AGENDA

Grand Haven Charter Township Planning Commission
Monday, January 4, 2016 – 7:30 p.m.

I. Call to Order

II. Roll Call

III. Pledge to the Flag

IV. Approval of the December 7, 2015 Meeting Minutes

V. Correspondence

VI. Public Comments/Questions on Agenda Items Only (Limited to 3 minutes)

VII. Old Business
- A. Review Resilient Grand Haven Master Plan Draft
  - a. Comments
  - b. Senior Chapter
  - c. Summary Document
  - d. Missing Middle Housing

VIII. New Business
- A. Review proposed Zoning Text Amendments
- B. Housekeeping Duties:
  - a. Approval of the 2016 Meeting Schedule
  - b. Appointment of Officers

IX. Reports
- A. Attorney's Report
- B. Staff Report
- 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
DECEMBER 7, 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, LaMourie, Robertson, Kieft, Taylor, Gignac, Reenders, Cousins, and Wilson
Members absent: None
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 November 2, 2015 meeting were approved.

V. CORRESPONDENCE

A. Christian Reformed Conference Grounds – Special Land Use Amendment
- Drueke – 12449 Jansma Drive
- Dudek – 12223 Bluewater Road
- Haveman – 12471 Jansma Drive
- Rop – 17633 Hillcrest Drive

B. Health Pointe – Planned Unit Development Amendment
- Rolfe – 13422 Greenleaf Lane
- Collins – by way of email, per Qualified Voter File, not a Township resident
- Kirchner – 16122 Vandenberg Drive
- Van Dyke – 17345 Mountain Plat Lane
- Weaver – 13840 Stearns Court

VI. PUBLIC COMMENTS ON AGENDA ITEMS ONLY

Mark Reenders – 16616 Warner Street, opposes the Health Pointe PUD Amendment project for the following reasons:

- Questions compliance with the Zoning Ordinance. Requested the Planning Commission provide clarification on several items.

- Attorney Bultje and Fedewa addressed each item.

- Project has not been transparent.

Dan Hansen – 11001 Lakeshore Drive, opposes the Health Pointe PUD Amendment project for the following reasons:

- Project has not been transparent.
- Medical uses within the building have not been provided.
- Requested the Planning Commission delay the vote until neighboring municipalities have been able to study the impact of this project.

Jaclyn Hansen – 11001 Lakeshore Drive, opposes the Health Pointe PUD Amendment project for the following reasons:

- Medical uses within the building have not been provided. Recent journal article indicated there will be operating rooms.

Holly Lookabaugh-Deur – 16760 Lincoln Street, opposes the Health Pointe PUD Amendment project for the following reasons:

- Planning Commissions, past and present, are not applying the US-31 Area Overlay Zone consistently.

Ross Pope – 15526 Linn Court, Spring Lake, opposes the Health Pointe PUD Amendment project for the following reasons:

- Real estate demographic analysis found there are currently enough medical services provided for this community.
- Requested the Planning Commission consider the economic impact.

VII. PUBLIC HEARING

A. Special Land Use Amendment – Christian Reformed Conference Grounds

Kantrovich opened the Public Hearing at 7:49 p.m.

Fedewa provided an overview through a memorandum dated December 3rd.

Representative Michael Perton, Executive Director of the Christian Reformed Conference Grounds was present and available to answer questions:

- Michael Perton – Executive Director of the Christian Reformed Conference Grounds
    - Gave an overview of the proposed amendments to the master site plan.

- No lighting is proposed for the "GaGa Ball" court. Daytime use only. Structure would be removed/replaced seasonally.
- Contact has not been made with the electric company to determine if the proposed "GaGa Ball" court is permitted to locate within the 15 foot setback. Willing to move the court to a more centralized location.
- Gate along Beach Road is intended for emergency vehicle access and traffic control, so vehicles have a second exit location after the end of an event.

After the applicant's presentation the Chairperson invited public comment:

- Thomas Dudek – 12223 Bluewater Road, opposes this project for the following reasons:
  - Development already at capacity, additional uses will continue to exacerbate noise and parking issues.
  - Patrons of the development have been parking on Beach Road and using the emergency gate to gain access.
  - Requested a screening fence be installed along Beach Road.
- Jim Haveman – 12471 Jansma Drive, opposes this project for the following reasons:
  - Since its inception the Conference Grounds have transitioned from a small campground to a commercial operation. Majority of revenue collected through facility rentals.
  - Campfire smoke continues to be problematic for health and the quiet enjoyment of a person's property.
  - Requested the Planning Commission delay the application and require the applicant to meet with neighbors and find a resolution.

Kantrovich closed the Public Hearing at 8:03 p.m.

VIII. OLD BUSINESS

A. Special Land Use Amendment – Christian Reformed Conference Grounds

The application was discussed by Commissioners and focused on:

- Questioned if the "GaGa Ball" court would encumber any of the utility easements.
- Conference Ground patrons parking on Beach Road to gain access to the site is problematic. Discussed possible resolutions.
- Capacity and noise issues continue to be raised by neighbors.

- Health impacts from the campfire smoke are concerning.
- Questioned if the application should be denied because the State of Michigan has a goal of eliminating nonconforming uses and structures.
- Requested staff determine if propane sales on site are permissible.
- Commissioners requested Attorney Bultje address the legal aspects of this application:
    - Review of legal history.
    - 1982 Court denied the Township's density limitation.
    - R-1 Zoning District allows public and private campgrounds as a Special Land Use, but the applicant has never obtained a SLU for its entire operation.
    - Section 19.07.46 of the Zoning Ordinance, Special Land Use for the Enlargement or Increase or Extension of a Non-Conforming Use is applicable in this case.

Motion by Reenders, supported by Gignac, to **approve** the Christian Reformed Conference Grounds Special Land Use Amendment Application to relocate Staff Cottage No. 20D and rotate Building 8, the Retreat Center. This is based on the application meeting the requirements and standards set forth by the Grand Haven Charter Township Zoning Ordinance and Master Plan. The motion is subject to, and incorporates, the following report. **Which motion carried** with LaMourie opposing because the issue surrounding the south gate was not addressed.

Motion by Robertson, supported by Kieft, to **deny** the Christian Reformed Conference Grounds Special Land Use Amendment Application to install a "GaGa Ball" court for the following reasons:

1. The proposed use is inconsistent with the intent and purpose of the Zoning Ordinance.
2. The proposed use is of such location, size, density, and character that it is incompatible with adjacent uses of land and the orderly development of the district.
3. The proposed use is such that traffic to, from, and on the premises (*including parking*) and the assembly of persons in relation to such use may be hazardous, or inconvenient to the neighborhood, general character, and intensity of the existing and potential development of the neighborhood.

Which motion carried unanimously.

Motion by LaMourie, supported by Robertson, to request the Township Board consider enforcing Parking Ordinance No. 299 to address parking on Beach Road. **Which motion carried** unaimously.

REPORT

Pursuant to the provisions of the Grand Haven Charter Township (the "Township") Zoning Ordinance (the "Zoning Ordinance"), the following report of the Grand Haven Charter Township Planning Commission (the "Planning Commission") concerning an application by the Christian Reformed Conference Grounds (the "Applicant") for approval of a Special Land Use Amendment application (the "Project").

The Project will consist of relocating Staff Cottage No. 20D to avoid the overhead power lines and abide by the 15 foot setback requirement imposed by the electric company; and rotating Building 8, the Retreat Center. The Project as recommended for approval is shown on a final site plan, last revised 11/23/2015 (the "Final Site Plan"), presently on file with the Township.

1. The Planning Commission finds the Project meets the special land use requirements of Section 19.05 of the Zoning Ordinance. This approval is based on the affirmative findings that each of the following standards has been fulfilled:

    A. The proposed use is consistent with, and promotes the intent and purpose of this Ordinance.

    B. The proposed use is of such location, size, density, and character as to be compatible with adjacent uses of land and the orderly development of the district in which situated and of adjacent districts.

    C. The proposed use does not have a substantially detrimental effect upon, nor substantially impair the value of, neighborhood property.

    D. The proposed use is reasonably compatible with the natural environment of the subject premises and adjacent premises.

    E. The proposed use does not unduly interfere with provision of adequate light or air, nor overcrowd land or cause a severe concentration of population.

    F. The proposed use does not interfere or unduly burden water supply facilities, sewage collection and disposal systems, park and recreational facilities, and other public services.

    G. The proposed use is such that traffic to, from, and on the premises and the assembly of persons relation to such use will not be hazardous, or inconvenient to the neighborhood, nor unduly conflict with the normal traffic of the neighborhood, considering, among other things: safe and convenient routes for pedestrian traffic, particularly of children, the relationship of the proposed use to

main thoroughfares and to streets and intersections, and the general character and intensity of the existing and potential development of the neighborhood.

H. The proposed use is consistent with the health, safety, and welfare of the Township.

2. The Planning Commission finds the Project meets the special land use requirements of Section 19.07.46 of the Zoning Ordinance. This approval is based on the affirmative findings that each of the following standards has been fulfilled:

   A. The Project is reasonable based upon a consideration of the area of the original non-conforming use.

   B. The Project shall not substantially interfere with the use of other properties in the surrounding neighborhood for the uses for which they have been zoned, or with the use of such other properties in compliance with the provisions of this Ordinance.

   C. The Project shall not significantly compromise the ability of the Township to effectuate the goals and purposes of its Master Plan.

3. The Planning Commission finds the Project meets the site plan review standards of Section 23.06 of the Zoning Ordinance. Specifically, pursuant to Section 23.06.7, the Planning Commission approves the Project based on the affirmative findings that each of the following standards has been fulfilled:

   A. The uses proposed will not adversely affect the public health, safety, or welfare. Uses and structures located on the site take into account topography, size of the property, the uses on adjoining property and the relationship and size of buildings to the site.

   B. The site will be developed so as not to impede the normal and orderly development or improvement of surrounding property for uses permitted in this ordinance.

   C. Safe, convenient, uncontested, and well defined vehicular and pedestrian circulation is provided for ingress/egress points and within the site. Drives, streets and other circulation routes are designed to promote safe and efficient traffic operations within the site and at ingress/egress points.

   D. The arrangement of public or private vehicular and pedestrian connections to existing or planned streets in the area are planned to provide a safe and efficient circulation system for traffic within the township.

   E. Removal or alterations of significant natural features are restricted to those areas which are reasonably necessary to develop the site in accordance with the requirements of this Ordinance. The Planning Commission has required that

landscaping, buffers, and/or greenbelts be preserved and/or provided to ensure that proposed uses will be adequately buffered from one another and from surrounding public and private property.

F. Areas of natural drainage such as swales, wetlands, ponds, or swamps are protected and preserved insofar as practical in their natural state to provide areas for natural habitat, preserve drainage patterns and maintain the natural characteristics of the land.

G. The site plan provides reasonable visual and sound privacy for all dwelling units located therein and adjacent thereto. Landscaping shall be used, as appropriate, to accomplish these purposes.

H. All buildings and groups of buildings are arranged so as to permit necessary emergency vehicle access as requested by the fire department.

I. All streets and driveways are developed in accordance with the Ottawa County Road Commission specifications, as appropriate.

J. Appropriate measures have been taken to ensure that removal of surface waters will not adversely affect neighboring properties or the public storm drainage system. Provisions have been made to accommodate storm water, prevent erosion and the formation of dust.

K. Exterior lighting is arranged so that it is deflected away from adjacent properties and so it does not interfere with the vision of motorists along adjacent streets, and consists of sharp cut-off fixtures.

L. All loading and unloading areas and outside storage areas, including areas for the storage of trash, which face or are visible from residential districts or public streets, are screened.

M. Entrances and exits are provided at appropriate locations so as to maximize the convenience and safety for persons entering or leaving the site.

N. The site plans conforms to all applicable requirements of County, State, Federal, and Township statutes and ordinances.

O. The general purposes and spirit of this Ordinance and the Master Plan of the Township are maintained.

B. PUD Amendment – Health Pointe

LaMourie recused himself due to a conflict of interest. His employer is under contract to render architectural and engineering services for Spectrum Health.

Fedewa provided an overview through a memorandum dated December 3rd.

Several representatives from Spectrum Health and Nederveld were present and available.

The application was discussed by Commissioners and focused on:

- Commissioners requested Attorney Bultje address the legal aspects of this application:
    - Applicant requesting departures, not a variance. PUD Ordinance and US-31 Area Overlay Zone provide for some discretion if specific findings are made.
    - Zoning Ordinance limits the scope of factors the Township can consider for this application. So long as the general use of the building is permissible then each service does not have to be specified.
    - The Zoning Ordinance does not provide for the consideration of private competition or free enterprise as a reason to approve or deny an application. The Township's scope is limited by the Zoning Ordinance.
    - Review process of the Planned Unit Development Amendment is not fast. Provides for an optional pre-application presentation, which was utilized in September 2015. It requires a public hearing with the Planning Commission and Township Board, which are both noticed in conformance with the Michigan Zoning Enabling Act. Township Board will hold a public hearing on the application regardless of the Planning Commissions' recommendation.
        - The Planning Commission public hearing is more than is required by the Michigan Zoning Enabling Act.
    - The State of Michigan is responsible for issuing Certificates of Need. The application process addresses items such as duplication of services. It is not advisable for the Township regulate the medical uses within the building.
- Questioned if a medical professional office building is a permitted use within the Commercial PUD. Staff referenced the 2009 Master Plan's Future Land Use Plan, which indicates the SP-Service Professional and C-1 Commercial zoning districts correspond to the Commercial PUD zoning district.
- Resilient Master Plan process has been in progress for over one year, which has included many discussions of increasing building heights.
- Commissioners requested staff provide several pieces of information and updates:
    - Provided a list of properties within the Township that are over 35 feet in height.
    - Described each departure the applicant is requesting.
    - Noted the applicant will provide the Township with two easements to allow for an internal connection with a neighboring parcel and for the future realignment of Whittaker Way and DeSpelder Street.

- Applicant will add the additional access points between the parking lots and driveways to address the backloading issue.

