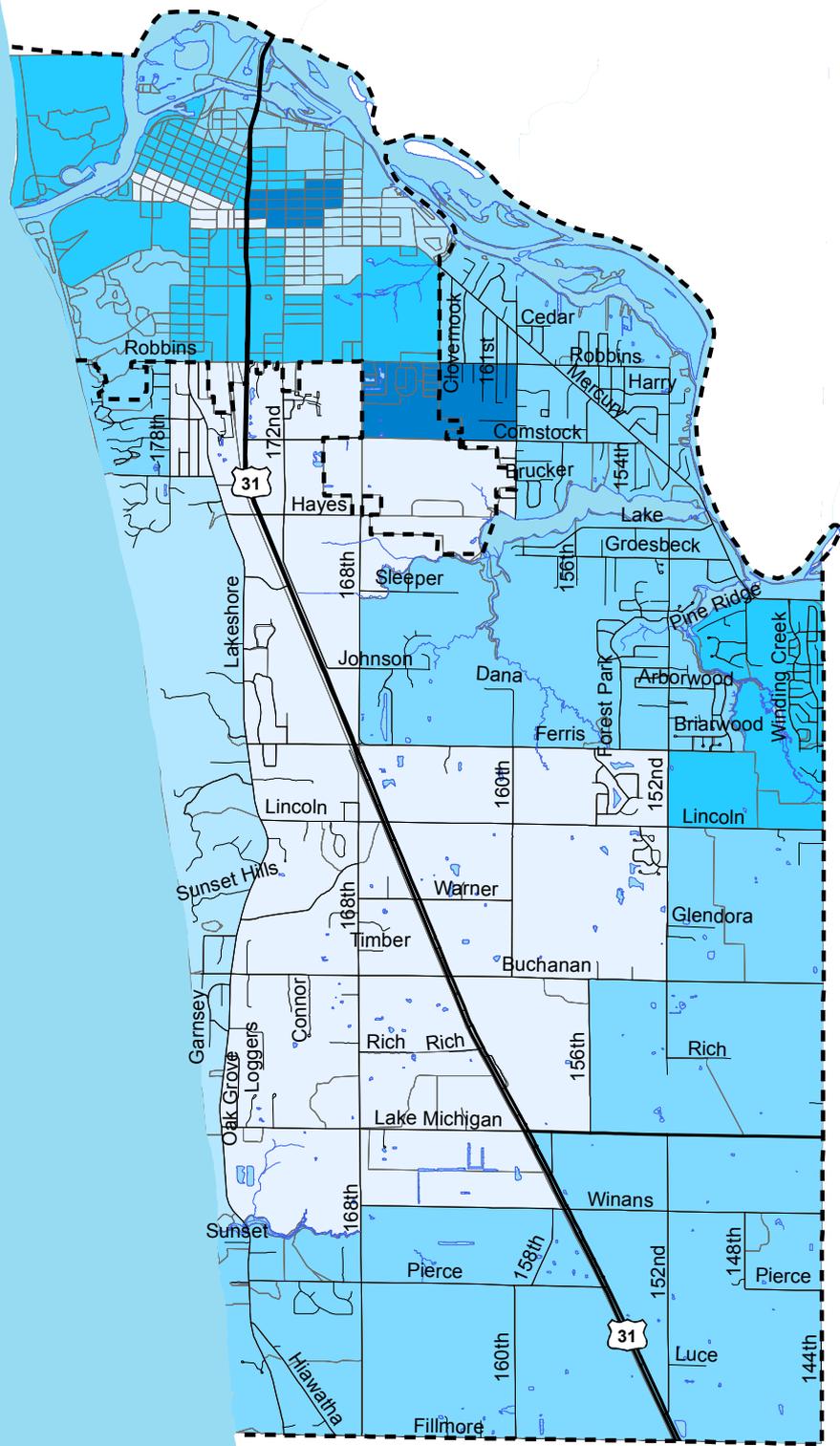
Data Sources:
 U.S. Census Bureau, Block Level Data (2010),
 ACS data (2009-2013)
 Grand Haven Charter Township
 Michigan Geo. Data Library
 Ottawa County GIS



Prepared August 2015 by:



Grand Haven Charter Township Percent of Households Living Below the Poverty Threshold Map #3.4



- 17.2 - 22.8% (5)
- 9.0 - 17.1% (4)
- 6.9 - 8.9% (3)
- 3.9 - 6.8% (2)
- 2.0 - 3.8% (1)
- Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams



Data Sources:
 U.S. Census Bureau, Block Level Data (2010),
 ACS data (2009-2013)
 Grand Haven Charter Township
 Michigan Geo. Data Library
 Ottawa County GIS

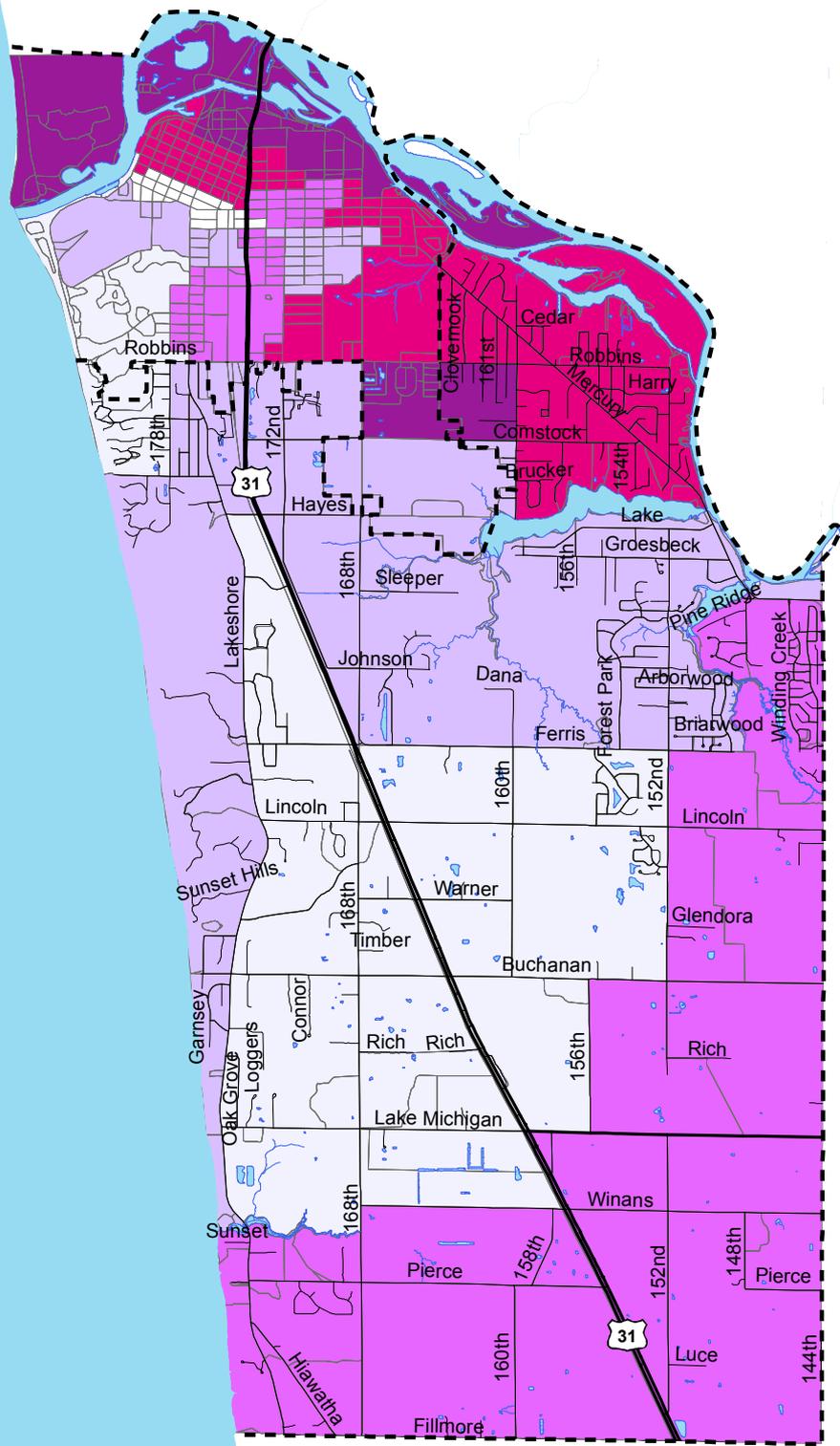


Prepared August 2015 by:



Grand Haven Charter Township Percent of Population 25 years and Older with less than a High School Education Map #3.5

- 10.31 - 16.40% (5)
- 8.11 - 10.30% (4)
- 4.01 - 8.10% (3)
- 1.11 - 4.00% (2)
- 0.80 - 1.10% (1)
- Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams



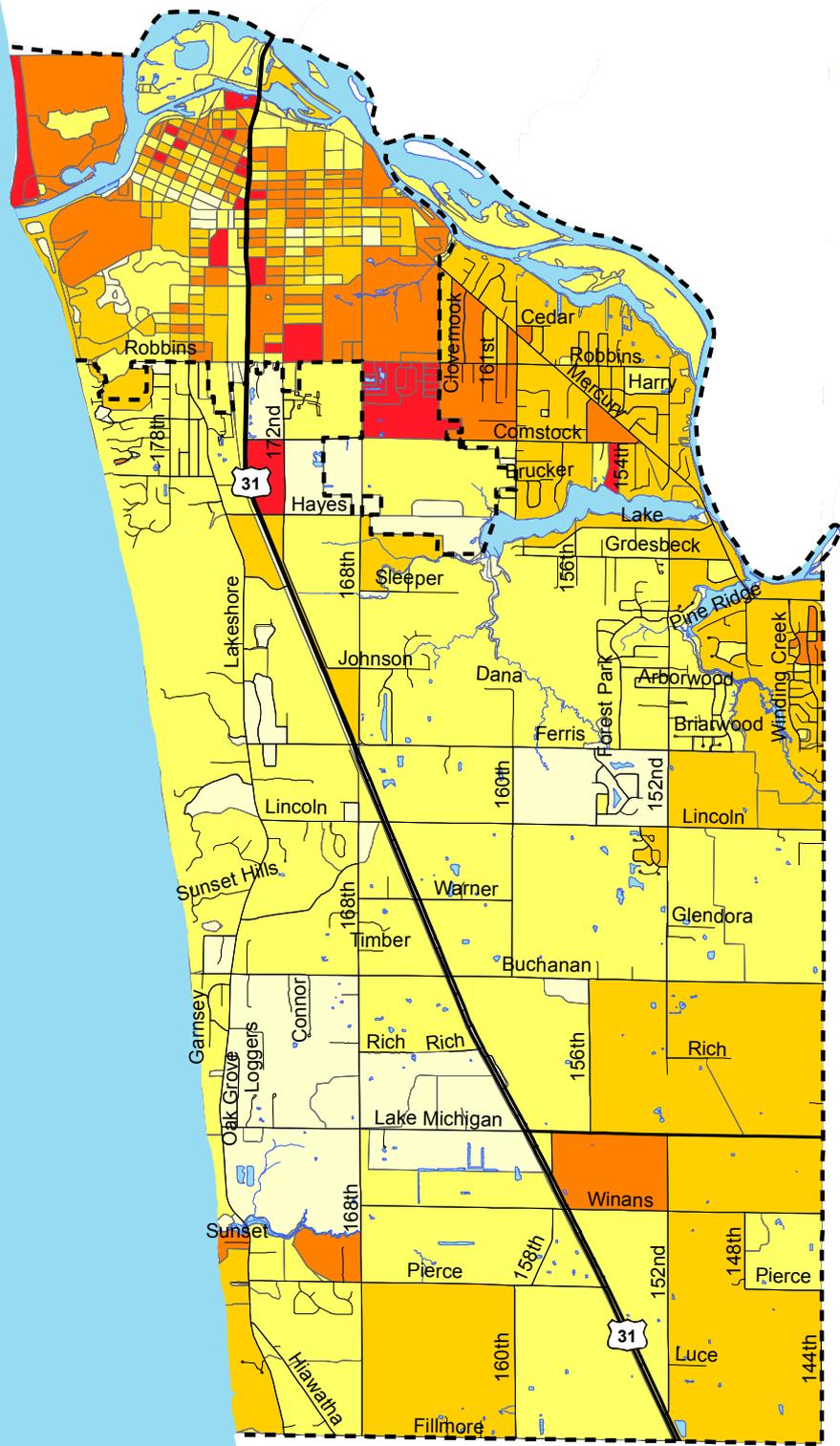
Data Sources:
 U.S. Census Bureau, Block Level Data (2010),
 ACS data (2009-2013)
 Grand Haven Charter Township
 Michigan Geo. Data Library
 Ottawa County GIS



Prepared August 2015 by:



Grand Haven Charter Township Relative Sensitivity of Populations to Extreme Heat Events Map #3.6



additive score	re-score
16 - 21	(5)
13 - 15	(4)
10 - 12	(3)
6 - 9	(2)
1 - 5	(1)

- - - Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams



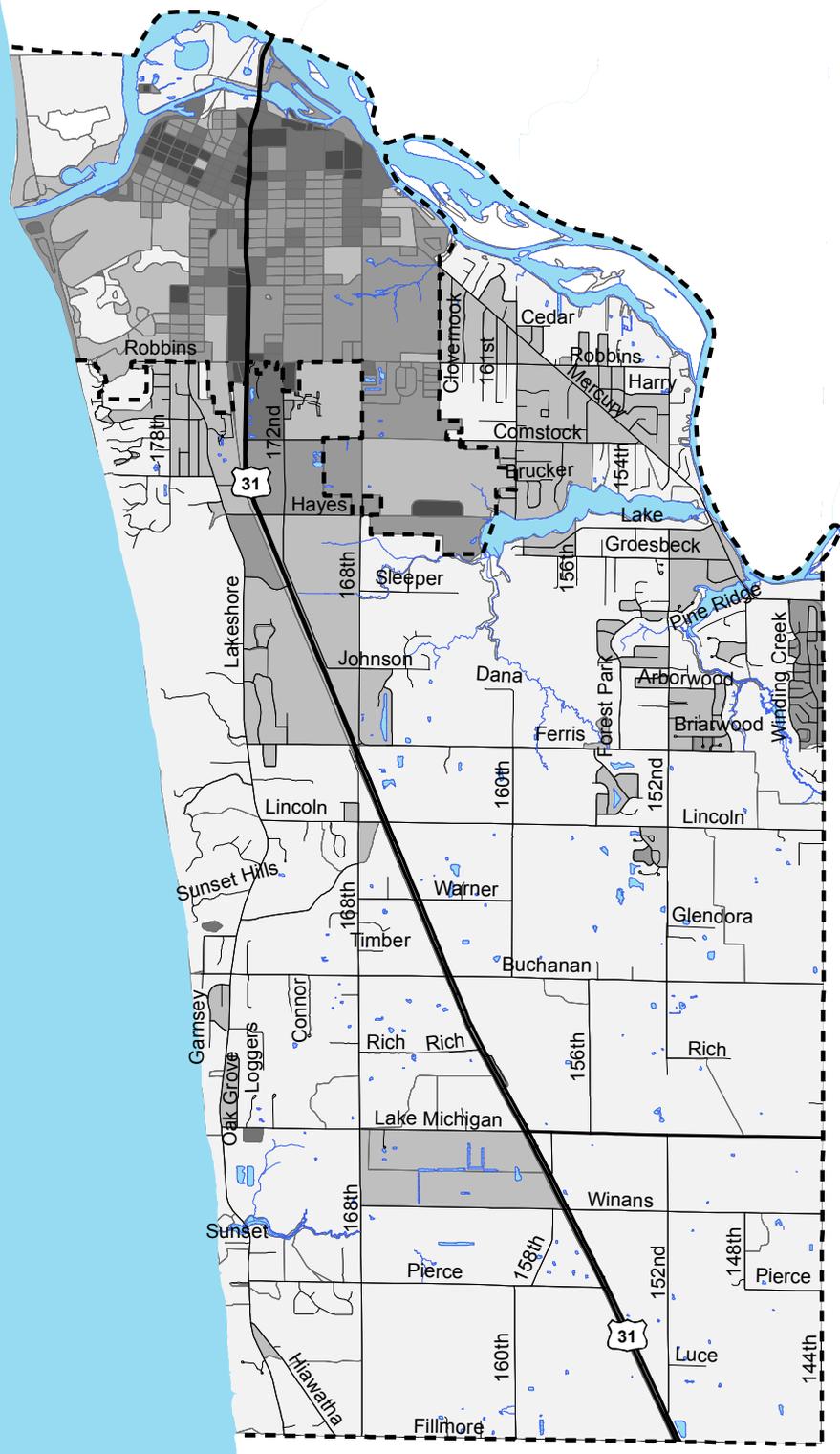
Data Sources:
 U.S. Census Bureau, Block Level Data (2010),
 ACS data (2009-2013)
 Grand Haven Charter Township
 Michigan Geo. Data Library
 Ottawa County GIS



Prepared August 2015 by:



Grand Haven Charter Township Percent Impervious Surface Exposure Map #3.7



- 67.0 - 99.1% (5)
- 44.4 - 66.9% (4)
- 26.3 - 44.3% (3)
- 11.5 - 26.2% (2)
- 0.1 - 11.4% (1)
- Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams



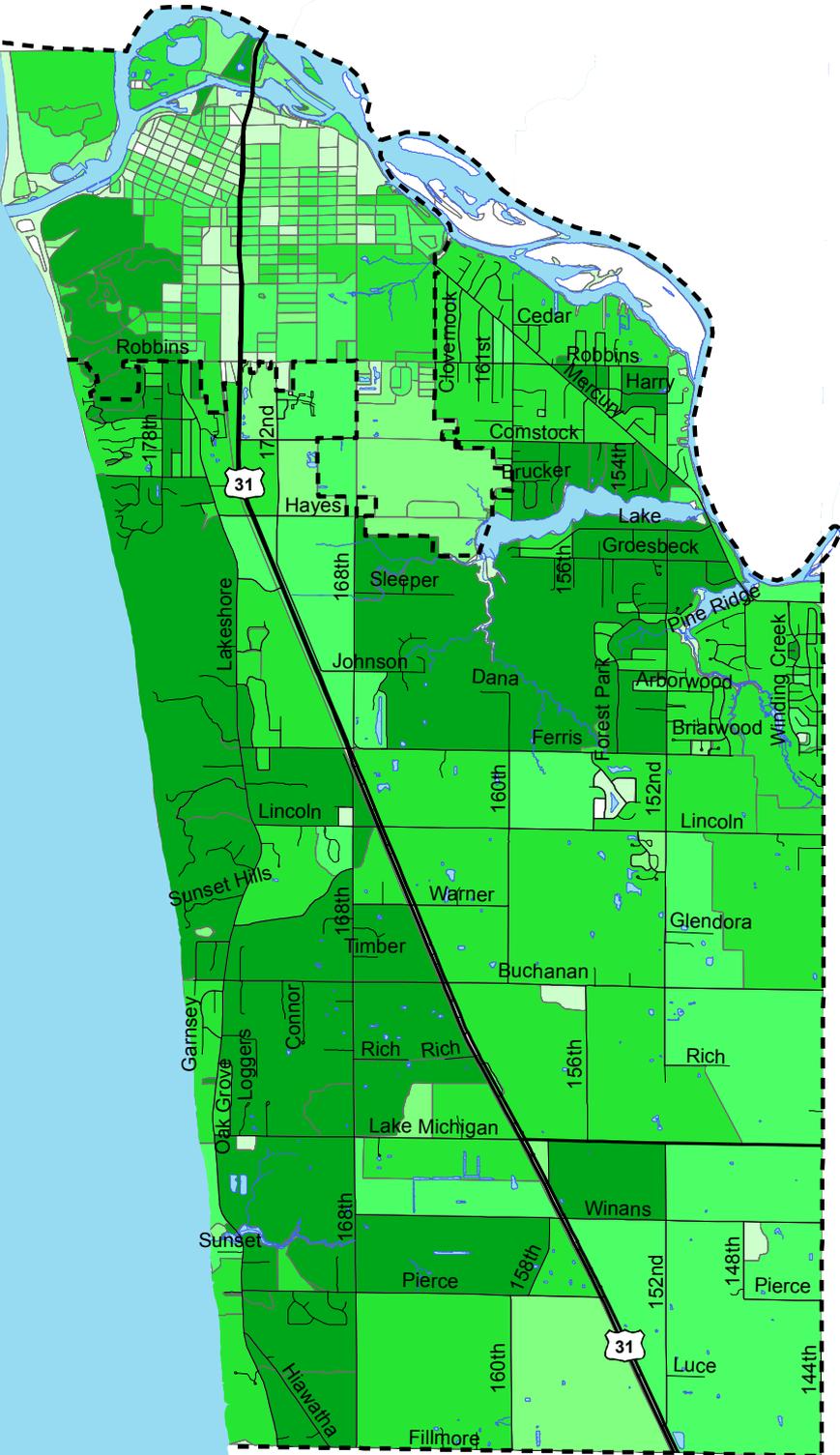
Data Sources:
 U.S. Census Bureau, Block Level Data (2010),
 ACS data (2009-2013)
 Grand Haven Charter Township
 Michigan Geo. Data Library
 Ottawa County GIS



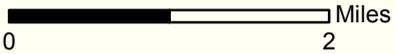
Prepared August 2015 by:



Grand Haven Charter Township Percent Tree Canopy Map #3.8



- 0.4 - 14.7% (5)
- 14.8 - 32.4% (4)
- 32.5 - 50.6% (3)
- 50.7 - 69.9% (2)
- 70.0 - 98.9% (1)
- Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams



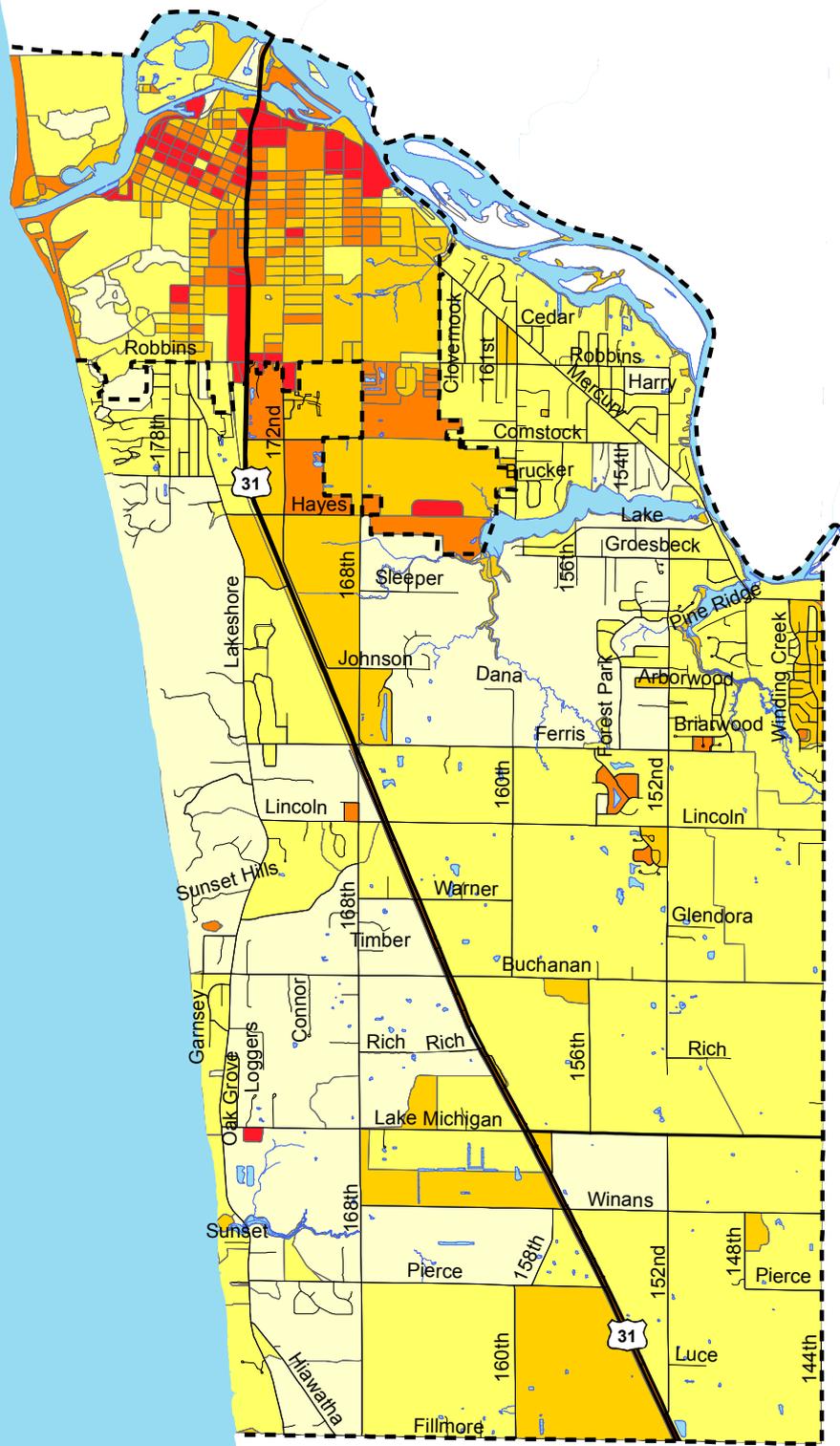
Data Sources:
 U.S. Census Bureau, Block Level Data (2010),
 ACS data (2009-2013)
 Grand Haven Charter Township
 Michigan Geo. Data Library
 Ottawa County GIS



Prepared August 2015 by:



Grand Haven Charter Township Relative Exposure of Populations to Extreme Heat Events Map #3.9



additive score	re-score
■ 9 - 10	(5)
■ 7 - 8	(4)
■ 5 - 6	(3)
■ 3 - 4	(2)
■ 1 - 2	(1)

- Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams



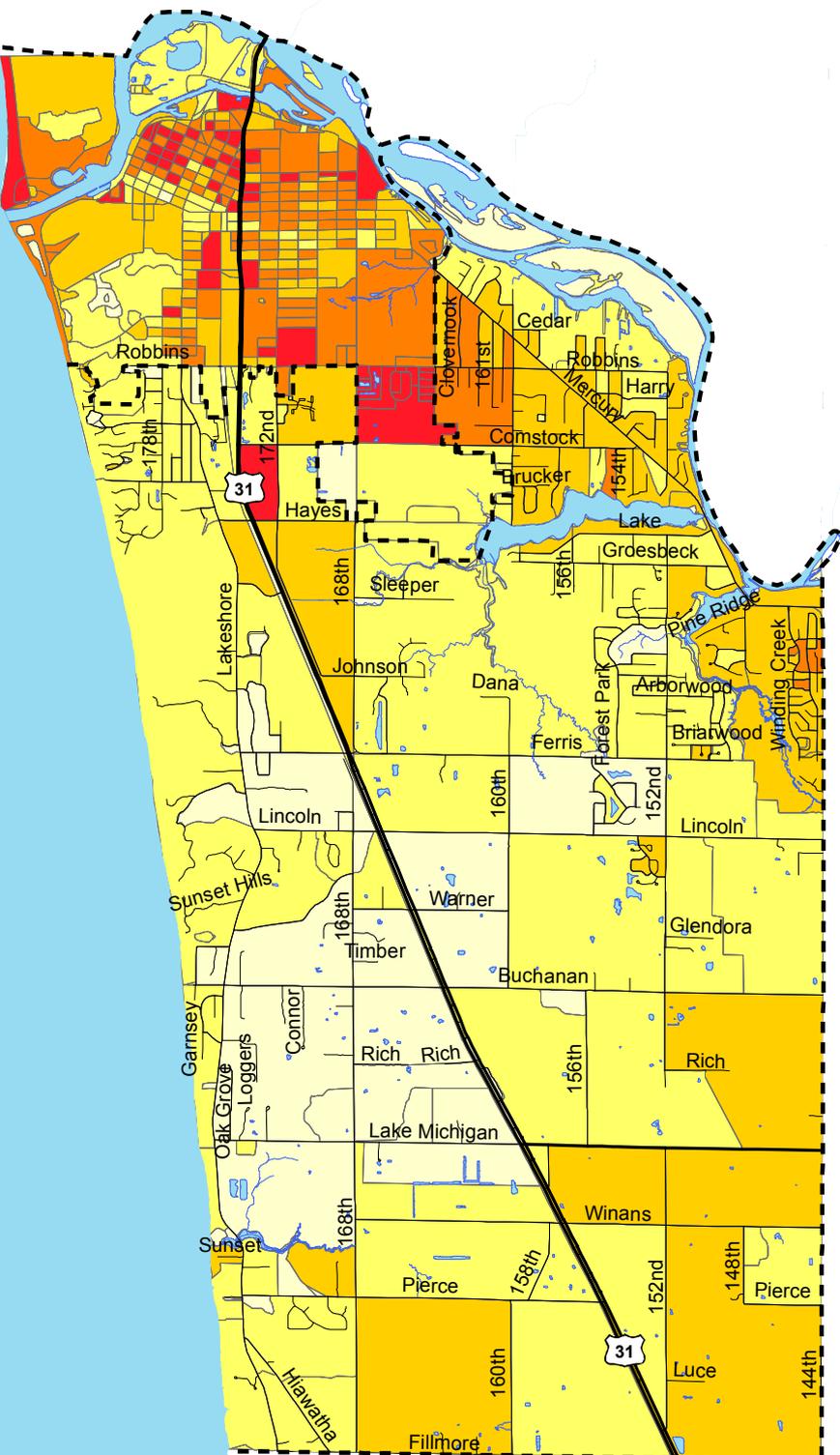
Data Sources:
 U.S. Census Bureau, Block Level Data (2010),
 ACS data (2009-2013)
 Grand Haven Charter Township
 Michigan Geo. Data Library
 Ottawa County GIS



Prepared August 2015 by:

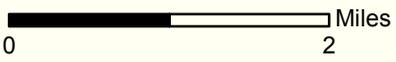


Grand Haven Charter Township Population Vulnerable to Extreme Heat Events Map #3.10



additive score	re-score
22 - 27	(5)
18 - 21	(4)
14 - 17	(3)
10 - 13	(2)
3 - 9	(1)

- - - Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams



Data Sources:
 U.S. Census Bureau, Block Level Data (2010),
 ACS data (2009-2013)
 Grand Haven Charter Township
 Michigan Geo. Data Library
 Ottawa County GIS



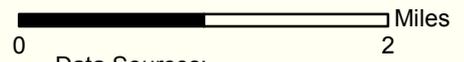
Prepared August 2015 by:



Grand Haven Charter Township Digital Elevation Model Map #3.11



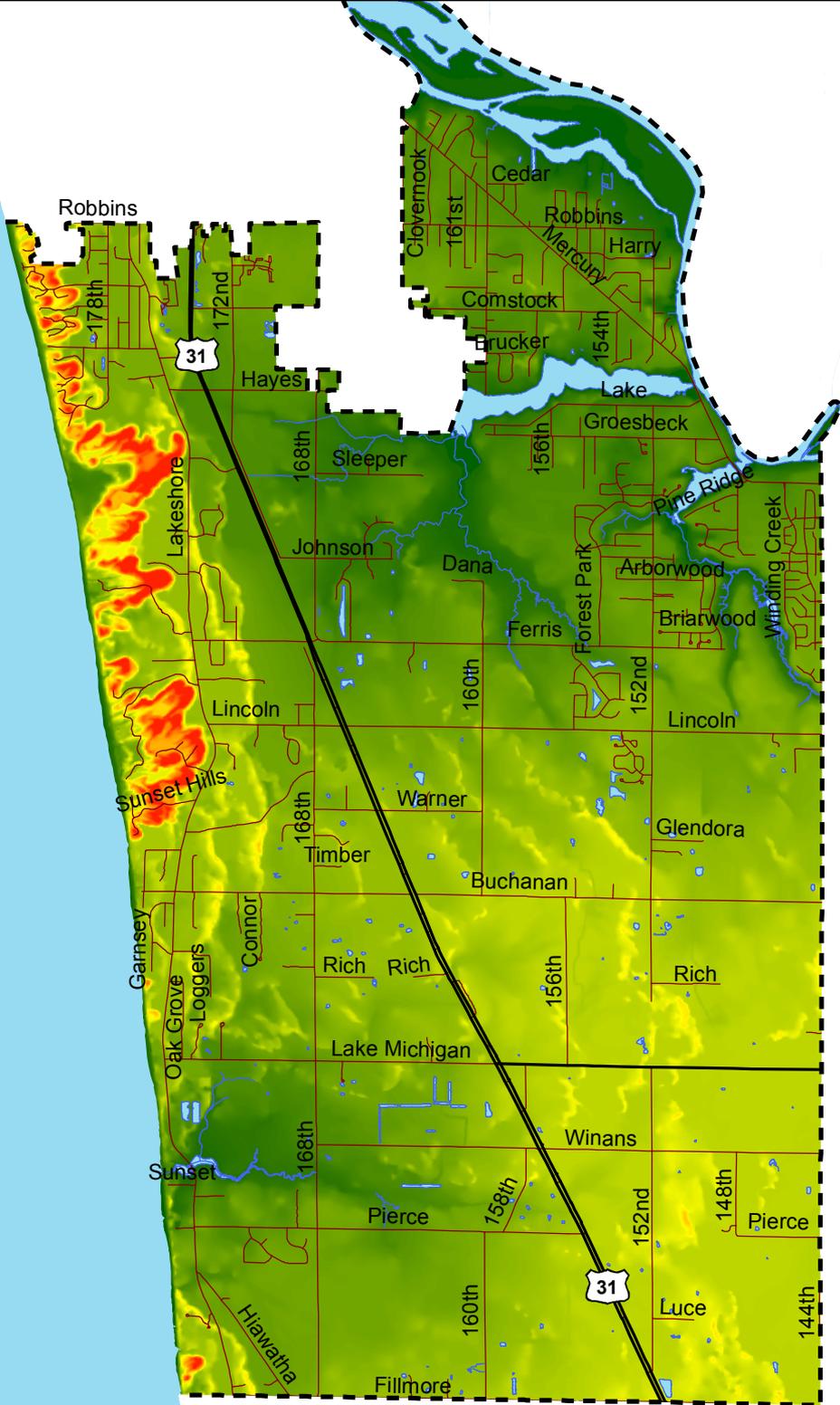
- - - Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams



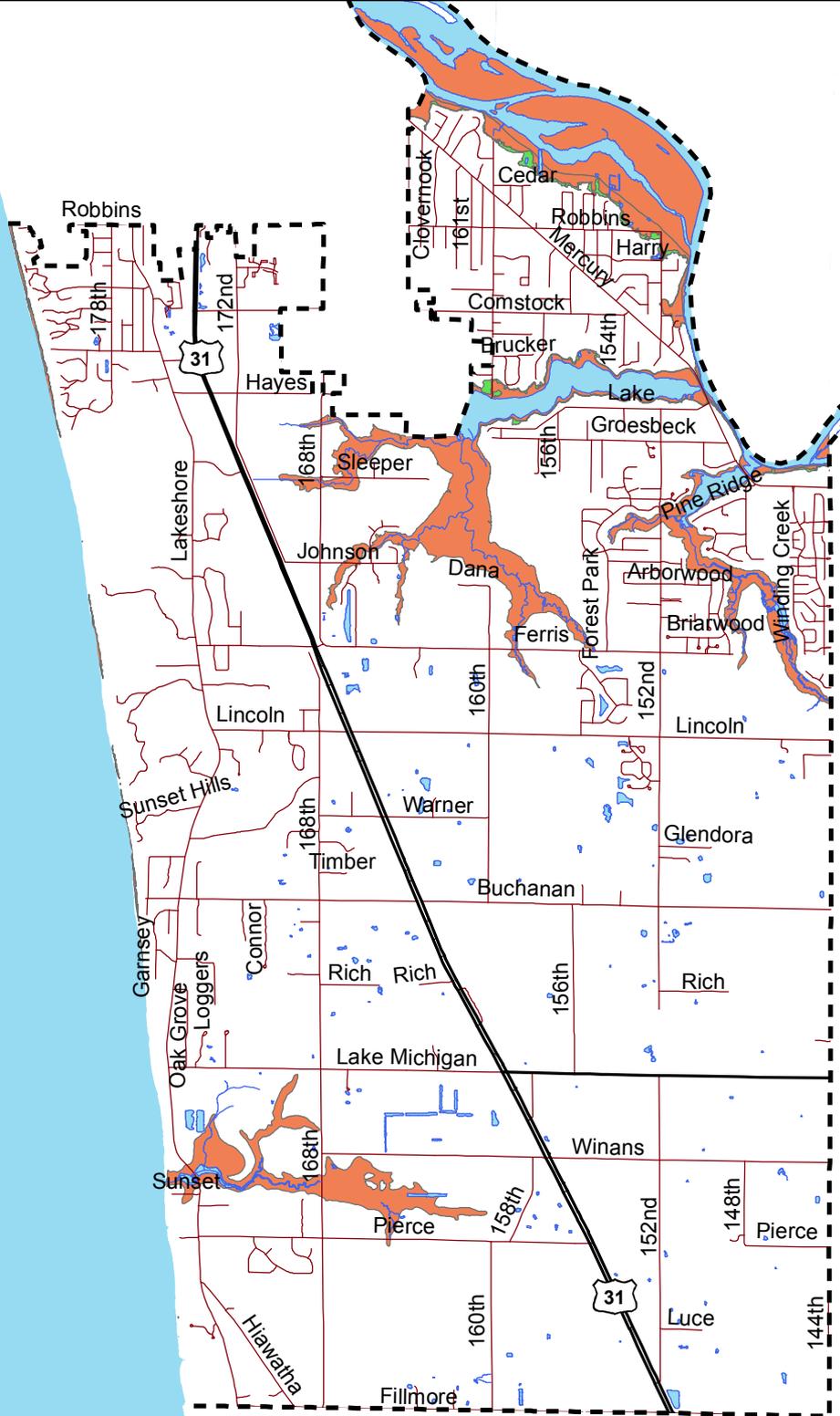
Data Sources:
 USDA-NRCS Geospatial Data Gateway
 Michigan Geo. Data Library
 Ottawa County GIS



Prepared August 2015 by:



Grand Haven Charter Township FEMA - 100 & 500 Year Flood Zones Map #3.12



- 500 year Flood Zone
- 100 year Flood Zone
- Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams



Data Sources:
 FEMA
 Michigan Geo. Data Library
 City of Grand Haven
 Ottawa County GIS