Motion by Robertson, supported by Cousins to recommend to the Township Board **approval with conditions** of the Health Pointe Planned Unit Development Amendment upon the removal of Section 3.D.iii of the attached Report. This is based on the application meeting the requirements and standards set forth by the Grand Haven Charter Township Zoning Ordinance and Master Plan. The motion is subject to, and incorporates, the following report. **Which motion carried** with Kieft opposing because the application does not meet requirements of the Zoning Ordinance.

REPORT

Pursuant to the provisions of the Grand Haven Charter Township (the "Township") Zoning Ordinance (the "Zoning Ordinance"), the following is the report of the Grand Haven Charter Township Planning Commission (the "Planning Commission") concerning an application by Health Pointe Corp (the "Developer") for approval of a Health Pointe Planned Unit Development Amendment (the "Project" or the "PUD").

The Project will consist of a 120,041 square foot three story medical office building. This 12 acre project will be located on the remaining five outlots from the original 1998 Meijer PUD. The Project as recommended for approval is shown on a final site plan, last revised 10/27/2015 (the "Final Site Plan"), presently on file with the Township.

The purpose of this report is to state the recommendation of the Planning Commission concerning the Project, the basis for the Planning Commission's recommendation, and the Planning Commission's recommendation that the Health Pointe PUD Amendment be approved as outlined in this motion. The Developer shall comply with all of the documentation submitted to the Township for this Project. In recommending the approval of the proposed PUD application, the Planning Commission makes the following findings pursuant to Section 17.04.3 of the Zoning Ordinance.

1. The Project meets the site plan review standards of Section 23.06 of the Zoning Ordinance. Specifically, pursuant to Section 23.06.7, the Planning Commission finds as follows:

    A. The uses proposed will not adversely affect the public health, safety, or welfare. Uses and structures located on the site take into account topography, size of the property, the uses on adjoining property and the relationship and size of buildings to the site. The site will be developed so as not to impede the normal and orderly development or improvement of surrounding property for uses permitted in this Ordinance.

B. Safe, convenient, uncontested, and well defined vehicular and pedestrian circulation is provided for ingress/egress points and within the site. Drives, streets and other circulation routes are designed to promote safe and efficient traffic operations within the site and at ingress/egress points.

C. The arrangement of public or private vehicular and pedestrian connections to existing or planned streets in the area are planned to provide a safe and efficient circulation system for traffic within the Township.

D. Removal or alterations of significant natural features are restricted to those areas which are reasonably necessary to develop the site in accordance with the requirements of this Ordinance. The Planning Commission has required that landscaping, buffers, and/or greenbelts be preserved and/or provided to ensure that proposed uses will be adequately buffered from one another and from surrounding public and private property.

E. Areas of natural drainage such as swales, wetlands, ponds, or swamps are protected and preserved insofar as practical in their natural state to provide areas for natural habitat, preserve drainage patterns and maintain the natural characteristics of the land.

F. The site plan provides reasonable visual and sound privacy for all dwelling units located therein and adjacent thereto. Landscaping shall be used, as appropriate, to accomplish these purposes.

G. All buildings and groups of buildings are arranged so as to permit necessary emergency vehicle access as requested by the fire department.

H. All streets and driveways are developed in accordance with the Ottawa County Road Commission ("OCRC") specifications, as appropriate.

I. Appropriate measures have been taken to ensure that removal of surface waters will not adversely affect neighboring properties or the public storm drainage system. Provisions have been made to accommodate stormwater, prevent erosion and the formation of dust.

J. Exterior lighting is arranged so that it is deflected away from adjacent properties and so it does not interfere with the vision of motorists along adjacent streets, and consists of sharp cut-off fixtures.

K. All loading and unloading areas and outside storage areas, including areas for the storage of trash, which face or are visible from residential districts or public streets, are screened.

L. Entrances and exits are provided at appropriate locations so as to maximize the convenience and safety for persons entering or leaving the site.

M. The Final Site Plan conforms to all applicable requirements of County, State, Federal, and Township statutes and ordinances.

N. The general purposes and spirit of this Ordinance and the Master Plan of the Township are maintained.

2. The Planning Commission finds the Project meets the intent for a PUD, as described in Section 17.01.3 of the Zoning Ordinance. By approving this Project as a PUD, the Township has been able to negotiate various amenities and design characteristics as well as additional restrictions with the Developer, which the Township would not have been able to negotiate if the PUD Chapter of the Zoning Ordinance was not used.

3. Section 17.01.5 of the Zoning Ordinance allows for departures from Zoning Ordinance requirements, and it is intended to result in land use development that is substantially consistent with the goals and objectives of the Township Master Plan, the Zoning Ordinance, and consistent with sound planning principles. The applicant requested five departures. The Planning Commission makes the following findings.

   A. A building height of 54'10" is permitted because of the following findings.

      i. The Resilient Master Plan Draft encourages vertical expansion to reduce sprawl and limit the cost of extending infrastructure.

      ii. The Grand Haven Charter Township Fire/Rescue Department has an emergency vehicle with the ability to exceed the proposed building height.

      iii. Section 17.05.2.A.2 requires mechanical equipment to be visually screened from adjacent properties, public roadways, or other public areas.

      iv. The Township has approved height departures for previous PUDs.

   B. A total of 590 parking spaces, which is 106 spaces more than allowed by the US-31 and M-45 Area Overlay Zone (the "Overlay Zone"), is permitted because of the following findings.

      i. Sections 15A.05.13, 15A.10.10, 17.05.1.F, and 24.03.1 require a maximum number of parking spaces unless the applicant provides a parking study that demonstrates the need for additional parking. The Developer has an established history with similar developments which establishes the need for additional parking, and has submitted a parking study to further establish the need.

      ii. Outside of the Overlay Zone this project would have been permitted 1,200 parking spaces.

      iii. The excess parking will not be highly visible from US-31.

   C. Three ground signs, each 48 square feet in size and six feet in total height, are permitted because of the following findings.

      i. The original Planned Unit Development approval memorialized in the March 9, 1998 Township Board meeting minutes permits one monument (ground) sign for each outlot, not to exceed 52 square feet and five feet in

height, subject to review by the Planning Commission for location. This PUD Amendment comprises five of the six outlots.

ii. The three permitted ground signs reduce the amount of signage permitted under the 1998 PUD by 116 square feet.

iii. A total height of six feet is permitted under Section 24.13 of the current Zoning Ordinance.

D. A departure from 15A.10.7 of the Zoning Ordinance, which requires concrete curb and gutter throughout the parking lot and paved areas, is denied.

i. The Planning Commission has consistently required curb and gutter throughout the parking lot and paved areas of developments in the Overlay Zone.

ii. As required by Section 15A.10.7, the Developer did not provide compelling evidence to find that overall stormwater disposition will be enhanced if the curbing requirement is reduced.

E. Interior landscape islands shall be permitted to extend the length of the parking space, contrary to Section 15A.10.5 of the Zoning Ordinance, because of the following findings.

i. Aesthetics to the surrounding area will be enhanced because the interior landscape island will screen the entire length of the parking space.

ii. The parking spaces surround sides of the building, and each abut a private road or access road. Due to the high visibility of this parking lot this departure is approved in order to provide additional screening from adjacent roadways.

iii. This provision has not been uniformly enforced by the Township for other development projects in the Overlay Zone.

4. Compared to what could have been constructed by right, the Project has been designed to accomplish the following objectives from Section 17.01.4 of the Zoning Ordinance.

A. The Project will encourage the use of land in accordance with its natural character and adaptability;

B. The Project will promote innovation in land use planning and development;

C. The Project will promote the enhancement of commercial employment and traffic circulation for the residents of the Township;

D. The Project will promote greater compatibility of design and better use between neighboring properties; and

E. The Project will promote more economical and efficient use of the land while providing harmonious integration of necessary commercial and community facilities.

5. The Project meets the following qualification requirements of Section 17.02 of the Zoning Ordinance:

   A. The Project meets the minimum size of five acres of contiguous land.

   B. The PUD design substantially promotes the Intent and Objectives of Section 17.01 of the Zoning Ordinance; it further permits an improved layout of land uses and roadways that could not otherwise be achieved under normal zoning.

   C. The Project, as part of the original 1998 PUD, contains two or more separate and distinct uses.

6. The Planning Commission also finds the Project complies with the general PUD Design Considerations of Section 17.05 of the Zoning Ordinance.

   A. The stormwater management system for the Project and the drainage facilities will properly accommodate stormwater on the site, will prevent runoff to adjacent properties, and are consistent with the Township's groundwater protection strategies.

   B. The Project will not interfere with or unduly burden the water supply facilities, the sewage collection and disposal systems, or other public services such as school facilities, park and recreation facilities, etc.

   C. Utility services within the Project shall be underground. This includes but is not limited to electricity, gas lines, telephone, cable television, public water and sanitary sewer.

   D. The internal road system in the Project is designed to limit destruction of existing natural vegetation and to decrease the possibility of erosion.

   E. Vehicular circulation, traffic and parking areas have been planned and located to minimize effects on occupants and users of the Project and to minimize hazards to adjacent properties and roadways.

   F. Parking requirements for each use have been determined to be in accordance with Chapter 24 (Parking, Loading Space, and Signs), and the deviation from Section 15A.10.10 is covered elsewhere in this motion.

   G. Street lighting will be installed in the same manner as required under the Township's Subdivision Control Ordinance.

   H. Buildings in the Project have been sited to protect natural resources. Natural features such as natural grade, trees, vegetation, water bodies and others have been incorporated into the Final Site Plan.

   I. Architectural design features visually screen the mechanical and services areas

from adjacent properties, public roadways, and other public areas.

J. The exterior walls greater than 50 feet in horizontal length or that can be viewed from a public street contain a combination of architectural features, variety of building materials, and landscaping near the walls.

K. Onsite landscaping abuts the walls so the vegetation combined with architectural features significantly reduce the visual impact of the building mass when viewed from the street.

L. The predominant building materials have been found to be those characteristic of the Township such as brick, native stone, and glass products. Pre-fabricated metal panels used to screen the mechanical penthouse do not dominate the building exterior of the structure.

M. Landscaping, natural features, open space and other site amenities have been located in the Project to be convenient for occupants of, and visitors to, the PUD.

N. The Project is reasonably compatible with the natural environment of the site and the adjacent premises.

O. The Project will not unduly interfere with the provision of adequate light or air, nor will it overcrowd land or cause an unreasonably severe concentration of population.

P. Exterior lighting within the Project complies with Chapter 20A for an LZ 3 zone.

Q. Outside storage of materials shall be screened from view.

R. Signage is compliant with Section 24.13 of the Zoning Ordinance, and the Planning Commission recommended the Township Board approve a modification to the sign provisions found in the March 9, 1998 meeting minutes of the original PUD.

S. The Project will not have a substantially detrimental effect upon or substantially impair the value of neighborhood property, as long as all of the standards and conditions of this approval of the Project are satisfied.

T. The Project is in compliance with all applicable Federal, State, County, and local laws and regulations. Any other permits for development that may be required by other agencies shall be available to the Township Board before construction is commenced.

U. No additional driveways onto public roadways have been permitted.

V. The Project is consistent with the goals and objectives of the Master Land Use Plan. Specifically, it is consistent with the Master Plan designation of the property in question.

7. The Planning Commission also finds the Project complies with the Overlay Zone findings and statement of purpose found in Section 15A.01 of the Zoning Ordinance.

A. The Project accommodates a variety of uses permitted by the underlying zoning, but ensures such uses are designed to achieve an attractive built and natural environment.

B. The Project provides architectural and site design standards that are more demanding than required elsewhere in the Township in order to promote harmonious development and complement the natural characteristics in the western sections of the Township.

C. The Project promotes public safety and efficient flow of vehicular traffic by minimizing conflicts from turning movements resulting from the proliferation of unnecessary curb cuts and driveways.

D. The Project ensures safe access by emergency vehicles.

E. The Project encourages efficient flow of traffic by minimizing the disruption and conflicts between through traffic and turning movements.

F. The Project preserves the capacity along US-31 and other roads in the Overlay Zone by limiting and controlling the number and location of driveways, and requires alternate means of access through service drives.

G. The Project seeks to reduce the number and severity of crashes by improving traffic operations and safety.

H. The Project requires coordinated access among adjacent lands where possible.

I. The Project provides landowners with reasonable access through a service drive.

J. The Project requires demonstration that prior to approval of any land divisions, the resultant parcels are accessible through compliance with the access standards.

K. The Project preserves woodlands, view sheds, and other natural features along the corridor.

L. The Project ensures that distractions to motorists are minimized by avoiding blight and clutter while providing property owners and businesses with appropriate design flexibility and visibility.

M. The Project implements the goals expressed in the US-31/M-45 Corridor Study.

N. The Project establishes uniform standards to ensure fair and equal application.

O. The Project addresses situations where existing development within the Overlay Zone does not conform to the standards.

P. The Project promotes a more coordinated development review process with the OCRC.

8. The Planning Commission also finds the Project complies with the conditions of approval described in the March 9, 1998 Township Board meeting minutes for the

original PUD, which conditions are still applicable to the Project, and it shall comply with the below additional conditions as well.

A. Outlot development was subjected to site plan review.

B. Parking lots are setback a minimum of 25 feet.

C. Outlot has architectural materials and landscaping compatible with that of the principal Meijer facility and site.

D. Location of monument (ground) signs have been approved.

E. Monument (ground) signs do not exceed 52 square feet.

F. Monument (ground) sign has a maximum height of six feet as permitted by Section 24.13 of the current Zoning Ordinance.

G. Revisions or changes to the conditions are made by the Township Board after a public hearing. These conditions are binding upon the Developer and all successor owners or parties in interest in the Project.

H. Drainage for the Project is approved by the OCWRC.

I. Any violation of the conditions constitute a violation of the Zoning Ordinance, and in addition to the remedies provided therein, shall be cause for the Township Board to suspend or revoke any zoning or building permit applicable to the project.

J. The right is reserved by the Township to impose additional conditions if reasonably necessary to achieve the purposes of the Zoning Ordinance.

K. The PUD approval is personal to the Developer and shall not be transferred by the Developer to a third party without the prior written consent of the Township.

L. Except as expressly modified, revised or altered by these conditions the Project shall be acquired, developed and completed in conformance with the Zoning Ordinance, as amended, and all other applicable Township ordinances.

M. Approval and compliance with all requirements set forth by the OCRC, and if applicable the OCWRC. No building permits shall be issued until all permits have been obtained.

N. The Developer shall enter into a PUD Contract with the Township. The Contract shall be reviewed and approved by the Township Board prior to the issuance of building permits.

O. The Developer shall agree to an access easement to the Township for the purpose of realigning the north end of Whittaker Way directly with DeSpelder Street pursuant to the Robbins Road Sub-Area Plan. The Developer shall preliminarily identify the easement area on the Final Site Plan, and the easement shall be

drafted by the Township Attorney and approved by the Township Board prior to the issuance of building permits.

P. This approval is also conditioned upon the Developer meeting all applicable Federal, State, County and Township laws, rules and ordinances.

Q. The Developer shall comply with all of the requirements of the Final Site Plan, specifically including all of the notes contained thereon, and all of the representations made in the written submissions by the Developer to the Township for consideration of the Project.

R. The parking areas in the Project shall be "backloaded," which means that the Final Site Plan shall be revised to allow vehicles to enter or leave the parking areas as far from the building in the Project as possible.

S. In the event of a conflict between the Final Site Plan and these conditions, these conditions shall control.

IX. REPORTS

A. Attorney Report – None

B. Staff Report

- Community Engagement Subcommittee – Dec 10th @ 7pm in the Main Conference Room
- Resilient Grand Haven Master Plan – Public Comment Period Ends Dec 22nd

C. Other

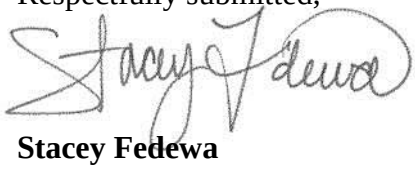
- Commission directed staff and Attorney Bultje begin implementing the draft Resilient Master Plan by drafting text amendments to address greater building heights, and parking requirements, in the Zoning Ordinance.

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

XI. ADJOURNMENT

Without objection, the meeting adjourned at 9:17 p.m.

Respectfully submitted,



Stacey Fedewa
Acting Recording Secretary

GRAND HAVEN CHARTER TOWNSHIP

Community Development Memo

DATE: December 30, 2015

TO: Planning Commission

FROM: Stacey Fedewa, Planning & Zoning Official

RE: Resilient Master Plan Draft

BACKGROUND

The statutorily required 63 day public comment period ended on Dec 22nd. The Land Information Access Association (LIAA) has provided the Township with an outline summarizing the formatting changes they have made as well as the comments received from the public.

There are 3 items that will be discussed in order to provide LIAA with enough information to complete a final draft of the Master Plan:

1. Comments
2. Senior Chapter
3. Summary Document

COMMENTS

Generally the comments received landed in a few different categories:

- More emphasis on pathways and their benefit to the community.
- Social programs were not discussed, such as NORA, Loutit Library, Four Pointes, Tri-Cities Museum, NOCHS, etc.
- The senior population needs more attention (*see section below*).
- Need to provide information on the Chamber of Commerce efforts to attract and retain businesses, especially as it pertains to the manufacturing sector.
- Offer alternative housing choices through zoning, known as the "missing middle housing" (*see memo included in packet for additional information*).
- Document is too long.

- Some, or all, of the appendices will be removed—added to the website—and a hyperlink will be included in the Master Plan to direct readers to additional information.
- The Summary Document discussed below will also assist with this comment.

SENIOR CHAPTER

It was staff's understanding the Four Pointes – Center for Successful Aging, agency was going to work with its members to draft a "Senior Chapter" similar to the "Youth Chapter." Unfortunately, the document that was received is a research paper written by a person that is not affiliated with Grand Haven.

That said, the information provided in the research paper is useful, but the Planning Commission will need to decide:

1. Should a "Senior Chapter" be included if it is <u>not</u> similar to the "Youth Chapter?"
2. Should a "Senior Chapter" <u>not</u> be included?
3. Should a "Senior Chapter" be included to at least provide general information on this population group?
    - If so, should LIAA only use the information presented in the research paper?
4. Should the Planning Commission request the Four Pointes agency to draft a "Senior Chapter" in their own words for inclusion?

Staff requests the Planning Commission provide direction on this item.

SUMMARY DOCUMENT

The Planning Commission and Township Board requested staff look at the option of drafting a "Summary Document," which highlights the important sections of the Master Plan. It would be a 5 – 10 page executive summary that would feature the information residents, businesses, and prospective businesses want to know.

LIAA has provided an outline of the information that could be found in the Summary Document, but the Planning Commission is welcome to make modifications to suit the Township's needs.

CONCLUSION

Please take this opportunity to review the Master Plan Draft again in order to provide LIAA with all the necessary information to create a final draft. Items to consider include—photograph choices; formatting of tables and charts; does white space need to be filled with additional photographs or captions; are the headings for each section sufficient; etc. Now is the time to thoroughly critique this document.

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

December 28th, 2015

To: Grand Haven Charter Township Planning Commission,

ATTN: Stacey Fedewa

From: Land Information Access Association

RE: Master Plan Public Review Period Over

Planning Commissioners,

As of 12/21/2015, the public review period of the Resilient Grand Haven Charter Township Master Plan has ended. LIAA has reviewed the public comments received on the Resilient Michigan website, during the open house, or in any email exchange to Stacey Fedewa or LIAA staff. Any comments that noted a spelling error or misinformation have been addressed and corrected in the plan. Any comments that recommend a change to the content of the Plan are noted on the following pages for the Commission to review.

Beyond the public comments, LIAA has made a number of changes to the Draft Plan for grammar, consistency in spelling, and formatting. LIAA has made NO content changes to the Draft Master Plan. All changes LIAA has made are documented below:

- Grand Haven Township is now referred to as Grand Haven Charter Township or "the Township" throughout the document.
- Consistent Footnote Formatting, Figure and Table numbering. Minor changes to grammar for ease of reading (no content changes).
- Incorporated changes from the 10/19/15 Special Joint Session of the Township Board and Planning Commission.
- Chapter 2: Changes made to the paragraphs on poverty on page 14 to clarify that the map shows the percent increase of families in poverty, while the table shows the percent increase in total population in poverty.

During your review of public comments, please record the nature of any changes to be made to the draft master plan based on your review of the public comments received.

Record of Public Comment/Recommendations for Planning Commission Review

From Board Members:

- The appendix is too large. Some information will still need to be edited out of the document, and other materials such as data, methodology, etc. (*a lot of the UM stuff*) may need to be added as a separate document and put on our website, and instead the MP can just include a link to direct interested readers to additional information.

- The maps are too small, some of them will need to be printed as 11x17s and folded accordion style into the plan. We'll pinpoint which maps later on.

- Page 22 and 44, Non-Motorized Pathways. The more positive we can say about them the better!!! And there should be more!!! As written, the MP just seems to acknowledge their existence, rather than pointing out the multiple public health and safety benefits, and environmental benefits, and the importance of expansion that is co-extensive with expanding development. Given the focus of this particular MP section (i.e., environmental issues), I think there would be a much greater focus on non-motorized trials as a *principal* aspect of transportation (i.e., not just a luxury), so that we can lead the way against an "auto-centric" way of thinking about all transportation. This is especially important in Michigan communities, where, because of the Detroit-centric way our state developed, autos are often the beginning and end of transportation discussions. I would be happy to further discuss my thoughts on this, but I think these paths are one of the greatest contributions to public health and safety a community can make, by providing a cheap, convenient, low-barrier route to personal exercise and personal health improvement, in a way that is safe and non-auto dependent for access. Goal 7 on page 52 is a great thing, but I would further stress the need for path-system expansion that must be *co-extensive* with the growth of residential development.

Received via email, website, or at the Open House:

1. **Email from resident of Grand Haven Charter Township, to Stacey Fedewa:** I would like to see more mention of economic sustainability and how our governmental units work together to insure we are planning for growth and expansion of our manufacturing/business sector, including additional property that is master planned for manufacturing. I realize that this may not be high on the planning commissions areas of consideration, but I believe it is our responsibility as communities to insure that we have a plan for a sound economic base in Northwest Ottawa County that will provide jobs for a diverse workforce and keep us from becoming a bedroom community that loses its identity and ability to provide jobs to area residents that would like to live, play and learn in the community in which they work. Environmental sustainability is great, but without economic sustainability strongly recognized as a component of the plan, (in my opinion) I feel we are not truly looking out for our residents, now and in the future.

   The second comment I have is regarding recreation. I feel strongly that Grand Haven Charter Township should be a leader in promoting collaborative and regional recreation programs for residents of Northwest Ottawa County as it is the most likely site for bricks and mortar for facilities. Just my 2 cents.

2. **Email from Tom Gerencer to Stacey Fedewa, proposed description for Chapter 4 (proposed changes are underlined).**

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

   Township firefighters are equipped with 1 quint (*75 foot aerial)*, 1 engine, 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 1,070 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.

   The Advanced Life Support (ALC) paramedic's increases survivability of the sick and injured. The department's cardiac arrest save rate over the last five years was 52%. The national average of cardiac arrest saves is 11%.

3. **Comment submitted to LIAA:** Pedestrian Path needed on Lincoln between Lakeshore and 31 (generation care)

4. **Comment submitted to LIAA:** Please use caution with any development @ Robbins and Mercury (southwest corner)- dangerous intersection, would love to see this as a preserve

5. **Email from Loutit Library Director John Smith to Stacey Fedewa:** I don't see any reference to library service in the Twp's plan. Or the Museum, NORA, 4 Pointes, or any other social/cultural/educational service, other than a paragraph about GHAPS. It seems to me that these agencies provide a ton of good service to the residents, helping make the communities better educated, healthier, informed and ... RESILIENT

6. **Email from Bill Cargo to Stacey Fedewa- suggested changes to Chapter 4:**

   Simply summarize state law (IE MCL 42.10) and write something similar to the following:

   The Administration and Human Resources Department Oversees the enforcement of all laws and township ordinances, manages all undertakings of the Township; prepares the annual budget; is responsible for all personnel matters; monitors risk management and liability concerns; and advises the Township Board.

7. See Memo Supplementary Letters for a comment from Brigit Hassig. Most comments are relevant only to the City's Master Plan, but the comment was sent to both governments.

8. See Memo Supplementary Letters for comments from Mike Hutchins.

Resilient Grand Haven Charter Township Master Plan

Notes from Mike Hutchins.

11-10-15

1. The master plan is slanted toward climate variability I think we need to add other variables.
    a. Federal funding
    b. State funding
    c. Technology.
    d. The state of the economy
        i. Cost of loans
        ii. Interest rates.
2. The study did not address other major components in the Grand Haven Charter Township that affect as many people as Lake Michigan shoreline does.
    a. The Grand River.
3. The study did not address the ground water study and its future effect on population.
4. As a master plan there does not seem to have any comments about senior living and the services that seniors may need or want.
5. Poverty: yes it was noted, but as a master plan maybe we should try to reduce the affect and the number of people under this label.
    a. Lower cost housing
    b. Education
    c. Jobs
        i. We really do not have any high tech. industries
6. Looking at housing type the younger generation may not want large single family house but want high density walkable type housing. Looking at my neighborhood the houses are not selling too big for the next generation.
7. Why don't we have the ridership for Harbor transit for 2014?
8. Industrial land and or industrial parks. Let's get away from making them have large lawns and landscaping it is an industrial park. Let them build what they need more building. Maybe then we would not need as much industrial park land.
    a. Let's try to prevent Industrial spread.
9. Schools: we have more schools than what is listed let's list them ALL.
    a. What we are missing in Grand Haven and Grand Haven Township is Higher Education type schools or trade schools.
10. Parks: with the addition of the properties this year maybe we have enough let's make them better.
    a. Educate dog owners about pick up.
    b. Dog Park in the new parks 2 - 3 or 4 acre fenced areas that we alternate.
    c. Senior actives (remember we are an area getting older) Not sure we need more team fields.

d. Sand volleyball: lets. See would you want to play on the Lake Michigan beach or in the woods? Unless we partner with a business and offer food and drink for player and visitors. (there is a facility like that in Indianapolis, they have beach volleyball and soft ball fields and are building indoor play fields)

e.

11. Land use. Let's get over the height restriction. Technology and equipment is past the 35 ft. level let them build what is economically feasible for the area they want to build in. Like the area around Meijer and Walmart what would be wrong if D & W wanted to put above the store. A level of offices and retail shops with multiple levels of senior living or apts. Put a parking ramp next to it with access to the shops and living spaces, all of sudden you have garages for residents.
12. Public/ Quasi-public: let's partner with business and or industry for trade schools and or parks.
    a. It was a shame that no other person came or was invited to the Pure Michigan Micro lending Initiative meeting. Great way to start a small business.
13. Public Participation; the face book is GREAT Keep up the good work.
14. The future of Grand Haven
    a. Youth is one leg but the seniors are the other
    b. The statement on Page 71 "the youth of grand haven would like to see the following educational opportunities and /or curriculum expansions in our schools" We should take that and make it happen.
    c. Diversity in grand haven is a joke.
15. Future
    a. Robbins Road we need to make this walkable. Friendly, business friendly this could be our 'downtown" in the future...
    b. Stacy if you want, I will take you to an idea for high density living for seniors in GR. Nice place square building with a courtyard in the middle so both sides of the halls in the upper floors have light court yard is where they have concerts in the summer , around the outside parking lots they have a farmers market in the summer.

November 25, 2015

To: Resilience Grand Haven Team

From: Brigit Hassig, Executive Director, Four Pointes

RE: Master Plan Comments

Being a community participant in initial meetings, I appreciate the tremendous time it takes to inventory the resources and community input for a document as instrumental as a Master Plan. I am pulling on former Downtown Development Authority experience for the City and my current role as a human service administrator in supporting this work.

As a representative of Four Pointes, the comments fall into two areas: factual and observation of impact.