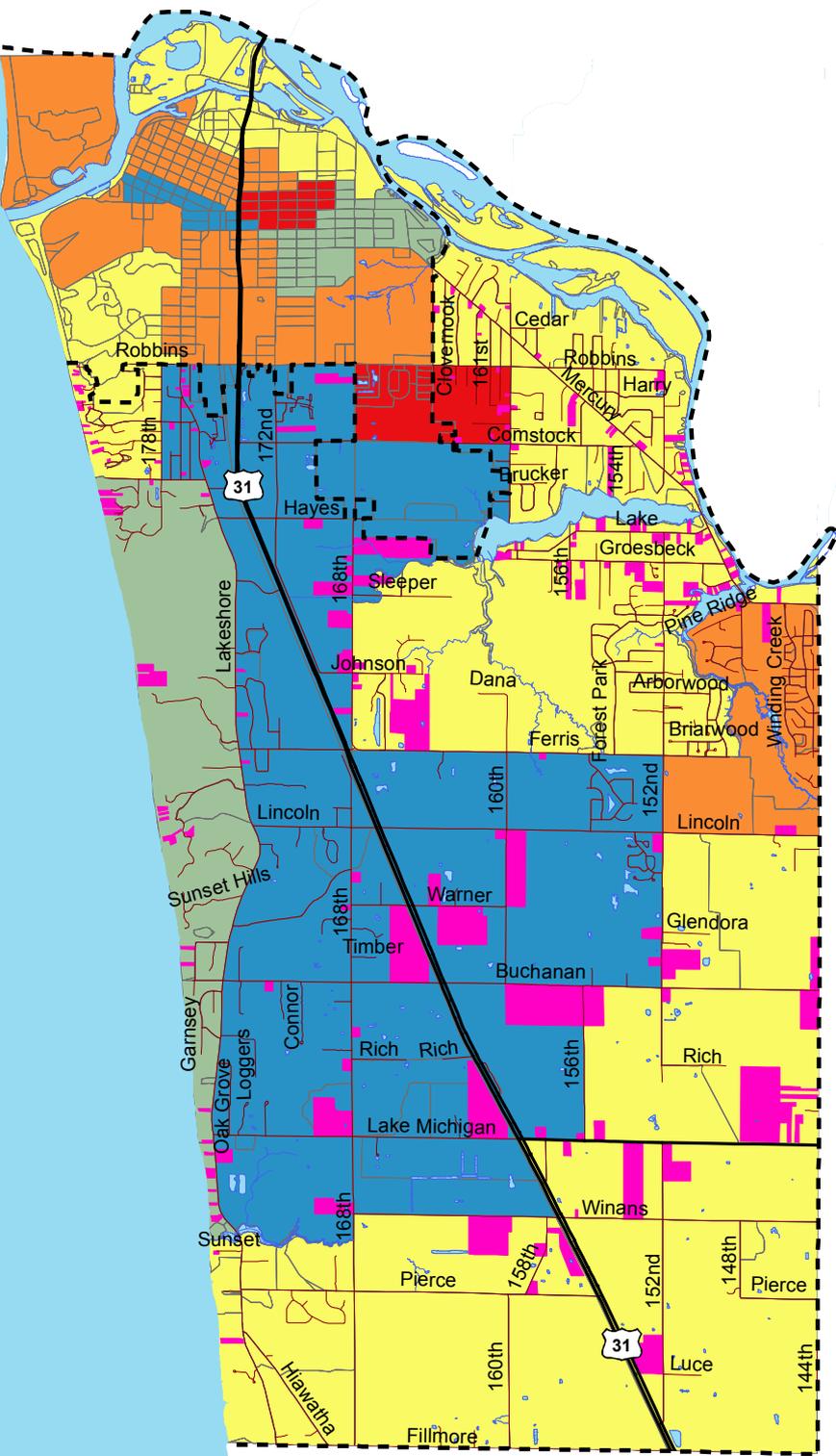


Prepared August 2015 by:



Grand Haven Charter Township Household Sensitivity Map #3.14

- 17.2 - 22.8%
- 9.0 - 17.1%
- 6.9 - 8.9%
- 3.9 - 6.8%
- 2.0 - 3.8%
- Home built 1940 & earlier
- Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams



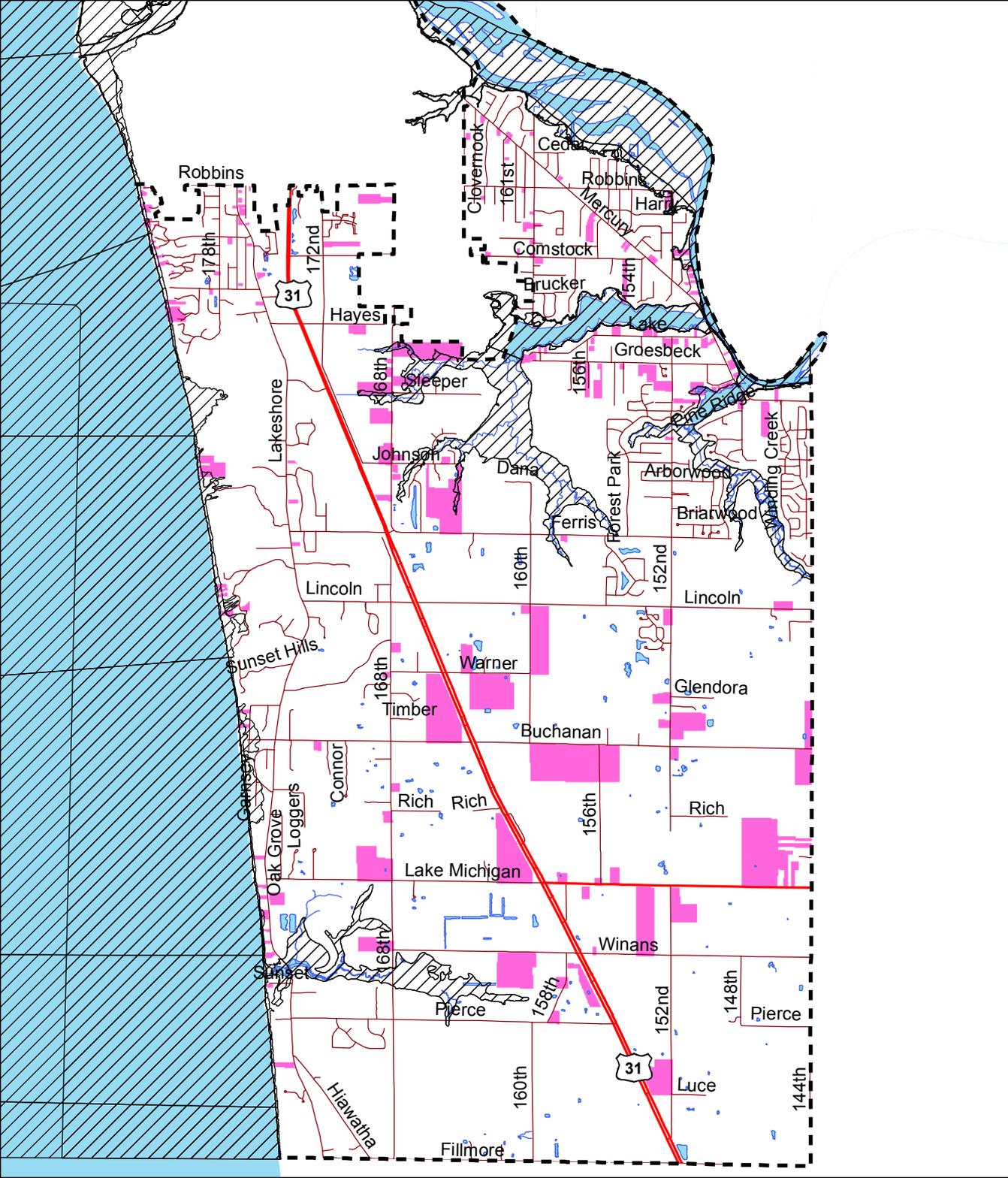
Data Sources:
 U.S. Census Bureau, Block Level Data (2010)
 Grand Haven Charter Township
 Michigan Geo. Data Library
 Ottawa County GIS



Prepared August 2015 by:



Grand Haven Charter Township Flooding Sensitive Homes Map #3.15



- Home built 1940 & earlier
- FEMA Flood Zones
- Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams



Data Sources:
 FEMA
 Grand Haven Charter Township
 Michigan Geo. Data Library
 Ottawa County GIS



Prepared August 2015 by:



Grand Haven Charter Township Critical Facilities Map #3.16

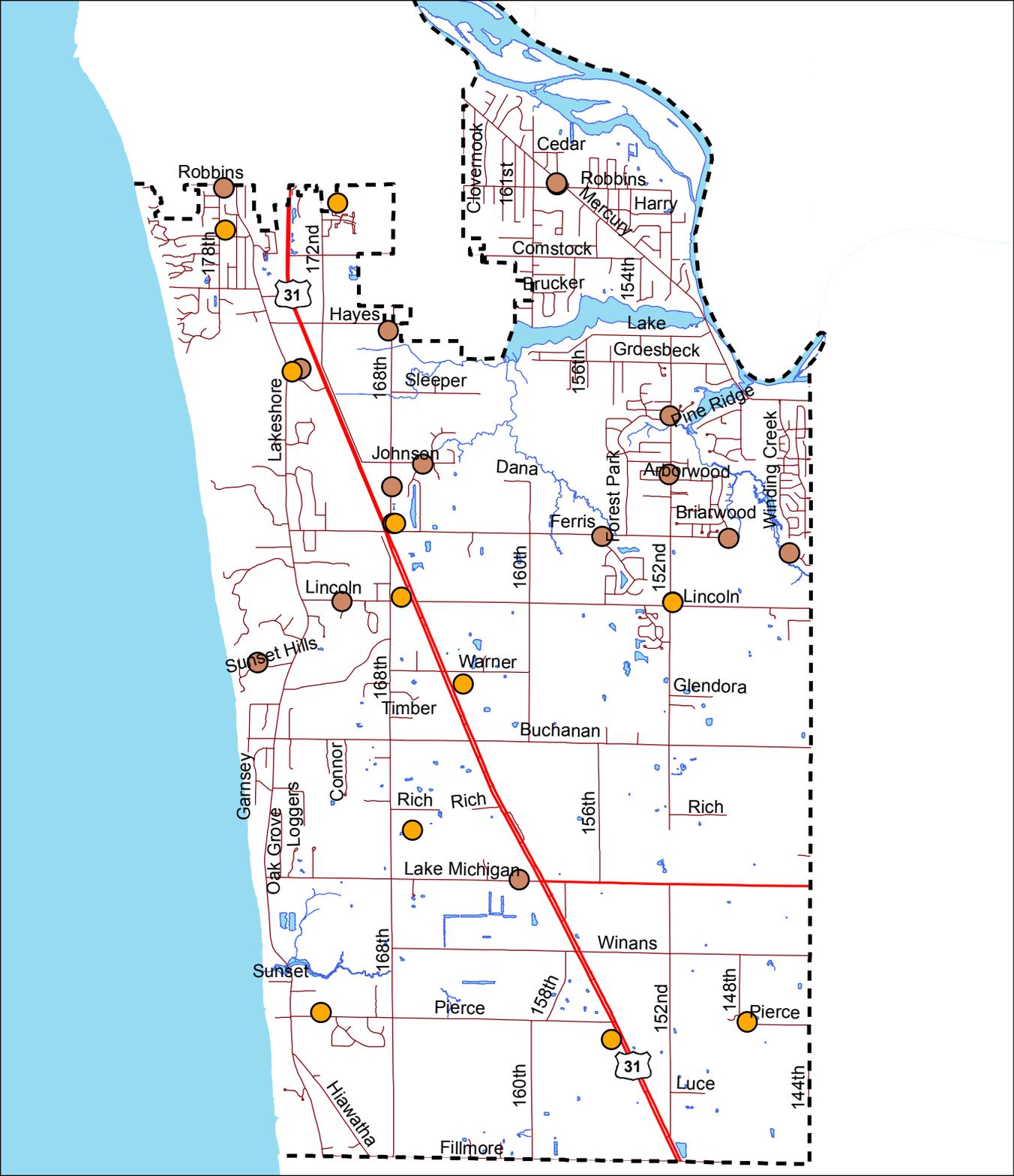
-  Communication Center
-  Fire Station
-  Utilities
-  Jurisdiction Boundary
-  Highways
-  Roads
-  Lakes
-  Streams



Data Sources:
Michigan Geo. Data Library
Ottawa County GIS



Prepared August 2015 by:



Grand Haven Charter Township Community Services Map #3.17

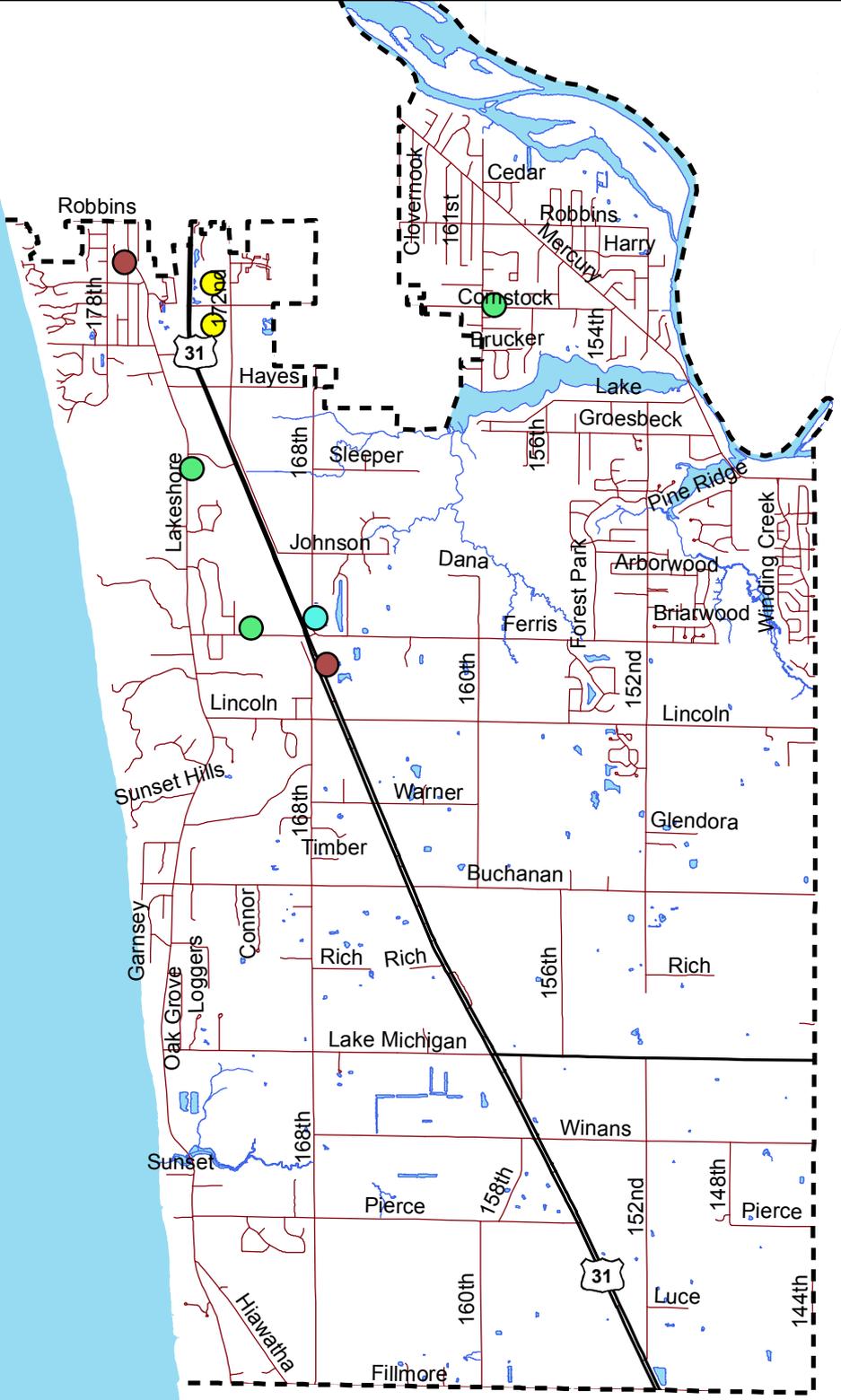
-  Grocery-Full Service
-  Place of Worship
-  Public Facility
-  School
-  Jurisdiction Boundary
-  Highways
-  Roads
-  Lakes
-  Streams