It is requested that the Community Services Map #10.17 be edited to reflect our new location since 2013 at the corner of Beacon Blvd and Taylor Roads, next to the hospital retail store and offices. Our former location seems to be noted on the map in the Community Center located on Columbus Street (former location). Muskegon Community College is now in this space.

On page 37, under Community Facilities, it designates the 'Grand Haven Council on Aging, Senior Center' as residing in the Community Center. Formerly the North Ottawa County Council on Aging (1968) and now the Four Pointes – Center for Successful Aging now resides in the Beacon Blvd. plaza (please refer to paragraph above.) With over 1000 human service clients and 1200 Activity Center members, it is also a Community Service funded by millages.

On page 37, under Recreational Programming, it would appear that Four Pointes should be noted in conjunction with NORA as eight municipal millages, including Grand Haven and Grand Haven Township, support Four Pointes and its recreational programming (among others) for over 1200 individuals 50 and over.

In summary, Grand Haven is a designated Community for a Lifetime by the state since 2007 due to the millage support allowing Four Pointes in its location to serve the physical, social, spiritual and intellectual pursuits of individuals 50 and older. Thank you for examining these changes.

With close to 20% of Grand Haven's population being 65 and older and close to 30% being 50 and older, there are significant planning implications beyond recreational programming for the City. On page 17, under Demographic Conditions, while "Grand Haven's Young Adult Population is Sizable, but Shrinking," it is strongly advocated that the Older Adult Population is Growing is fundamental to these Conditions.

Livable communities supporting living (aging) in place require very deliberate planning in the areas of zoning allowing for accessory units that may be temporary (elder cottages, mediflats), home sharing which many rental statutes inappropriately encumber, transportation when safe driving is no longer an option and other universal design considerations are necessary for communities to remain relevant and have a sustainable tax base. Each day, over 10,000 individuals will turn 65 through 2026. The older adult population will strongly define municipal needs of the future.

Thank you for the opportunity to comment and educate on these issues influencing the accuracy and representation of the new Master Plan.

GRAND HAVEN CHARTER TOWNSHIP
13300 168th Ave. • Grand Haven, MI 49417
Phone: 616.842.5988 • Fax: 616.842.9419 • www.ght.org

Resilient Master Plan – Executive Summary – Proposed Outline:

I. What is a Master Plan?
   a. Uses of a Master Plan
   b. What is the Resilient Grand Haven Charter Township Master Plan?
      i. What is Resiliency?
   c. Public Participation Overview

II. Summary of Demographic and Housing Trends

III. Future Land Use
   a. Introduction
   b. Future Land Use Descriptions
   c. Future Land Use Map

IV. Goals and Objectives

GRAND HAVEN CHARTER TOWNSHIP

Community Development Memo

DATE: December 30, 2015

TO: Planning Commission

FROM: Stacey Fedewa, Planning & Zoning Official

RE: Missing Middle Housing

WHAT IS IT?

The term "Missing Middle" was coined in 2010, and defined as: a range of multi-unit or clustered housing types compatible in scale with single family homes that help meet the growing demand for walkable urban living. Defining characteristics include:

- Walkability
- Medium density, but lower perceived densities
- Small footprint and blended densities
- Smaller, well-designed units

More information can be found at www.missingmiddlehousing.com.

WHAT ARE THE MISSING HOUSING TYPES?

Carriage House

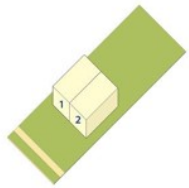
Description

An accessory structure typically located at the rear of a lot providing space for a small residential unit, home office, or other small commercial or service use. This unit could be above a garage or at ground level.

Duplex: Side by Side

Description

A small- to medium-sized structure that consists of two dwelling units, one next to the other, both of which face and are entered from the street.



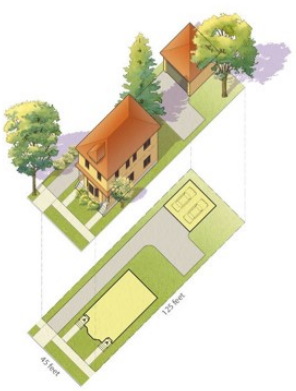
Ideal Specifications

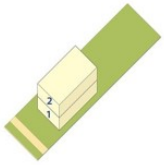
Lot	
Width	50 feet
Depth	130 feet
Area	6,500 sq. ft.
	0.15 acres
Units	
Number of Units	2 units
Typical Unit Size	612 sq. ft.
Density	
Net Density	13.4 du/acre
Gross Density	10.3 du/acre
Parking	
Parking Ratio	2 per unit
On-street Spaces	2
Off-street Spaces	2
Setbacks	
Front	30 feet
Side	10 feet
Rear (main building)	
Between Main and Accessory Buildings	
Building	
Building Size	1,224 sq. ft.
Width	36 feet
Depth	34 feet
Height (to eave)	14 feet

Duplex: Stacked

Description

A small- to medium-sized structure that consists of two stacked dwelling units, one on top of the other, both of which face and are entered from the street.





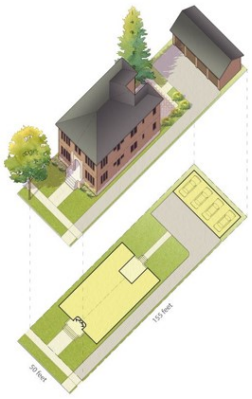
Ideal Specifications

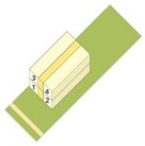
Lot	
Width	45 feet
Depth	125 feet
Area	5,625 sq. ft.
	0.13 acres
Units	
Number of Units	2 units
Typical Unit Size	
Density	
Net Density	15.5 du/acre
Gross Density	12.5 du/acre
Parking	
Parking Ratio	2 per unit
On-street Spaces	2
Off-street Spaces	2
Setbacks	
Front	14 feet
Side	3 feet

Fourplex

Description

A medium structure that consists of four units: typically two on the ground floor and two above with a shared entry.





Ideal Specifications

Lot	
Width	50 feet
Depth	155 feet
Area	7,750 sq. ft.
	0.18 acres
Units	
Number of Units	4 units
Typical Unit Size	
Density	
Net Density	22.5 du/acre
Gross Density	18.3 du/acre
Parking	
Parking Ratio	1.5 per unit
On-street Spaces	2
Off-street Spaces	4
Setbacks	
Front	25 feet
Side	3 feet
Rear (main building)	70 feet
Between Main and Accessory Buildings	47 feet
Building	
Building Size	4,320 sq. ft.
Width	36 feet
Depth	60 feet

Courtyard Apartments

Description

A medium- to large-sized structure consisting of multiple side-by-side and/or stacked dwelling units accessed from a courtyard or series of courtyards. Each unit may have its own individual entry, or up to three units may share a common entry.

Bungalow Court

Description

This building type consists of a series of small, detached structures, providing multiple units arranged to define a shared court that is typically perpendicular to the street. The shared court takes the place of a private rear yard and is an important community-enhancing element.

Ideal Specifications

Lot	
Width	110 feet
Depth	160 feet
Area	17,600 sq. ft.
	0.4 acres
Units	
Number of Units	8 units
Typical Unit Size	840 sq. ft.
Density	
Net Density	19.9 du/acre
Gross Density	15.0 du/acre
Parking	
Parking Ratio	1.6 per unit
On-street Spaces	5
Off-street Spaces	1 per unit max.
Setbacks	
Front	10 feet
Side	6 feet
Rear (main building)	5 feet
Between Main and Accessory Buildings	8 feet
Building	
Building Size	
Width	24 feet
Depth	35 feet
Height (to eave)	15 feet

Townhouses

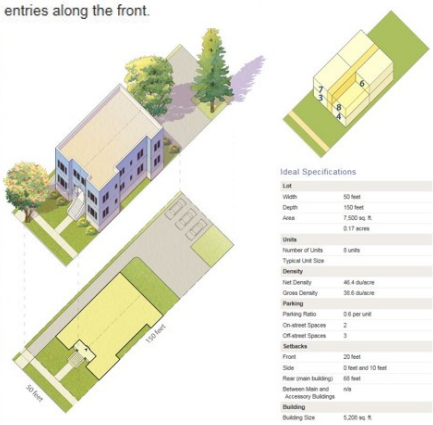
Description

A small- to medium-sized structure, consisting of two to eight (usually) attached single-family homes placed side by side.

Multiplex: Small

Description

A medium structure that consists of five to 10 side-by-side and/or stacked dwelling units, typically with one shared entry or individual entries along the front.



Ideal Specifications

Lot	
Width	50 feet
Depth	150 feet
Area	7,500 sq. ft.
	0.17 acres
Units	
Number of Units	6 units
Typical Unit Size	
Density	
Net Density	46.4 du/acre
Gross Density	35.6 du/acre
Parking	
Parking Ratio	0.6 per unit
On-street Spaces	2
Off-street Spaces	3
Setbacks	
Front	20 feet
Side	0 feet and 10 feet
Rear (main building)	60 feet
Between Main and Accessory Buildings	n/a
Building	
Building Size	5,200 sq. ft.

Live/Work *(a form of mixed-use)*

Description

A small- to medium-sized attached or detached structure consisting of one dwelling unit above or behind a flexible ground floor space for residential, service, or retail uses. Both the primary ground-floor flex space and the second unit are owned by one entity.

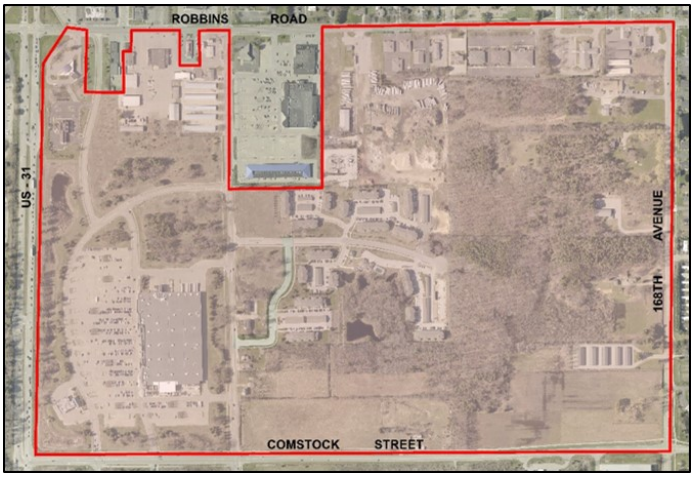
Traditional Mixed-Use

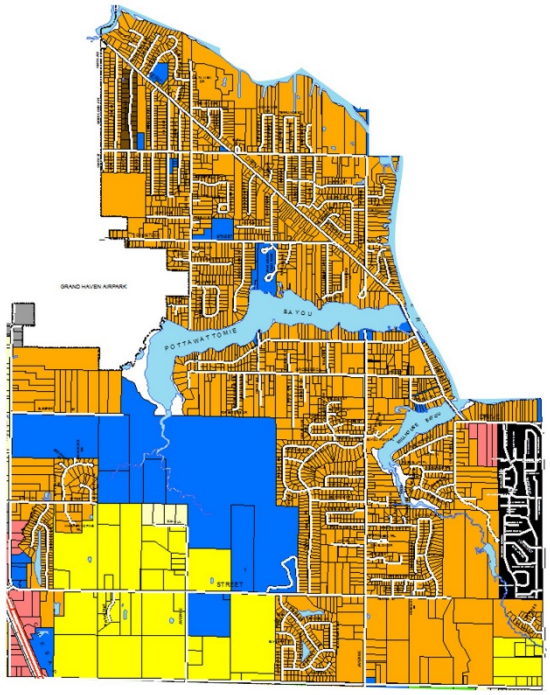
WHY ARE THEY MISSING?

These housing types are classified as **"missing" because very few have been built since the early 1940's** due to regulatory constraints, the shift to auto-dependent patterns of development, and the incentivization of single family homeownership.

There is a **mismatch between the current housing stock and shifting demographics**; combined with growing demand for walkable urban living. Additionally, there is a need to adaptively reuse buildings or land adjacent to existing single family housing, especially along major urban streets, or on the back side of those blocks.

When discussing the "missing middle" in relation to the Township, the best areas for this type of development are the Robbins Road Corridor, and the well-developed neighborhoods found in the northeast quadrant.

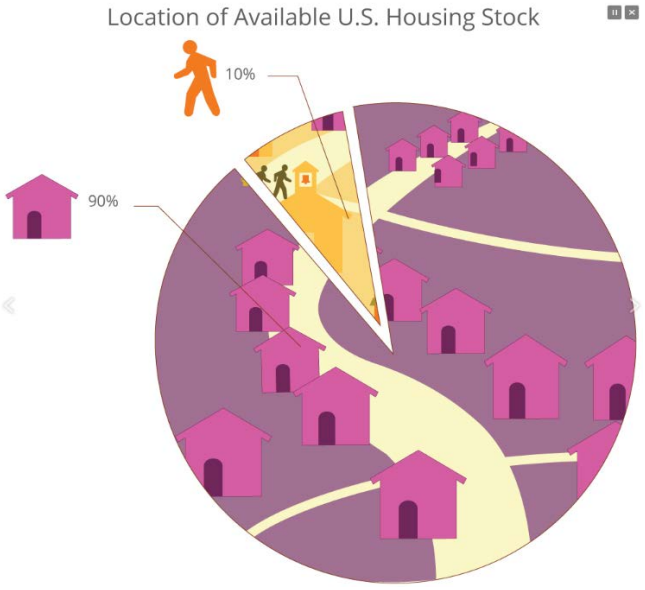




Missing Middle housing types offer options between the scales of single family homes and mid-rise flats for walkable urban living. They are **designed to meet the specific needs of shifting demographics and the new market demand**.

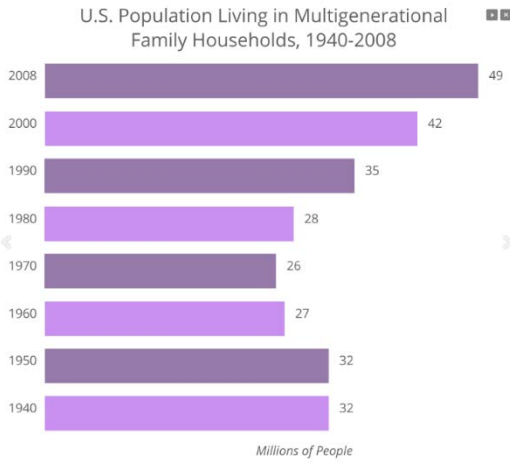
WHO WANTS TO LIVE IN MIDDLE HOUSE?

Singles, childless couples, and empty nesters have two things in common: they are growing in number, and they want a unique type of home. Single family homes located in conventional suburbs make up 90% of the current housing stock available in the U.S., yet more consumers are seeking non-single family options that offer a walkable lifestyle.



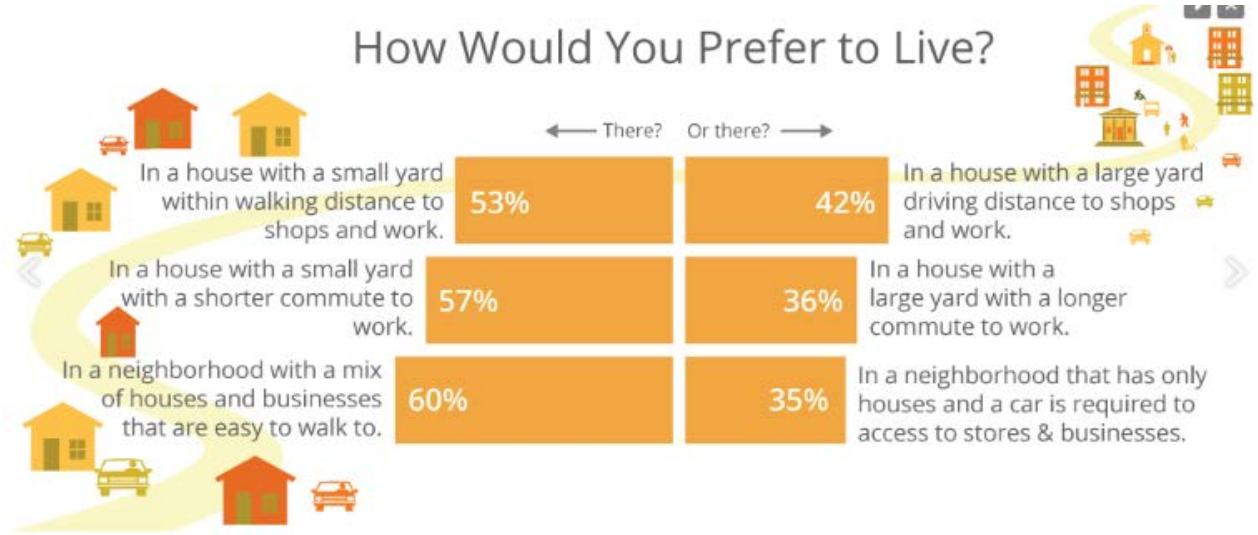
Millennials (*persons born between 1980 – 1999*) account for 25% of the population (*the number of people in this generation passed the baby boomers in 2011*). 77% of Millennials want to live in an urban center and are willing to sacrifice less individual space in favor of more flexible working situations, stimulating mixed-use neighborhoods, and a variety of rental and for-sale housing. While most Millennials are waiting longer to start families 70% of them do not plan on moving to the suburbs once they have children.

Baby Boomers represent almost 20% of the population and unlike previous generations, this growing population of retirees does not want to live in traditional retirement communities. Rather, health and wellness are still top priorities, so access to transportation and connectivity is key to maintain independence. Affluent seniors seek to downsize from their large suburban homes to more convenient, easy-to-care-for townhouses, apartments, or condos. Furthermore, many retirees would like to move close to, but not live with, their children and grandchildren.



Multigenerational homes have increased 17% since 1940, and the number continues to rise. The growing senior population, an increase in population that has cultural traditions that encourage multigenerational living, and an increased desire to live in intergenerational neighborhoods all contribute to the growing demand for multigenerational (*i.e., carriage house a/k/a grandmother cottage*) and even multifamily households.

Unsatisfied Suburbanites have a growing demand for a walkable lifestyle that has the potential to reshape conventional/sprawling suburbs into walkable, transit-oriented communities that provide a variety of housing choices because a generation ago cities struggled to implement the revitalization of downtowns and urban neighborhoods.



HOW DO YOU INTEGRATE INTO THE EXISTING LANDSCAPE?

The "missing middle" buildings typically have the same footprint as a large single family home, which makes integration into existing neighborhoods much easier. It also serves as a way for the neighborhood to transition to higher-densities. This can be accomplished by:

1. Distributed throughout a block with single family homes—a blended pattern.

2. Placed on the end-grain of a single family block facing the primary street.

3. Using a block comprised exclusively of "missing middle" types to transition to a commercial corridor.

4. Using "missing middle" types to transition from single family homes to higher-density housing.

HOW DO WE IMPLEMENT?

The Township's current zoning ordinance is a conventional (Euclidean) zoning practice that assigns blocks and/or large areas of a Township based on land use. Along with use, the zones are often defined and controlled by placing numeric values to their build-out and permitted density, which divides neighborhoods into single family residential, multi-family residential, commercial, office, etc.

According to the experts, Missing Middle Housing cannot be effectively regulated by conventional zoning because these building types often have medium- to high-densities, excluding them from the single family districts, but their small footprints with lower heights do not meet the requirements of the multi-family district.

These same experts recommend an alternative to conventional zoning, which is known as form-based code (FBCs). FBCs represent a paradigm shift in the way the built environment is regulated. Rather than separating uses it focuses on the physical form to create predictable results with a high-quality product.

The model Transect for American towns is divided into six transect zones, each with a correlating number, higher numbers designate more urban zones, and lower numbers designate more rural zones: Natural (T1), Rural (T2), Sub-Urban (T3), General Urban (T4), Urban Center (T5), and Urban Core (T6). *Item 5 of 5*

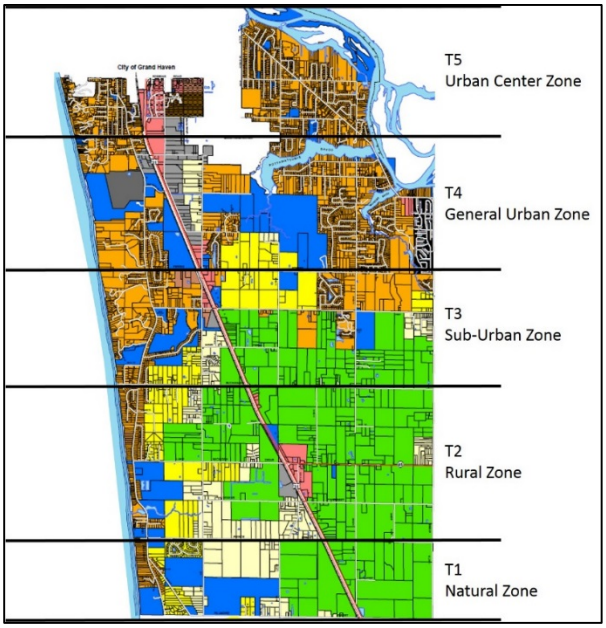
Utilizing the FBC would begin with identifying a range of housing types appropriate for the community at large, and is created based on the existing physical patterns, climate, and other considerations. Next, each form-based zoning district is given a specific range of permitted housing types. Then, each type is given a minimum lot size and maximum number of units allowed, thus enabling a maximum density calculation. Typically there are supplemental standards for each housing type such as maximum height, footprint, unit size, etc.

The form-based zoning districts are defined by the Rural-to-Urban Transect (*rather than a separation of uses*), which provides more predictability on where growth will occur. For example, in a T3 Walkable Neighborhood a single family detached type, bungalow court, and side-by-side duplex may be allowed; a T4 Urban Neighborhood zone would allow bungalow courts, side-by-side

duplexes, stacked duplexes, fourplexes, and the multiplex: small type, even though the densities of each of these types can range dramatically. The typical Rural-to-Urban Transect is:

A Rural-to-Urban Transect for the Township would likely resemble the illustration below. That said, the landscape of the Township is unique because of the water bodies and nonlinear jurisdictional boundary with the City. Therefore, staff believes the typical Transect may need to be modified in order to "fit" the Township's needs.

Transitioning from a conventional zoning ordinance to FBC is a big change that must be considered carefully. Staff believes there could be a way to integrate the allowance of "missing middle" housing types within conventional zoning, which would provide consistency with the type of ordinance the Township has been accustomed to since 1948, but also promote the need and desire for a more diverse housing market.



For example, the City of Hudsonville has a conventional zoning ordinance plus a form-based code for their downtown

If the Planning Commission is interested in including "missing middle" housing types in the zoning ordinance then staff will begin reviewing other ordinances to determine if/how to combine a Euclidean ordinance with FBC. A few websites to visit if you would like more information is:

City of Hudsonville - 2012 Downtown Zoning Ordinance
Cincinnati, OH - Form-Based Code
Form-Based Codes Institute

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

RESILIENT GRAND HAVEN CHARTER TOWNSHIP

Grand Haven Charter Township 2015 Master Plan

DRAFT

ACKNOWLEDGMENTS

GRAND HAVEN CHARTER TOWNSHIP TRUSTEES

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Laurie Larsen, Clerk
William Kieft III, Treasurer
Ron Redick
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CHAPTER 10. THE FUTURE OF GRAND HAVEN- A YOUTH PERSPECTIVE WRITTEN BY:

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TABLE OF CONTENTS

CHAPTER 1. INTRODUCTION

The *Resilient Grand Haven Charter Township Master Plan* serves as the official policy guide for Grand Haven Charter 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

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.

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 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 9.

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.

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.

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 11 and Appendix B.

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 Charter Township. During the planning process, these ideas coalesced into *Ten Guiding Principles* 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

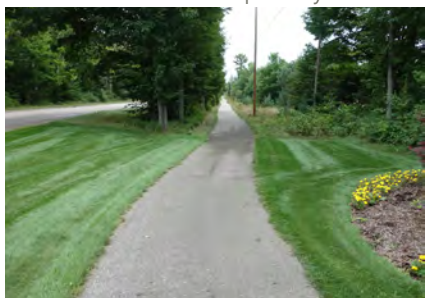
1) BUILD ON WHAT'S WORKING

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 Charter 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 7.

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.



SHAPE THE PRESENT

Each of the guiding principles for shaping the present 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 and protect 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 11 and Appendix B.

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.

3) SUPPORT SMART GROWTH

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

Ten Tenets of Smart Growth
The Ten Tenets of Smart Growth have been accepted and widely used by local municipalities throughout Michigan.

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.

Plan for Place
Even small amenities like this neighborhood library can help promote social interaction and contribute to a sense of place.

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 10 through 12.

1 The Smart Growth Network, 2014. This is Smart Growth. http://www2.epa.gov/sites/production/files/2014-04/documents/this-is-smart-growth.pdf

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. Many of the key tenents of a resilient community, listed on the right, will be used throughout the plan.[3]

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 and 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 Chapters 11 and 12. A number of goals and implementation strategies are intended to address climate concerns, as seen in Chapter 7.

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, 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 called the "New Economy."

Build Community Resilience

According to the 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 very evident in Michigan 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, 2015. Community Resiliency Featured. http://www.rand.org/topics/community-resilience.html
3 Rockefeller Foundation, 2014. Resilience Framework. https://www.rockefellerfoundation.org/our-work/topics/resilience/

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 jobs and industries. Investing in various sectors will increase economic resiliency and proactively attract growing industries. In fact, economic diversity is shown to spur overall economic growth more efficiently than an economy based solely on a small number of sectors.[4]

9) PROTECT AGRICULTURE

As discussed in the 2009 Master Plan, at one time, most of the Township was used for agricultural purposes. Today, as the population of the Township continues to grow, local officials may be presented with 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. In order to protect this vital use of land, 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, recreation, and economic benefits such as increased revenues from tourism, 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 Charter 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.

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.

4 Ashraf, Quamrul and Oded Galor (2011). Cultural Diversity, Geographical Isolation, and the Origin of the Wealth of the Nations. Working Paper 17640. JEL No. NO1,O1,O4. Web. Accessed September 2015. http://www.nber.org/papers/w17640.pdf

CHAPTER 2. 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, BUT IS FASTER THAN OTTAWA COUNTY OVERALL. Between 2000 and 2010, population in the Township increased by just 14.3%, about half its 10 year pace over the previous 30 years. Yet, the Township is projected to grow 46% between 2010 and 2030, faster than Ottawa County's projected growth rate of 40%.

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, a total of 534 children. Some of this change may be attributed to the Great Recession.

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 2.1 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 2.1 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 2.1 Regional Population Change.

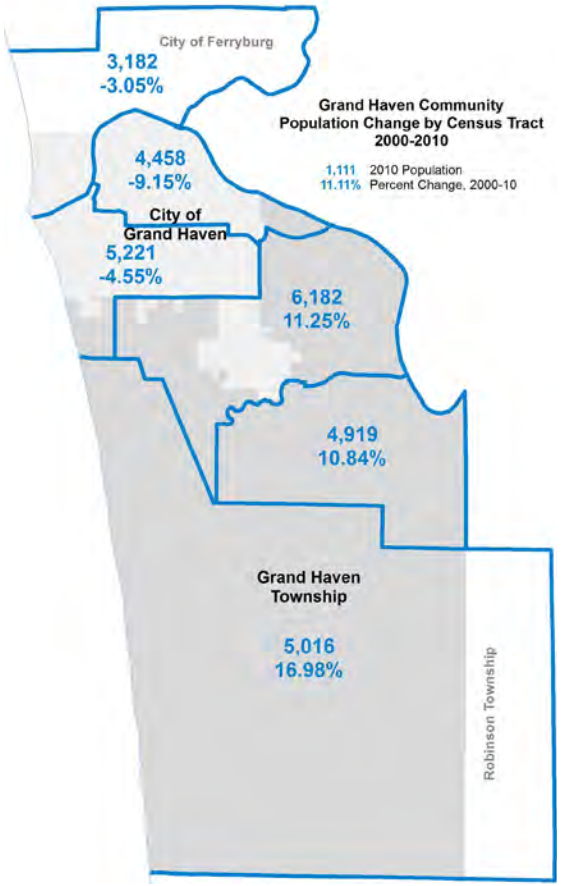


Table 2.1 Population Change, 1970 to 2010

	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) published 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 2.2 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.