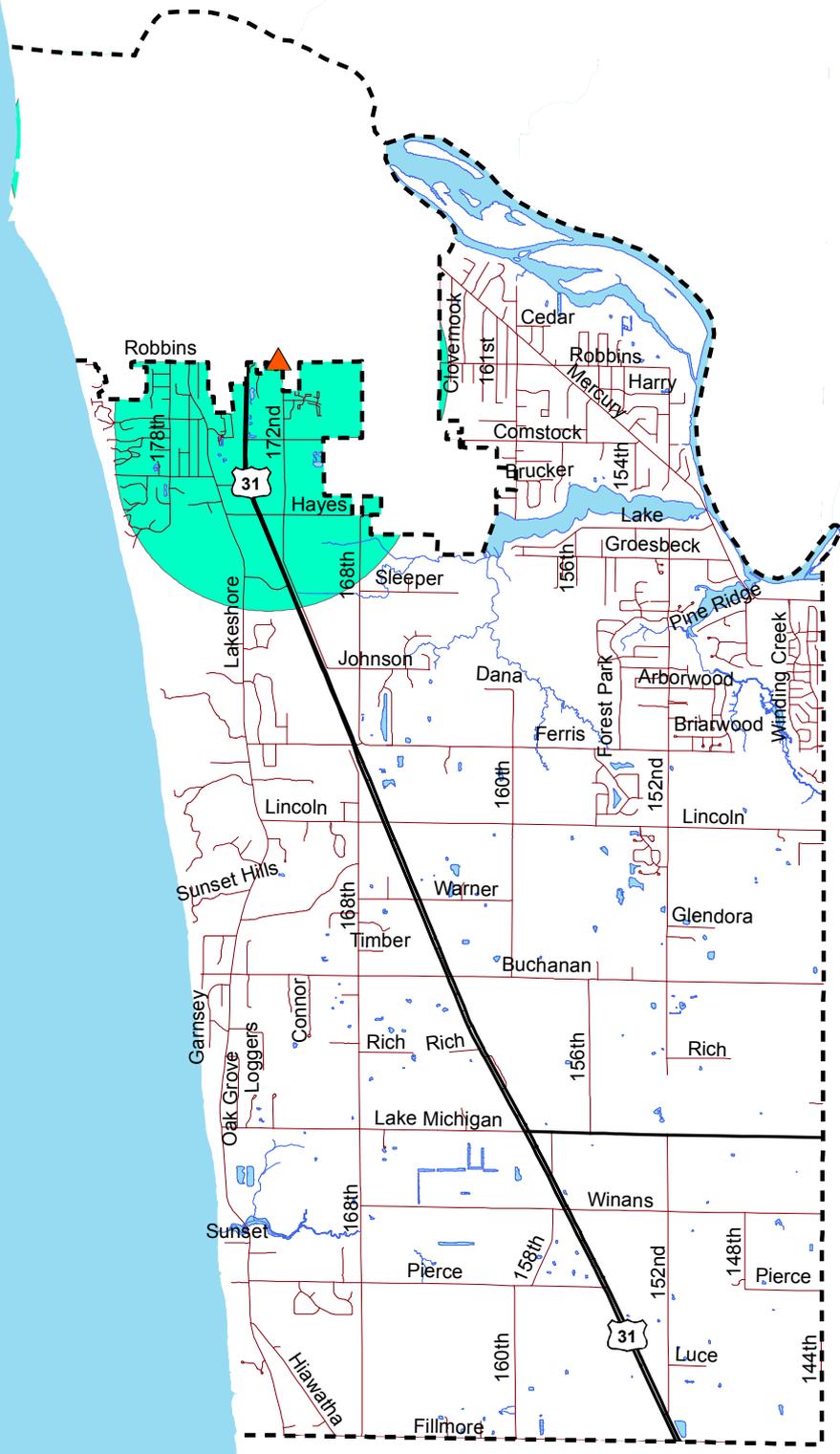
Data Sources:
Michigan Geo. Data Library
Ottawa County GIS



Prepared August 2015 by:



Grand Haven Charter Township Food Availability Map #3.18



- Grocery-Full Service (1 mile radius)
- Grocery-Convenience
- Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams



Data Sources:
 Grand Haven Charter Township
 Michigan Geo. Data Library
 Ottawa County GIS

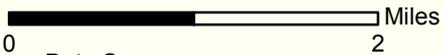


Prepared August 2015 by:



Grand Haven Charter Township Future Land Use Map #7.1

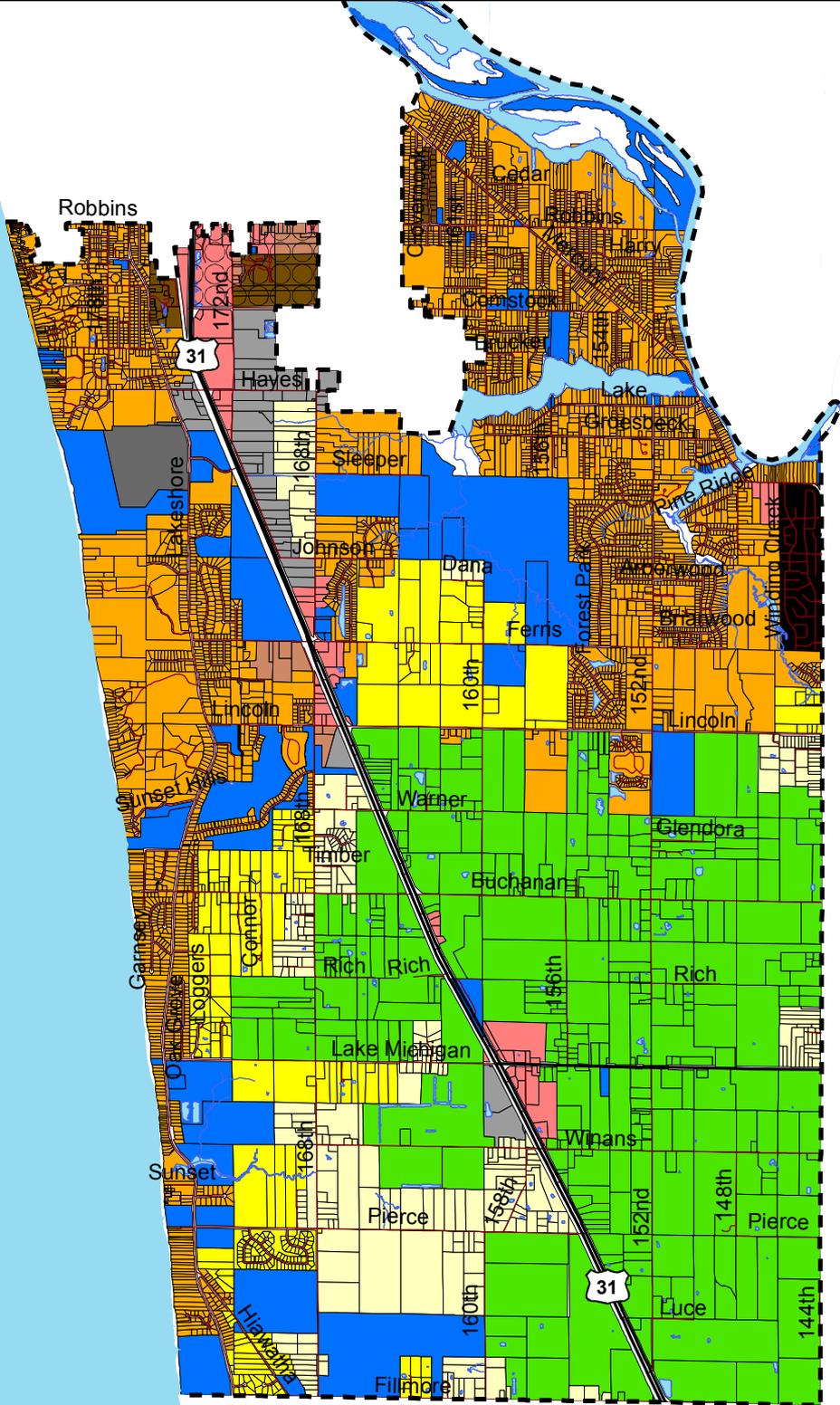
- Public/Quasi-Public
- AG Preservation
- Rural Residential
- Low Density Residential
- Medium Density Residential
- High Density Residential
- Manufactured Home Park
- Office/Service
- Commercial
- General Industrial
- Extraction
- Robbins Road Sub Area
- Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams



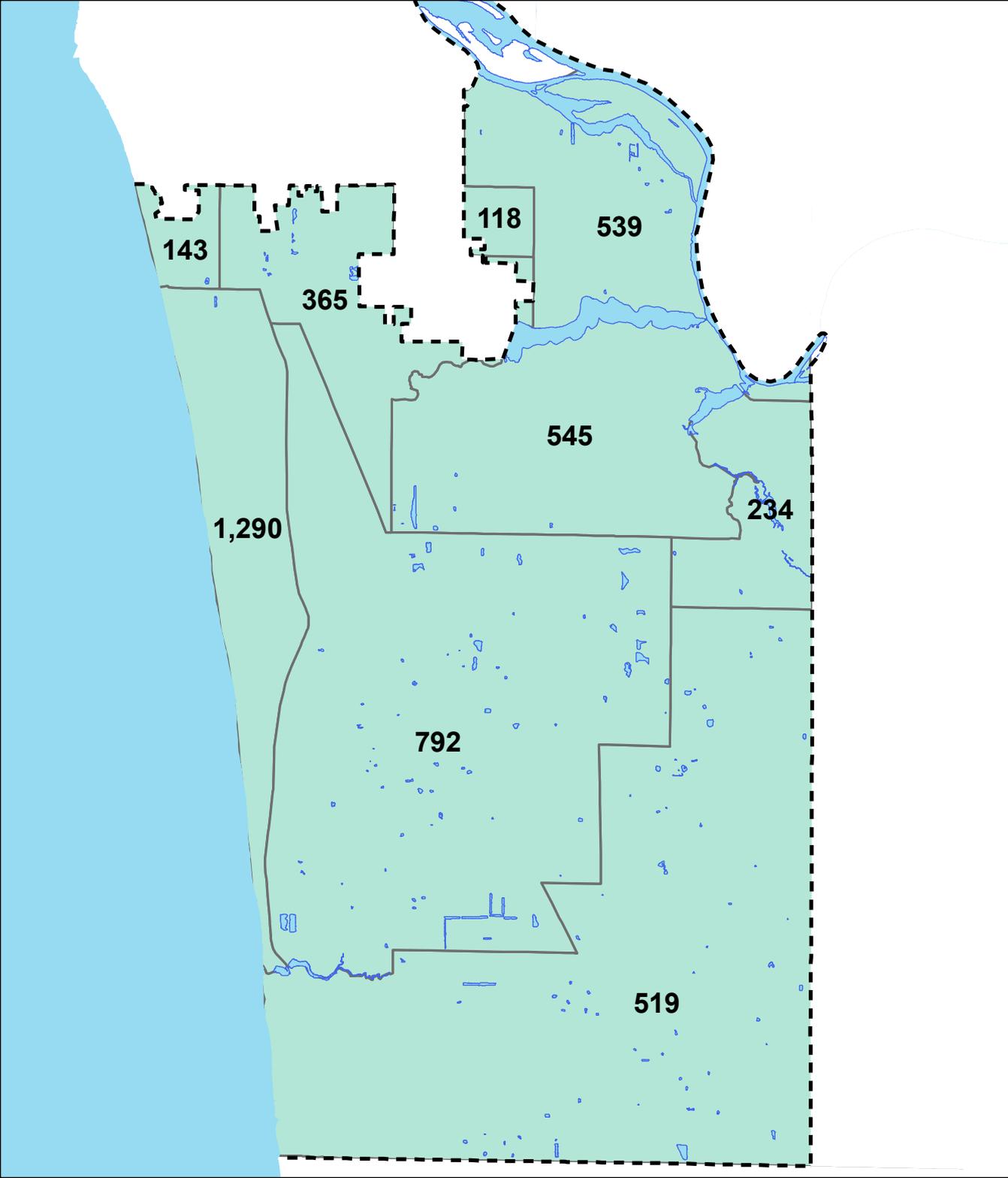
Data Sources:
Michigan Geo. Data Library
Grand Haven Charter Township
Ottawa County GIS