Population Projections

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

Table 2.2 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

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

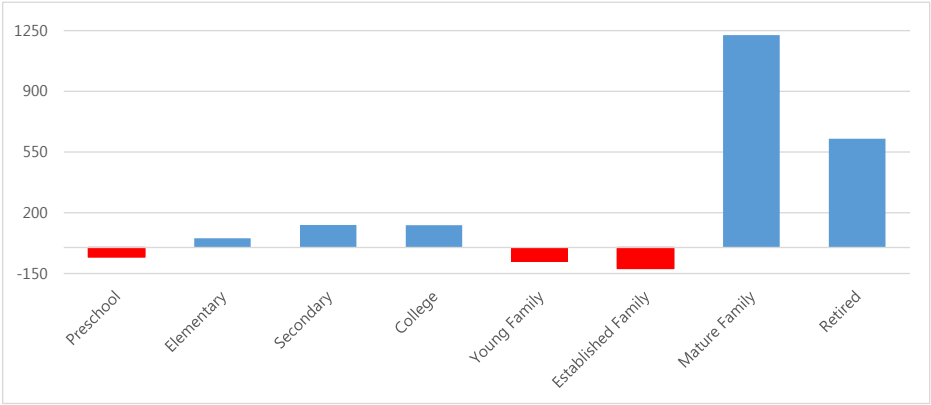
This age range includes residents aged 50 to 64. There are many more residents in this life stage in 2010 than there were in 2000. This may mean that residents are aging in place or that others in this life stage have relocated to Grand Haven Charter Township.

Table 2.3 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 2.2 Change in Life Stage Population, 2000 to 2010



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.

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 2.2 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 2.4). 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.

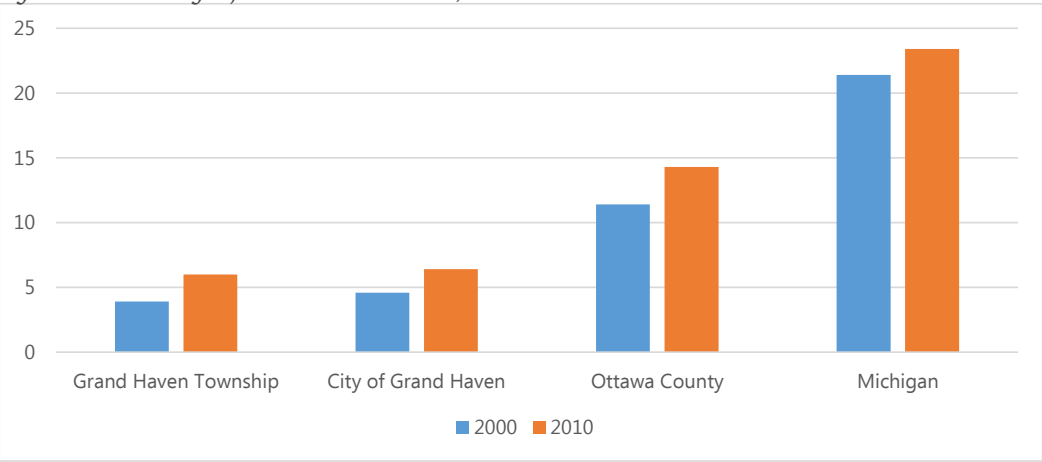
Figure 2.3 shows the Township has a lower percentage of non-white residents than Michigan and Ottawa County overall.

Table 2.4 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 2.3 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 2.5 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 2.5 Types of Households

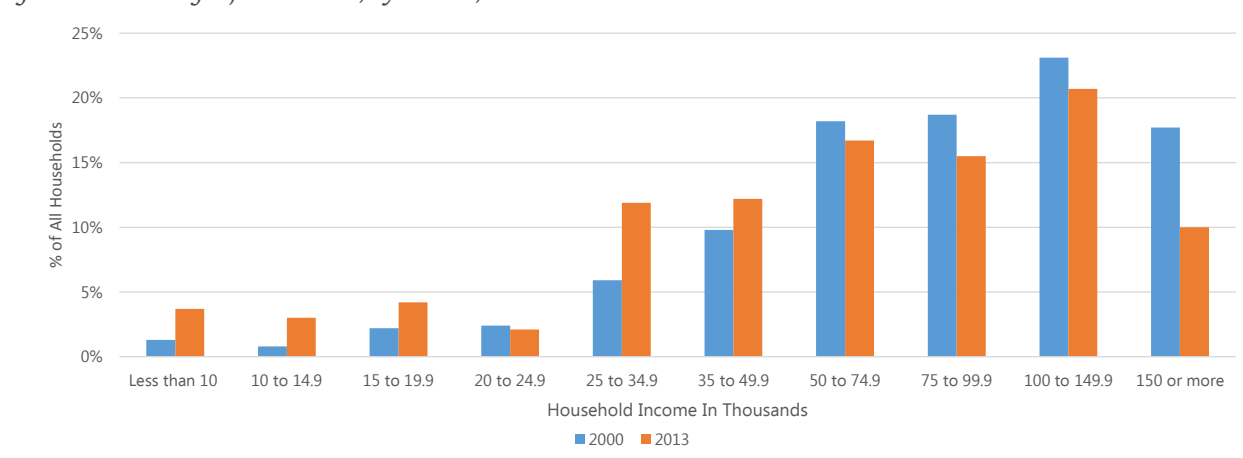
	2000		2010	
	#	% of total households	#	% of total households
Unmarried male, with children	N/A	N/A	122	2.2
Unmarried female, with children	237	5.1	275	5.0
Married couple, no children	1,611	35.0	2,117	38.2
Persons Living Alone Under 65	432	9.4	641	11.6
Persons Living Alone Over 65	205	4.4	315	5.7
Total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

Figure 2.4 Percentage of Households, By Income, 2000 to 2013



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

with income below $50,000 tended to increase (see Figure 2.4). 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 2.6 shows that, in general, nearly 68% of the Township's adult population has at least some college education. Table 2.7 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 2.6 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 2.7 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>

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% from 2009 to 2013.

In the Township, poverty rates are growing the fastest among children and those aged 18 to 64. Table 2.7 shows that the number of children in poverty has grown significantly in recent years, while Figure 2.2 shows percentage increase of families living in poverty by Census Block Group. The majority of the Township is in a Census Block Group with a moderate increase in percentage of families living in poverty. Compared to other nearby communities, the Township has a moderate to low poverty rate among families.

Figure 2.2 Percent Increase in Families in Poverty

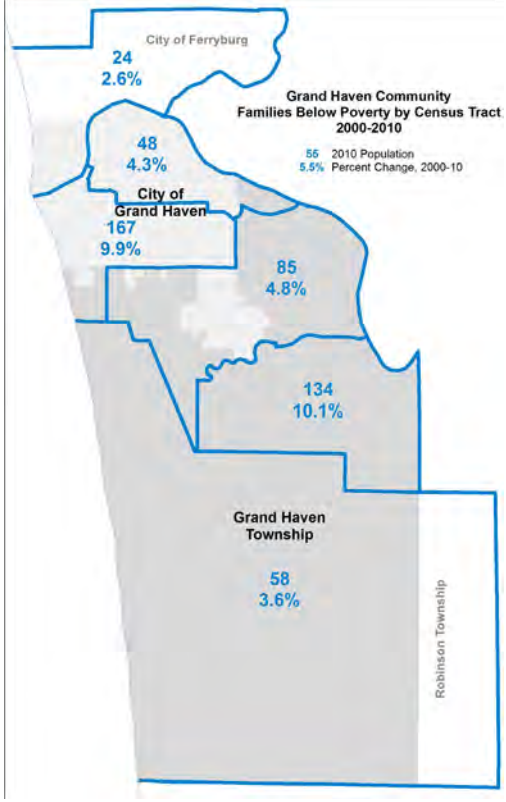


Table 2.7 Population in Poverty Comparison

	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

CHAPTER 3. HOUSING

Understanding the types and number of households, the choices householders 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. As much as possible, the data is selected to compare decennial census years to one another (1990, 2000, 2010). In some instances, variables are not available, and data collected by the U.S. Census' American Community Survey is substituted.

SUMMARY OF HOUSING TRENDS

THE NUMBER OF HOUSING UNITS IN GRAND HAVEN CHARTER TOWNSHIP CONTINUES TO GROW. Between 2000 and 2010, the Township gained an additional 1,200 housing units. This boost included a mix of renter and owner-occupied units. Single-family units grew about proportionate to the Township's overall housing stock.

MORE RESIDENTS LIVE IN MULTI-UNIT BUILDINGS. While the number of single-family homes increased by 20% in the Township between 2000 and data collected from 2009 to 2013, the number of units in structures with 3 or more units increased by 400%, much more than the State overall (6%).

THE NUMBER OF VACANT, NON-SEASONAL PROPERTIES HAS INCREASED. Perhaps due to the Great Recession, nearly 200 additional non-seasonal units were counted as vacant between the 2000 and the 2010 census.

BETWEEN 2000 AND 2010, THE AVERAGE HOUSEHOLD SIZE DECREASED. In the 2010 census the average household in the Township had 2.7 people, a change from 2000 when the average household size was 2.9

HOUSING VALUE CONTINUES TO RISE. Between 2000 and 2010, the median value of a home in the Township grew by 15%, higher than the State overall (10%).

MEDIAN RENTS HAVE INCREASED, FASTER THAN THE STATE OVERALL. From 2000 to data collected in 2009-2013, median gross rent as a percentage of median household income rose from 19.9% to 26.8%. Rising rents and housing costs are a national and statewide trend, but Grand Haven Charter Township's median rent grew faster than the State overall.

TAXABLE VALUE IS INCREASING IN GRAND HAVEN CHARTER TOWNSHIP. The taxable value in the Township increased by 2.96% or $679 million dollars, between 2013 and 2014.

HOUSING UNITS AND TENURE

In 2010, there were 6,219 housing units in Grand Haven Charter 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 3.1 also shows 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]

Table 3.1 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

HOUSING VACANCY AND SEASONAL HOUSING

From 2000 to 2010, the number of seasonal units, which are considered vacant by the United States Census Bureau, increased by 50 units, or 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 3.1.

HOUSING TYPES

Between 2000 and data collected from 2009-2013, the housing stock gained many multi-unit structures. Table 3.2 on the following page shows the percentage of housing structures with more than 3 units grew by 547 units to comprise 10% 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.

HOUSEHOLD SIZE

Table 3.3 on the following page shows the average household size decreased in Grand Haven Charter 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 Charter Township had 2.7 persons.

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

Table 3.2 Housing Types 2000 to 2010

	2000				2009-2013				Percent Change from 2000 to 2009-2013 for Grand Haven Township	Percent Change from 2000 to 2009-2013 for the State of Michigan
	Grand Haven Township		Michigan		Grand Haven Township		Michigan			
	#	%	#	%	#	%	#	%		
1 unit	4,216	83.2	3,153,728	74.5	5,093	80.8	3,469,410	76.5	20.8	10.0
2 Unit	112	2.2	146,414	3.4	84	1.3	119,644	2.6	-25.0	-18.2
3 or More Units	136	2.6	649,434	15.3	683	10.8	692,840	1.5	402.2	6.6
Mobile Home	557	10.9	277,158	6.5	439	6.9	246,438	5.4	-21.1	-11.0
Total Housing Units	5,066	100	4,234,279	100	6,299	100	4,529,311	100	24.3	6.9

Source: U.S. Census Bureau 2010, American Community Survey 5 -Year Estimates 2009-2013

HOUSING VALUE AND GROWTH

The value of housing in Grand Haven Charter Township continues to rise. Table 3.4 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 Charter 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. 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 3.5 and are current through September 2015.

Table 3.3 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 2010, American Community Survey 5 -Year Estimates 2009-2013

Table 3.4 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 2010, American Community Survey 5 -Year Estimates 2009-2013

From 2008 to September 2015, 365 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 (62 permits issued between January and September of 2015).

The cost associated with the construction projects averaged 689,400 dollars for a commercial building, 229,850 dollars for a single family dwelling, and 468,000 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 248,000 dollars.

HOUSING AFFORDABILITY

Table 3.5 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	2
Single Family Dwelling	32	11	16	37	51	68	68	60
Multi Family Dwelling	1	0	0	0	2	0	0	0

Source: Grand Haven Charter Township

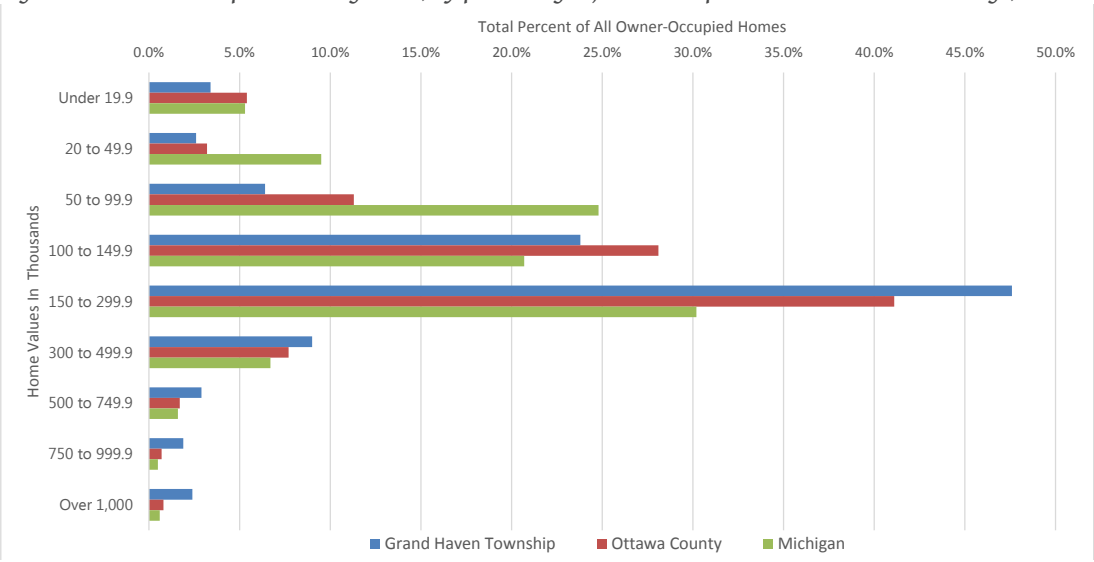
Housing affordability is important for both owners and renters. Affordability for homeowners generally means that a homeowner should pay no more than 2.5 times their annual income on a home. In Grand Haven Charter Township, the median household income is $69,850 and the median value of an owner-occupied 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 3.1, on the following page, show the percentage of owner-occupied units in each value range in Grand Haven Charter 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 the values of owner-occupied homes in Grand Haven Charter Township are less evenly distributed, with the bulk of homes valued in the middle ranges.