Prepared August 2015 by:



Grand Haven Charter Township Buildout Analysis Map #10.2



- Sections, based on Block Groups*
- Jurisdiction Boundary
- Lakes

* The number in each section summarizes additional residential unit growth possible under current zoning



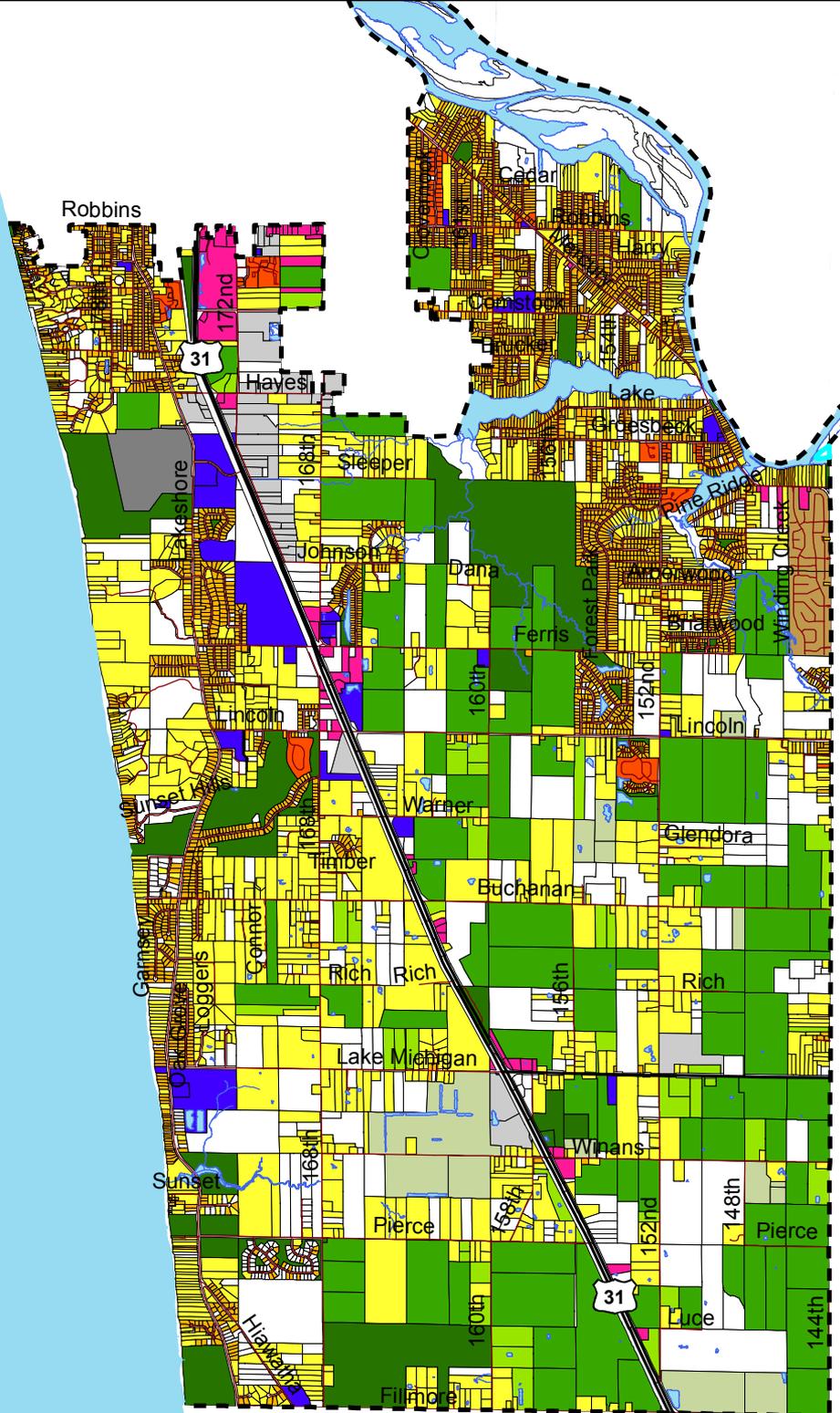
Data Sources:
U.S. Census Bureau,
Block Group Level Data (2010)
Michigan Geo. Data Library
Ottawa County GIS



Prepared August 2015 by:



Grand Haven Charter Township Existing Land Use Map #10.3



- Agricultural (Greater than 20 acres)
- Agricultural (Less than 20 acres)
- Commercial-Horticultural / Agricultural
- Low Density Residential (Greater than 1 acre)
- Medium Density Residential (Less than 1 acre)
- Multi-Family Residential
- Manufactured Home Park
- Commercial
- Light Industrial
- Parks, Recreation, Natural Areas
- Public / Quasi-Public
- Mining
- Vacant / Open Space
- Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams



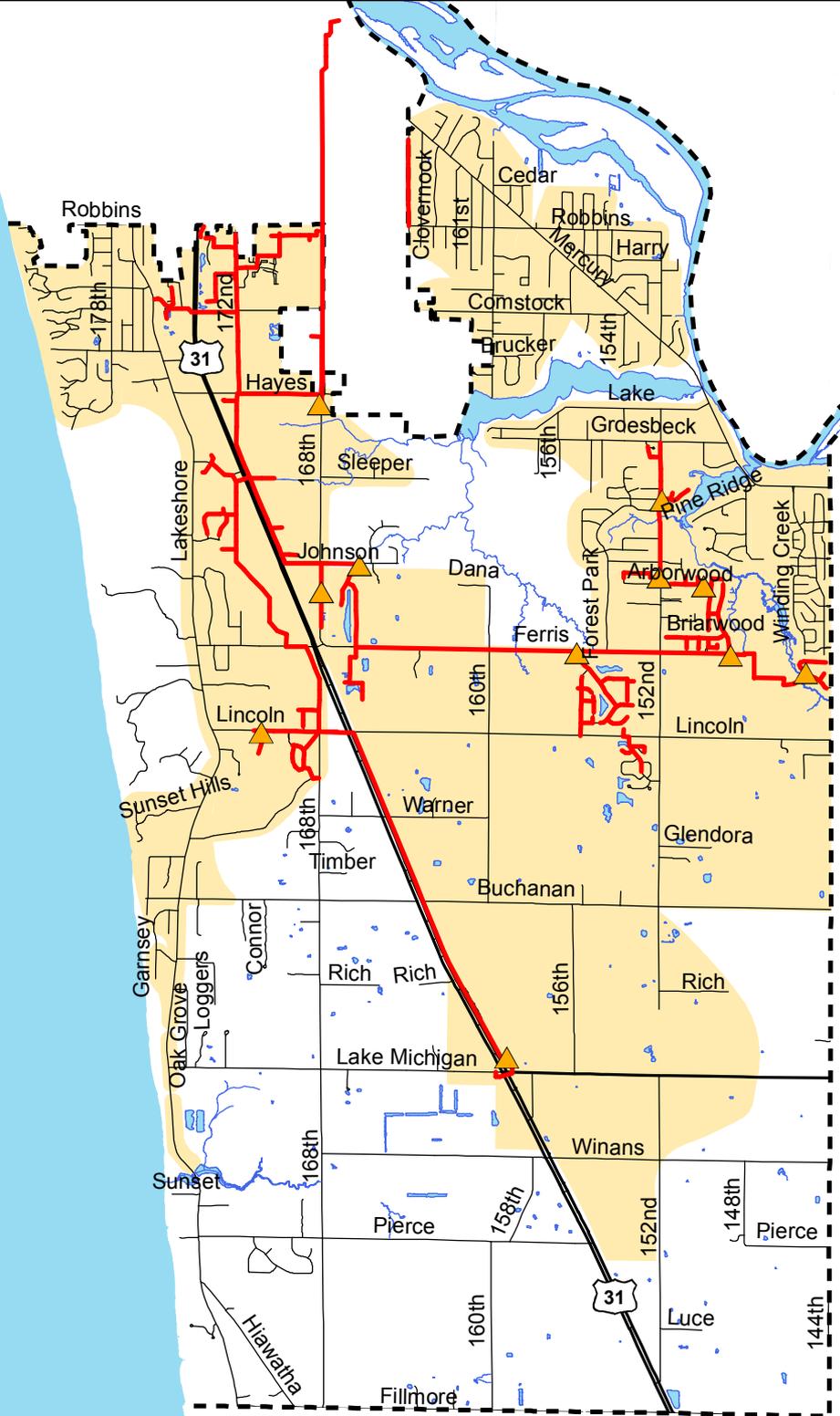
Data Sources:
Michigan Geo. Data Library
Grand Haven Charter Township
Ottawa County GIS



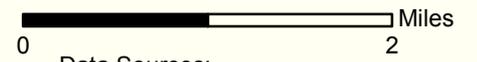
Prepared August 2015 by:



Grand Haven Charter Township Existing Sanitary Sewer System Map #10.4



- Sanitary Sewer Service area
- Lift Stations
- Existing Sanitary Sewer Mains
- Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams



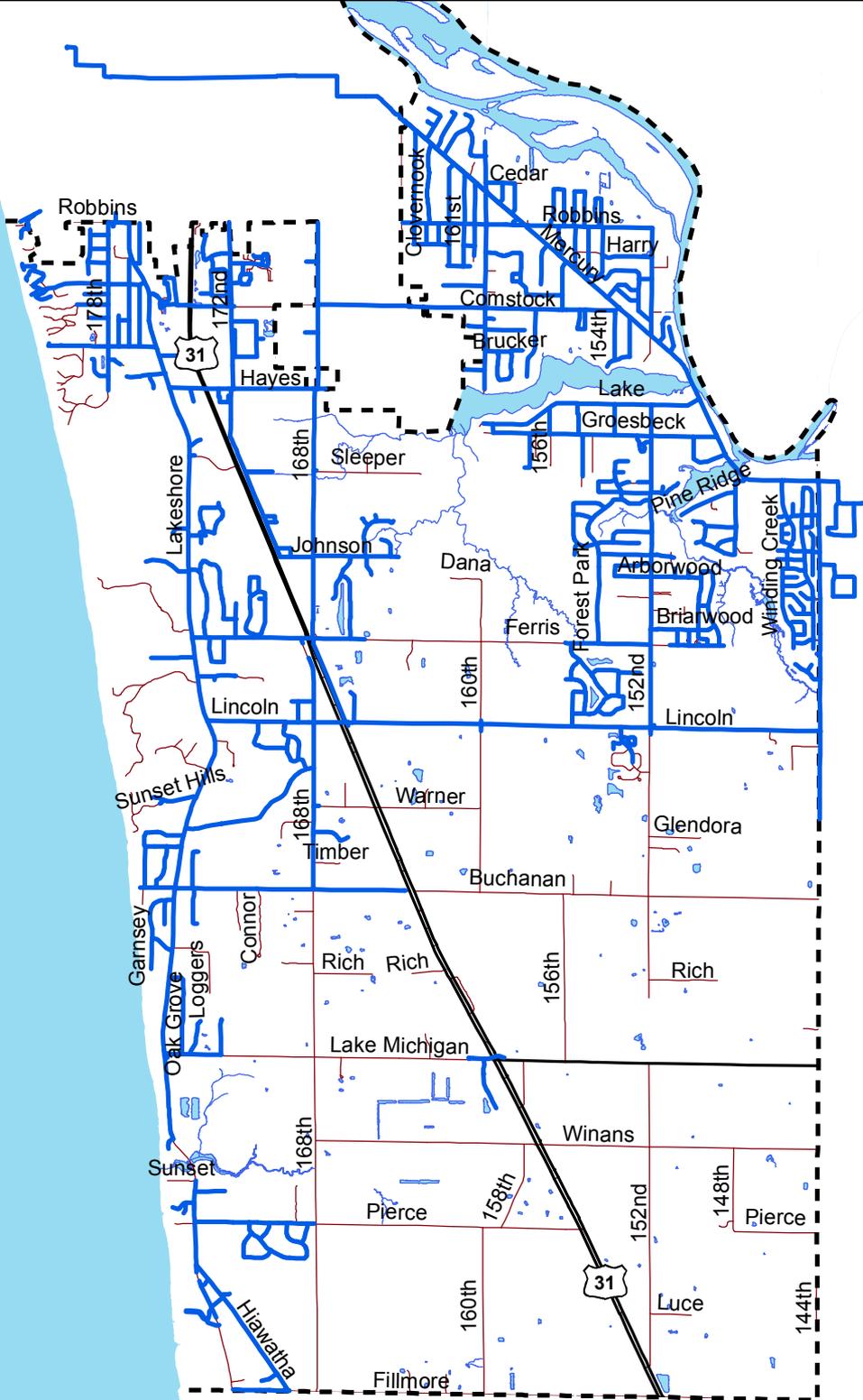
Data Sources:
 USDA-NRCS Geospatial Data Gateway
 Michigan Geo. Data Library
 Ottawa County GIS



Prepared August 2015 by:



Grand Haven Charter Township Water Distribution Map #10.5



- Existing Water Mains
- - - Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams