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 3.2 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

Figure 3.1. Owner-occupied housing value, by percentage of total occupied units in each value range, 2009-2013

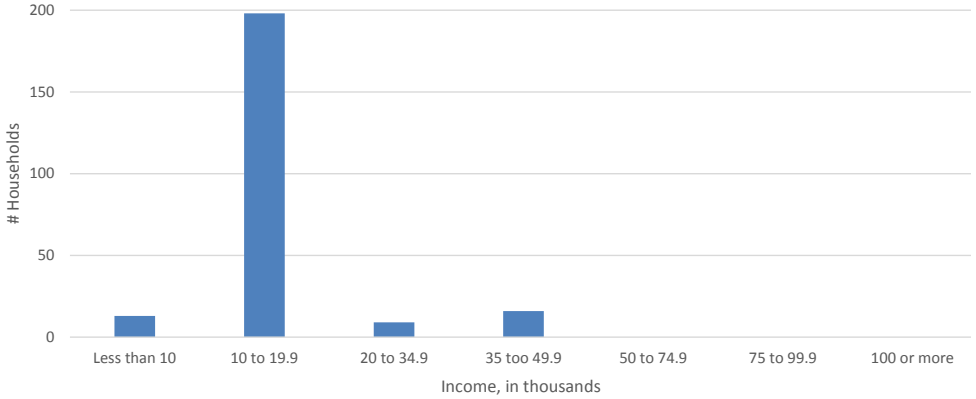


Source: American Community Survey 5 -Year Estimates 2009-2013

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.

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 Charter Township saw a slightly greater percent increase in the last 25 years than the State of Michigan. Table 3.6 shows the median gross rent from 1990 to 2013.

Figure 3.2 Number of cost-burdened renting households, by income range



Source: American Community Survey 5 -Year Estimates 2009-2013

Table 3.6 Median Gross Rent

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

Source: American Community Survey 5 -Year Estimates 2009-2013

CHAPTER 4. BUILT SYSTEMS

This chapter provides an overview of the roads and infrastructure, utilities, public services, and land use in Grand Haven Charter Township. Each of these areas are vital to the overall operation of the Township and its provision of services for residents, workers, and visitors.

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 145 miles of paved and unpaved roads that link the outlying areas of the Township (see Table 4.1). 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 years.

TRANSPORTATION NETWORK ROAD CLASSIFICATIONS

The Federal Highway Administration classifies roads based on the function they serve using the National Functional Classification system. Map 4.1 in Appendix D indicates classifications for all public and private roadways in the Township. The following are examples and definitions of those road classifications:

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.

Table 4.1 Miles of Roads, by Type

	Miles
Private Roads	27
County Primary Roads	23
County Local Roads	43
Subdivision Roads	40
State Highways	9
Total	**142**

Source: Grand Haven Charter Township, 2015

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 a sense-of-place.

Pathways

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

PRINCIPAL ARTERIAL ROADS

Principle Arterial Roads are often state and interstate highway corridors, carrying high traffic volume. The only principal arterial road in the Township is US-31.

MINOR ARTERIAL ROADS

Minor Arterial Roads link cities and towns, carrying moderate traffic and providing access to adjacent development. 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 are designed for short trips, serving developed areas and "collecting" traffic from 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 4.1 in Appendix D, 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, and owners and users of these roads must pay for maintenance.

ROAD CONDITIONS

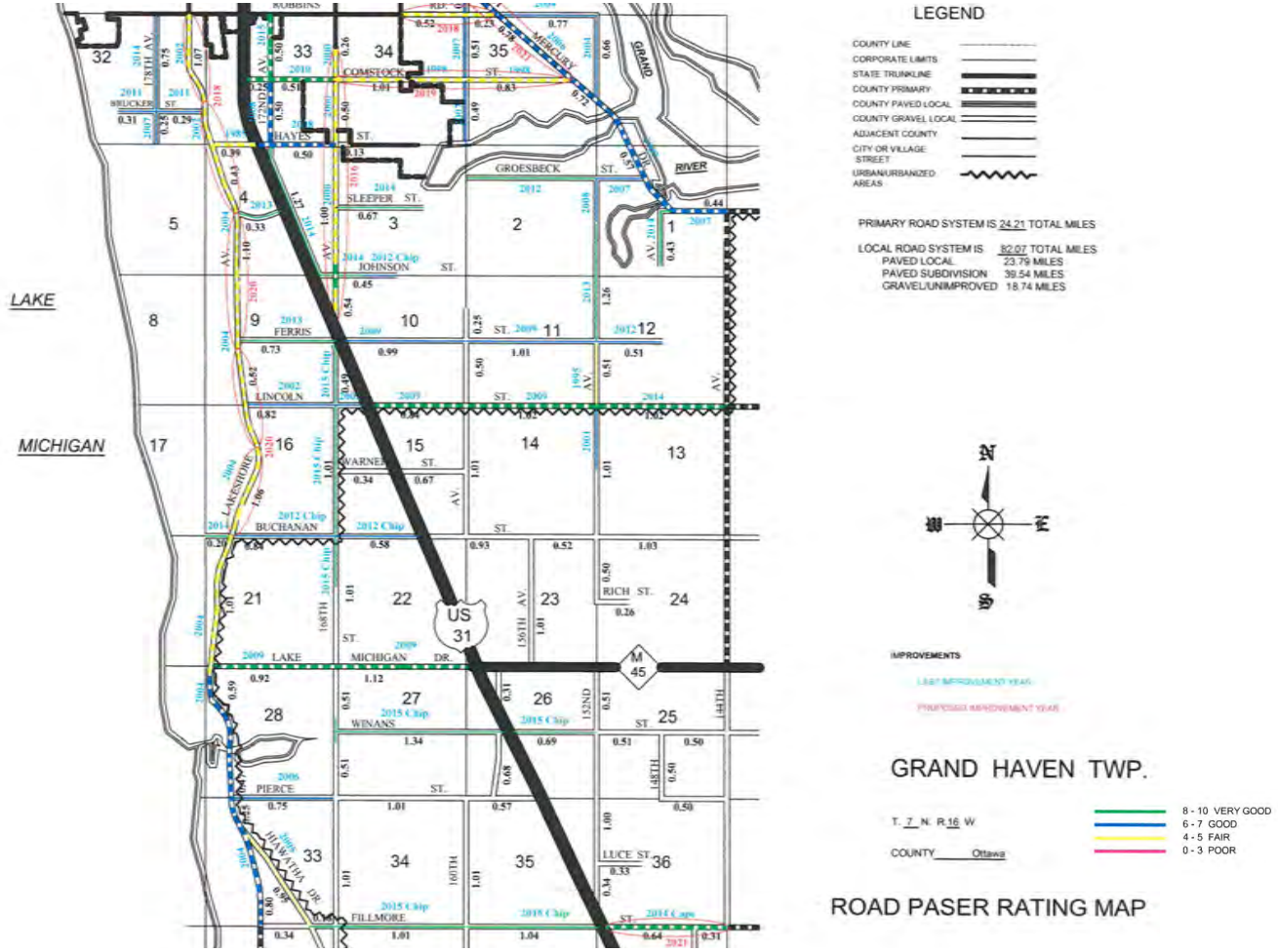
Federal aid eligible roads are rated for surface conditions under Michigan's Asset Management Program. The process of rating roads involves a visual road surface evaluation based on surface condition and appearance. The rating (PASER, Pavement Surface Evaluation and Rating) a road receives suggests where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

Figure 4.1 below illustrates the PASER rating for roads in Grand Haven Charter Township.

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 mileage 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 intends to ask the voters to approve another debt millage in the 2016 General Election in order to construct an additional 10 miles of pathways.

Figure 4.1 PASER Rating for Roads in Grand Haven Charter Township



PUBLIC TRANSPORTATION

HARBOR TRANSIT

Harbor Transit is a public demand-response transportation system that serves 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 Charter Township contributes the largest share - roughly 32% of the $1.18 million collected in property taxes - of the five jurisdictions serviced by Harbor Transit.

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.

Resilient Activities - Harbor Transit

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

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.

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 Charter 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. The majority of riders within the Township emanate from the "urban" areas. Figure 4.2 shows the ridership demographics for Grand Haven Charter Township.

EXISTING LAND USE

The characteristics of the land in Grand Haven Charter 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.

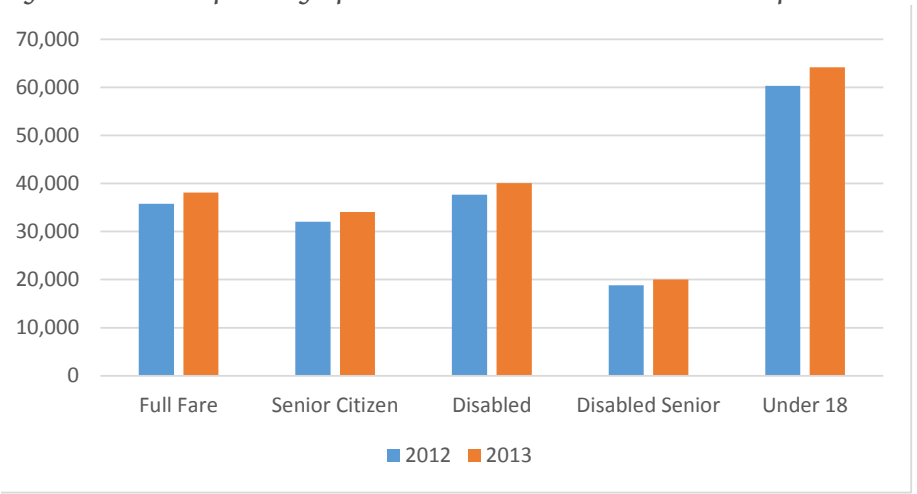
Agricultural Land Uses

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

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

Figure 4.2 Ridership Demographics in Grand Haven Charter Township



for agricultural purposes.

On the Existing Land Use Map (Map 4.2 in Appendix D) 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 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 Charter Township should their land use be converted to a more intensive use such as a residential subdivision.

Blueberries are one of the primary crops successfully grown in Grand Haven Charter 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 dominant 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 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

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

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 0.9% of the Township's total land area.

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.

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 or 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 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 small 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-operated parks like Pottawattomie and Hofma Preserve and county-operated parks like Kirk Park. This category also includes privately owned and operated facilities such as the Grand Haven Golf Club and the North Ottawa Rod and Gun Club. 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 the 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 Charter Township offers some of the best in the region. The Township's recreation amenities are discussed in more detail in Chapter 5.

PUBLIC/QUASI-PUBLIC

Sometimes 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 Charter 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 are important for the future stability of the community. Public/Quasi-Public uses account for 2.1% 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.

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 19.6% of the Townships 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.

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 accounts for 19.6% (approximately 3,396 acres) of the Township's total land area, a significant amount of acreage.

Table 4.2 on the following page shows the acreage in each land use category in 2015.

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 that were located near main roads. Large plots of agricultural lands and open spaces were maintained behind these "strips" of roadside residential development.

The Township recognized this development pattern was causing safety hazards for residents. The growing population of the Township was leading to more driveways being accessed from heavily traveled public roadways that typically have a 45 – 55 mph speed limit. In 2011, the Township adopted an ordinance to directly address this issue. This ordinance requires any lot that abuts, and is accessed from, a public street (which are classified as state Trunkline, county primary, or county local by the Ottawa County Road Commission) shall have the minimum lot width doubled (e.g., R-1 increases from 100 feet to 200 feet). Furthermore, the Township requires properties located on corner lots to obtain driveway access from the lesser traveled of the two roads. These two provisions have made great strides in reducing the number of driveways on public roadways, and improving the safety of residents traveling in the Township.

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

Table 4.2 Acreage of Existing Land Uses

	Acreage	% of Total Acreage
Large Agricultural (Lot size > 20 Acres)	3,633	21%
Small Agricultural (Lot size < 20 Acres)	443	2.6%
Commercial/Horticultural	501	2.9%
Low Density Residential (Lot size > 1 Acres)	4,803	27.8%
Medium Density Residential (Lot size < 1 Acres)	1,823	10.5%
Multi-Family Residential	151	0.9%
Manufactured Home Park	152	0.9%
Commercial	227	1.3%
Light Industrial	347	2.0%
Parks, Recreation, and Natural Areas	1,321	7.6%
Public/Quasi-Public	366	2.1%
Mining	129	0.7%
Vacant/Open Space	3,396	19.6%

Grand Haven (immediately north) and Holland (12 miles south) into adjacent Townships. As the Township grows, it is taking steps to protect existing agriculture land in the face of development pressure. Notably, as the Township has grown, open and undeveloped land has been used for development, leaving the agricultural land, and its aesthetic rural character of the Township intact. This is clear in the different types of land uses that can be identified as "patterns" when looking at the Existing Land Use Map (Map 4.2 in Appendix D).

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 large subdivisions such 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 Charter 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.