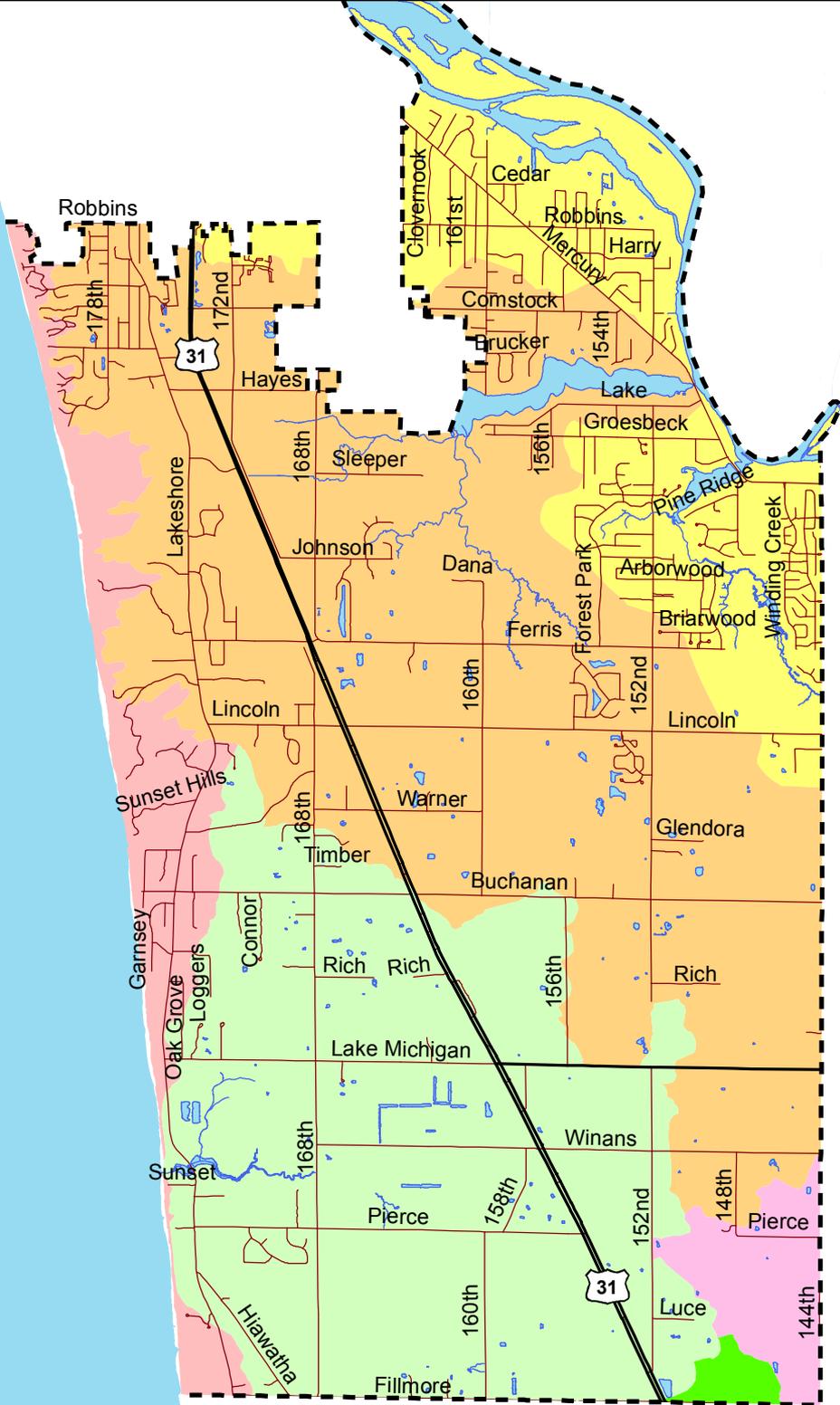
Data Sources:
 USDA-NRCS Geospatial Data Gateway
 Michigan Geo. Data Library
 Ottawa County GIS



Prepared August 2015 by:



Grand Haven Charter Township Watersheds Map #11.1



- Bass River
- Grand River
- Lake Drainage
- Little Pigeon Creek
- Pigeon River
- Pottawattomie Bayou
- Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams



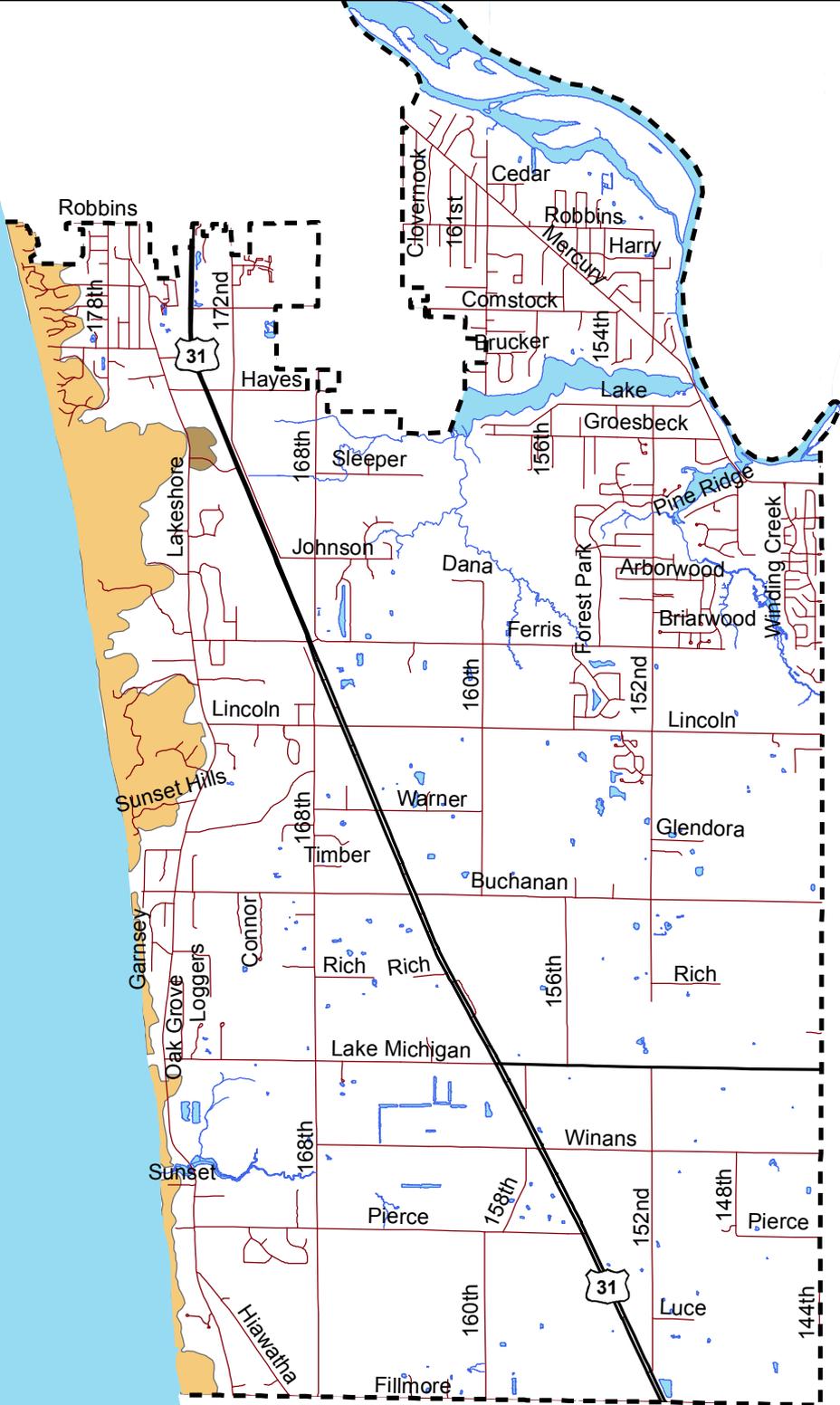
Data Sources:
Michigan Geo. Data Library
Ottawa County GIS



Prepared August 2015 by:



Grand Haven Charter Township Critical Dunes Map #11.2



-  Barrier dunes
-  Exemplary dune associated plant community
-  Jurisdiction Boundary
-  Highways
-  Roads
-  Lakes
-  Streams



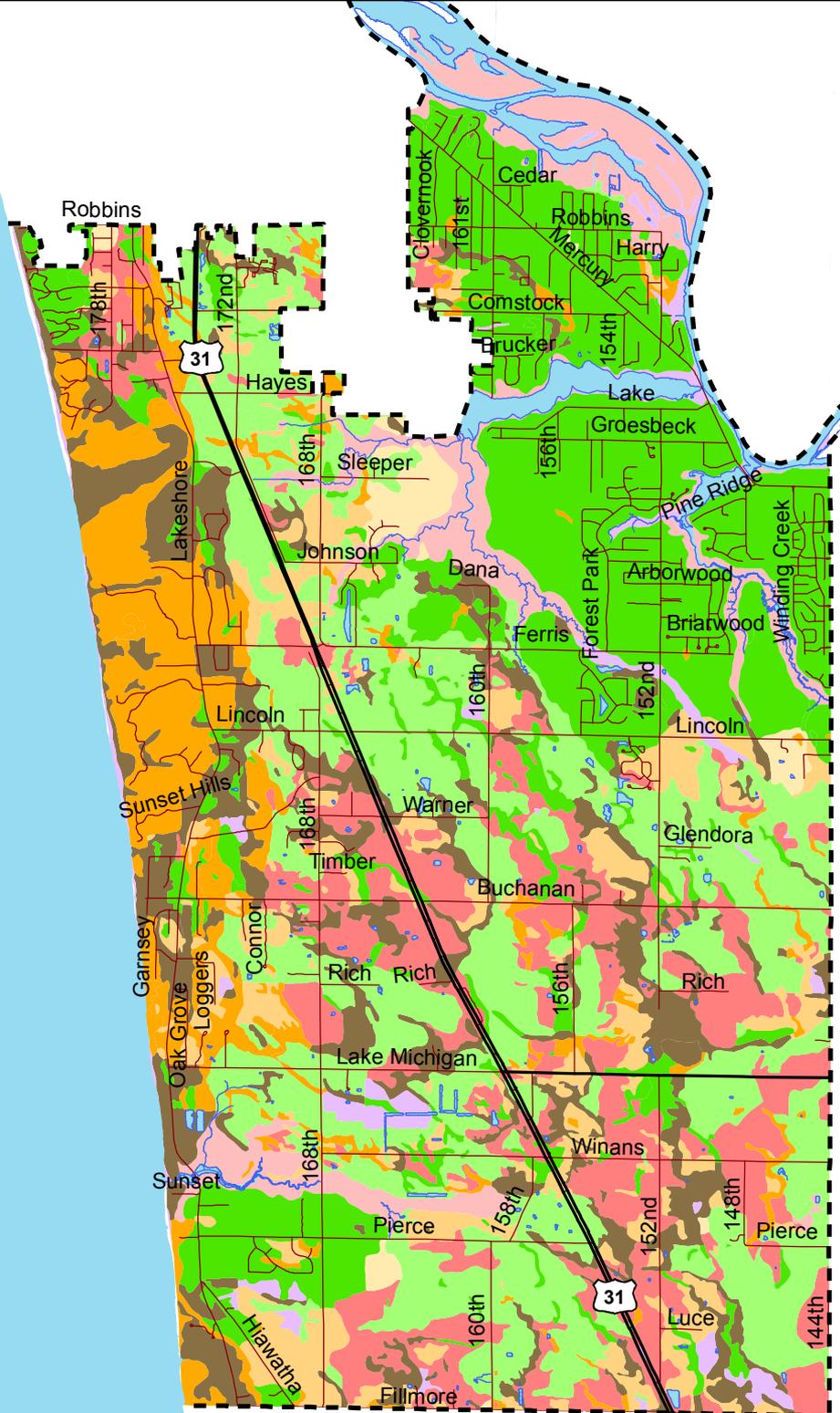
Data Sources:
Michigan Geo. Data Library
Ottawa County GIS



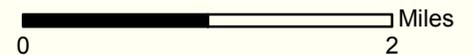
Prepared August 2015 by:



Grand Haven Charter Township Soil Classification Map #11.4



- Adrian-Houghton classification
- Au Gres-Saugatuck classification
- Blown-out land
- Chelsea classification
- Croswell and Au Gres classification
- Deer Park classification
- Grandby classification
- Other
- Rubicon classification
- Water
- Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams



Data Sources:
Michigan Geo. Data Library
Ottawa County GIS



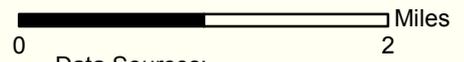
Prepared August 2015 by:



Grand Haven Charter Township Digital Elevation Model Map #11.5



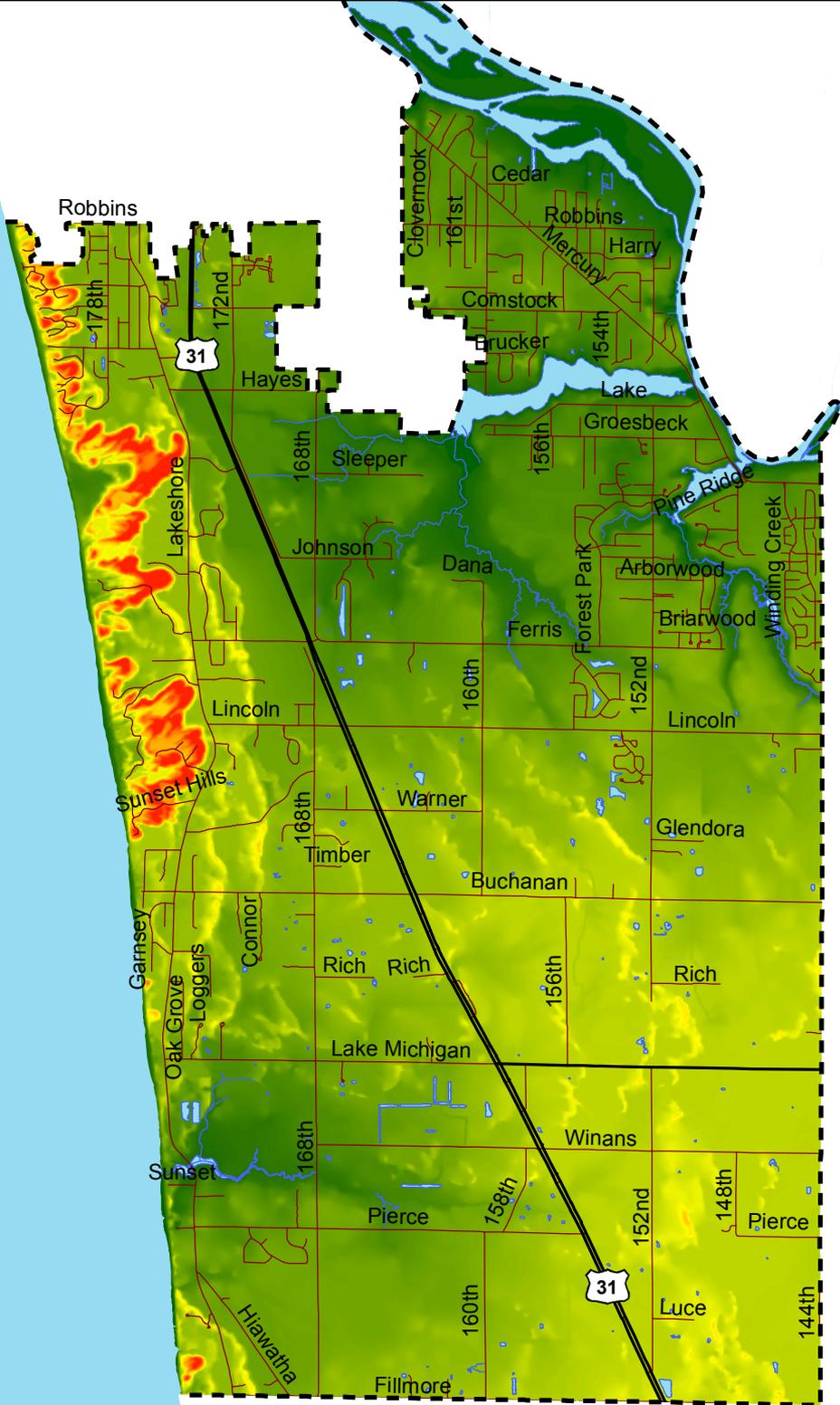
- Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams



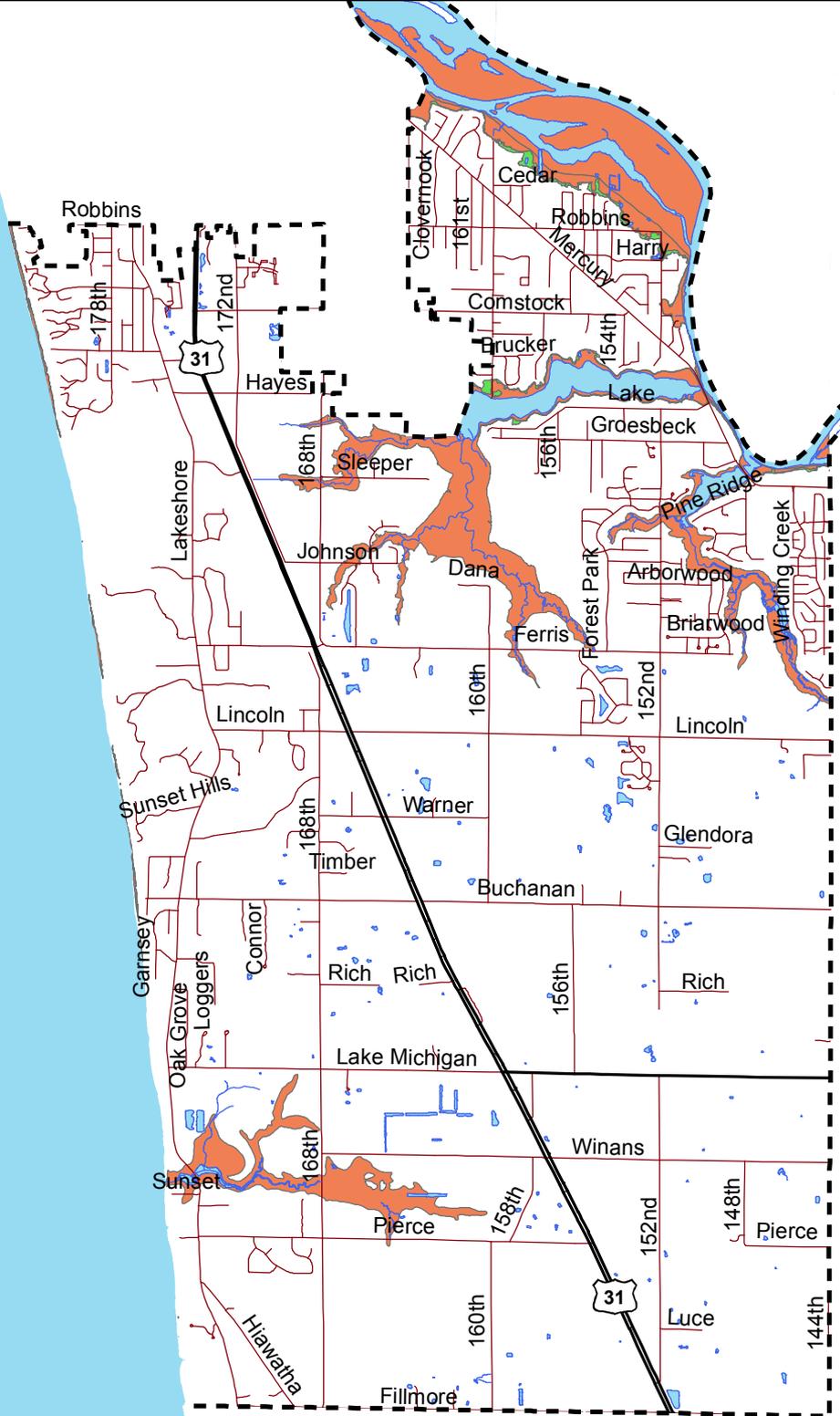
Data Sources:
 USDA-NRCS Geospatial Data Gateway
 Michigan Geo. Data Library
 Ottawa County GIS



Prepared August 2015 by:



Grand Haven Charter Township FEMA - 100 & 500 Year Flood Zones Map #11.6



- 500 year Flood Zone
- 100 year Flood Zone
- Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams



Data Sources:
 FEMA
 Michigan Geo. Data Library
 City of Grand Haven
 Ottawa County GIS



Prepared August 2015 by:



Grand Haven Charter Township Parks and Trails Map #11.7

-  Property Boundaries
-  Jurisdiction Boundary
-  Highways
-  Roads

-  Local Parks
 - 1 - 152nd Avenue Access
 - 2 - Bignell Park
 - 3 - Brucker Street Access
 - 4 - Buchanan Street Access
 - 5 - Hofma Park and Preserve
 - 6 - Mercury Park
 - 7 - Odawa/Battle Point Boat Launch
 - 8 - Pottawattamie Park
 - 9 - Shiawassee Drive Access

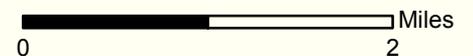
-  County Parks
 - 1 - Hiawatha Forest
 - 2 - Kirk Park
 - 3 - Rosy Mound Natural Area

-  State
 - 1 - Agnew Roadside Park
 - 2 - Grand Haven State Game Area

-  Private
 - 1 - North Ottawa Rod and Gun Club
 - 2 - Grand Haven Golf Club

-  Schools
 - 1 - Grand Haven High School
 - 2 - Lakeshore Baptist School
 - 3 - Peach Plains Elementary
 - 4 - Rosy Mound Elementary

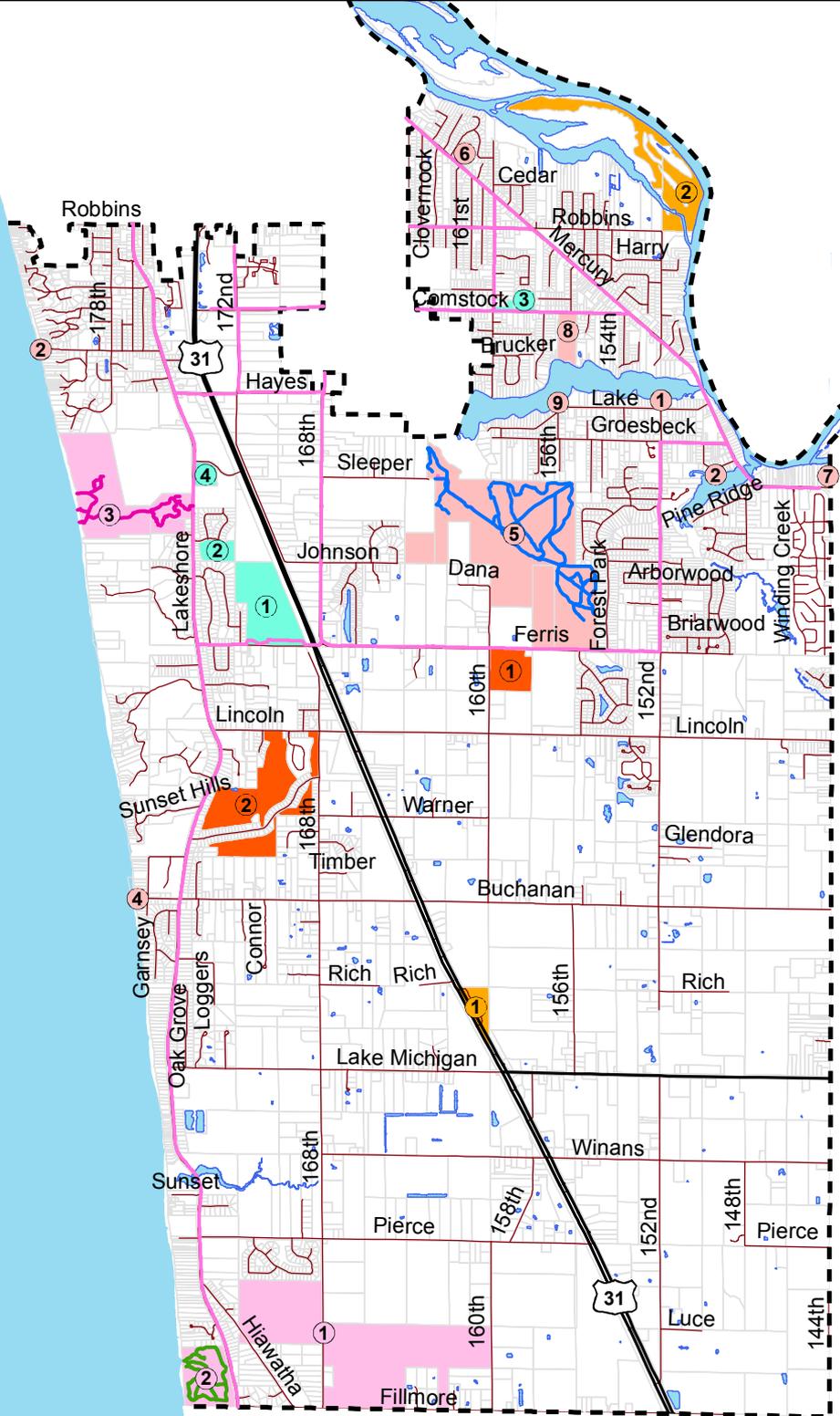
- Non-Motorized Trails/Pathways
 -  Grand Haven Township Trails and Pathways
 -  Hofma Park and Preserve Trails
 -  Kirk Park Trails - Ottawa County
 -  Rosy Mound Trails - Ottawa County



Data Sources:
 Grand Haven Charter Township
 Michigan Geo. Data Library
 Ottawa County GIS



Prepared August 2015 by:





Community Development Memo

DATE: October 1, 2015
TO: Planning Commission
FROM: Stacey Fedewa, Planning & Zoning Official
RE: 2016 Planning Commission Budget

2016 PLANNING COMMISSION BUDGET NEEDS

The next step in implementing the Resilient Master Plan is to budget for everything needed to accomplish the goals. This will have a direct correlation to the Implementation Plan.

The Planning Commission will need to specify the following information:

1. What? Suggestions include...
 - a. Zoning Ordinance update/recodification
 - b. Traffic Impact Study for M-231 Bypass
 - c. Sensitive Landscape Study
 - d. Tree Survey
 - e. Impervious Surface Study
2. When?
 - a. Current long term budget projects are 2016–2018, so a year will need to be specified.
3. Other points to consider:
 - a. Is it possible certain projects may be done jointly with the City of Grand Haven, or other surrounding municipalities?
 - b. Many projects are likely eligible for grant funding.
 - c. What type of expert, or consultant, is needed to complete each project?

HOUSEKEEPING

Staff has identified a number of activities that are compensable, but have not been paid. Commissioners that attended training events should expect to see an increase in their next check.

Additionally, most of the travel expenses had not been reimbursed. A Commissioner is eligible to receive travel reimbursement for driving to training sessions, and visiting the site of development applications.

At future meetings staff will inquire, which Commissioners visited the site of the application item on the agenda, and travel expenses will be reimbursed accordingly.

Please contact me prior to the meeting with questions or concerns.