Township Land Uses

SOUTHWEST QUADRANT SUB-AREA PLAN

In 2004, Grand Haven Charter 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 (e.g. the proposed 80 acre Lakeshore Woods PUD development on Pierce Street).

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 (Map 4.3 in Appendix D) 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 Appendix A.

UTILITIES AND PUBLIC SERVICES

WASTEWATER COLLECTION

Grand Haven Charter 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 capacity is about 6.8 million gallons per day.

Robbins Road Sub-Area Plan
The Robbins Road Corridor planning process included several walking tours and design charrettes.

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 4.4 in Appendix D.

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 4.5 in Appendix D.

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

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.

Township Services

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

4. FINANCE 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 DEPARTMENT

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

6. PUBLIC SERVICES 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 Charter Township is currently provided by the Michigan State Police and four full-time officers contracted from the Ottawa County Sheriff's Department, one of which is solely dedicated to traffic enforcement. 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 Charter Township has an effective Fire/Rescue Department, Township property owners enjoy lower insurance rates.

EMERGENCY MEDICAL CARE

The nearest hospital to Grand Haven Charter 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

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%.

which is also equipped with an emergency room. Grand Haven Charter Township is also a member of a seven community group that contracts NOCH for ambulance services.

SCHOOLS

All of Grand Haven Charter 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 Schools) 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 5. NATURAL SYSTEMS

Grand Haven Charter 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 Charter 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 Charter 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 21 percent of the world's supply of surface freshwater and 90 percent of the United States' supply of surface 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 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 11 and Appendix B of this plan discusses coastal processes and shoreline management strategies in detail.

Grand Haven Charter Township

Water Assets

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

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 Charter Township are used for recreational activities like boating, paddling and fishing.

The Grand River

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

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 5.1 in Appendix D.

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, the run-off entering 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 suck 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 within the Township. The inland extent of the dune areas is quite substantial in the northern portions of the Township. Critical dune areas are illustrated on Map 5.2 in Appendix D. For more information on current regulation and maps of Critical Dunes in Grand Haven Charter Township, please see Chapter 11 and Appendix B.

Sand Dunes

Grand Haven Charter Township has 1,056 acres of Critical Dunes

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 by water 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 5.3 in Appendix D illustrates the location of wetlands in the Township.

For more information and detailed analysis on wetlands regulation and wetland analysis specific to Grand Haven Charter Township, see Chapter 11 and Appendix B.

Wetlands

Grand Haven Charter 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 11 and Appendix B.

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 northwestern portion of the Township where the sand dunes are located. Overall, the Township contains soils in eight different classifications, which are described below and illustrated on Map 5.4 in Appendix D, 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. This land can be suitable for celery, onions, carrots, or grain. However, special fertilizers are required to grow crops in this soil type, as this soil type quickly decomposes its organic matter.

The AuGres-Saugatuck classification are somewhat poorly drained soils that 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 0.5 to 1.5 feet below the surface from December to June. In some areas, this soil can naturally support a variety pine and spruce trees. With specialized fertilizer and supplemental irrigation, soil in this classification support blueberries, melons, strawberries, and cucumbers.

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. This type of sandy soil can typically support trees, beach grass, and other vegetation hearty enough to withstand erosion.

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. Land in this classification is suitable for hardwood forests.

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 0.5 and 5.0 feet from November to May. A limited amount of land in this classification may be suitable for pine tree forestation, though it natively supports grass and sparse trees.

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.

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. This land is not suitable for farming, but has high recreational and aesthetic value for cottages, parks, and scenic woods.

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 near or above the surface from late fall to early spring. This land is typically forested with low-lying hardwoods as crops in this soil require artificial drainage.

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. Land in this soil type does not support crops but is useful for recreational facilities, woodland, and wildlife habitat.

TOPOGRAPHY

The northwestern portions of Grand Haven Charter Township are dominated by dunes that reach over 800 feet above the Lake Michigan Shoreline. Comparatively, the elevation along the Lake Michigan shoreline is 557 feet above sea-level. The remaining portions of the Township are relatively flat. Area's along the Grand River and other tributaries are fairly low-lying. Map 5.5 in Appendix D illustrates the topography of Grand Haven Charter Township.

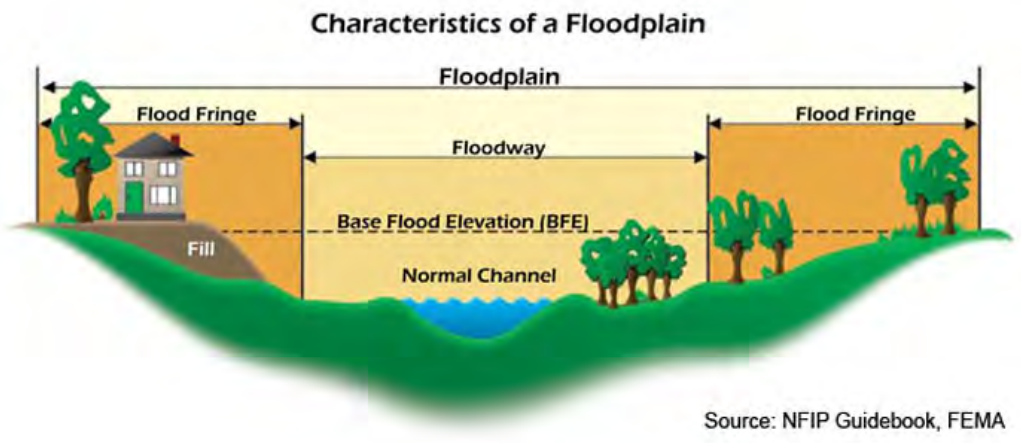
MANAGEMENT EFFORTS

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. Rather, selected policies and plans are outlined that have significance to the goals and objectives in Chapter 7.

FLOODPLAIN MANAGEMENT

A river, stream, lake, or drain may occasionally overflow its bank and inundate adjacent lands. 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 permiting 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 5.6 in Appendix D. For an analysis of properties and environmental features that fall in floodplains based on the FIRMs, see Chapter 11 and Appendix B.

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. 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 Appendix B.

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 entering 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 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 the park and recreation facilities for each participating jurisdiction as well as a number of action statements. See Map 5.7 in Appendix D for a map of parks and recreational amenities in Grand Haven Charter 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. The 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 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: 407 Acres

Hofma Park and Hofma Preserve are located adjacent to each other on the Pottawattomie Bayou encompassing approximately 407 acres. An additional 118 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 40 acres of contiguous land abutting the west property line of Hofma Park. The acquisition is expected to be completed in early 2016. The 158 additional acres of park land amounts to a 38% increase in size for Hofma Park and Preserve, which will total 565 acres of protect park and recreation land after the transactions are complete.

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. 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.

With its extensive size and quality of natural areas, the Park serves a larger population than only 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

Parks

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

MERCURY PARK

Location: 16715 Mercury Drive

Size: 6.71 Acres

Mercury Park is the oldest Township Park and is 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 Charter Township has roughly 26 miles of trails

TRAILS NON-MOTORIZED PATHWAY PLANNING

Trails are a popular and important asset to Grand Haven Charter Township. The Township has roughly 26.7 miles of non-motorized pathways that serve as an important transportation system within the Township. Currently, the section of trail along Lakeshore drive extends the length of the Township and is designated a regional shared use path by the West Michigan Shoreline Regional Development Commission. The pathway system serves both as a recreational resource for walking and biking, but also as a transportation network, as the Township does not have public sidewalks.

The Township Department of Public Service is responsible for maintaining the Township's pathways, including removing snow to ensure the pathways remain open year-round. Because of the popularity of the trails, the Township Board is currently considering whether to place another dedicated millage for an additional 10 miles of pathway on the ballot in 2016. The section of trail along Lakeshore Drive is designated a regional shared use path by the West Michigan Shoreline Regional Development Commission..

CHAPTER 6. ECONOMY

The following chapter provides a summary and analysis of the Township's economic conditions. Understanding the economic profile of Grand Haven Charter Township helps inform and shape land use and development in the future. It can also highlight opportunities for public and private investment. This chapter will discuss the types of businesses, wages, employment, and other data relevant to the economic growth of Grand Haven Charter Township.

It is important to note the sources listed below all collect data in slightly different ways. As much as possible, large discrepancies are avoided by using only one reliable source for each topic presented in this chapter. Each data source was carefully chosen to provide an overall, well-rounded look at the economic condition of Grand Haven Charter Township, and small discrepancies may exist.

REGIONAL ECONOMIC OVERVIEW

According to the Upjohn Institute's June 2015 Business Outlook report, the six Metropolitan Areas that make up West Michigan have overall seen job growth in manufacturing, construction, and most goods and service producing industries since 2014. It is unclear if job growth is a result of the economy 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 (MSA). This data is only comparable through 2014, as the U.S. Bureau of Labor Statistics has changed the MSA definitions for West Michigan. Table 6.1 shows the Holland-Grand Haven MSA has continued to grow in terms of employment and jobs from 2010 to 2014.

Table 6.1 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 6.2 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 6.2 have a high location quotient, meaning 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. The location quotient is based on 2014 data alone. The third column in Table 6.2 shows the percent increase in employment from 2010 to 2014.

Table 6.2 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 6.2 shows 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, 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 6.3.

Table 6.3 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

WORKFORCE LOCATIONS

WHERE DO RESIDENTS OF GRAND HAVEN CHARTER TOWNSHIP FIND WORK?

According to the Longitudinal Employer-Household Dynamics published by the U.S. Census Bureau, Grand Haven Charter Township residents held 6,389 primary jobs in 2013. The infographic in Figure 6.1 on the right shows the most common places, outside of the Township, that job holders travel to for work. About 26% (1,698) of Grand Haven Charter Township's workers commuted to the City of Grand Haven. 8.4% (538) worked in Grand Rapids, and fewer numbers worked in the City of Holland, Muskegon, and Spring Lake Township. Residents in the Township work in a wide variety of places. Figure 6.1 shows only the locations where more than 100 residents work. The remaining jobs are held in smaller numbers in various places throughout the State. About 10% (629) worked in Grand Haven Charter Township.

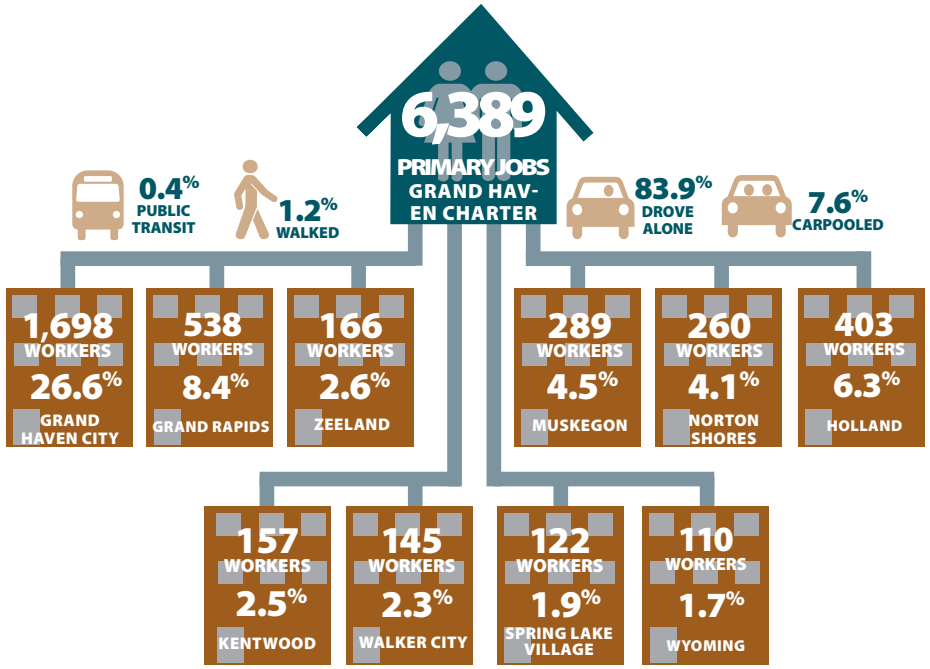
It is clear from Figure 6.1 that a large percentage of laborers living in the Township work nearby. This is reflected in a low commute time of 23 minutes for Grand Haven Charter Township residents, as measured in the American Community Survey. The mode of transportation for employees living in the Township is also shown in Figure 6.1, using 2009-2013 American Community Survey estimates. It is clear that while most choose to drive, carpooling is a viable option. About 1.2% of workers live within walking distance of their jobs. This information 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 Charter Township. Grand Haven Charter 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 Charter Township if they work in the manufacturing industry than if they work in another industry.

WHO HOLDS JOBS IN GRAND CHARTER HAVEN TOWNSHIP?

A second way to analyze regional commute patterns and the Township's labor force is to ask: Who is working in Grand Haven Charter Township and what kinds of jobs does Grand Haven Charter Township have? Data for this section also comes 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 this industry may continue to grow in the Township. Retail comprises an additional 9.4% of jobs.

Figure 6.1 Destinations for Grand Haven Charter Township's work-



Source: U.S. Census (On The Map Tool, 2013 Commuting Data), American Community Survey, (Commuting Modes, 2009-2013)

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 Haven Charter 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 Charter 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 Charter Township does not hold a college degree.

About 16% (629) of Grand Haven Charter 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. Remaining workers come from smaller villages and Townships, further away from Grand Haven Charter Township and in smaller numbers.

CHAPTER 7. 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 blue and orange boxes to the right of each goal and objective designate an approximate, estimated time frame for the project's completion.

PROJECT	TIME FRAME				
	Within 1 Year	1-3 Years	3 or more Years	As available	On-Going
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.					
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.					
Limit the amount of impermeable surface with all new development to minimize surface runoff and maintain infiltration.					
Develop and implement shoreline protection standards such as riparian buffers, erosion protection with native vegetation plantings, and low-impact development.					
The Township will take thoughtful measures to ensure residents will have long-term sustainable water sources.					
Develop best management practices to prevent the introduction, and spread, of invasive species and diseases transmitted by fauna.					
Encourage forest stewardship practices through public education.					

PROJECT	TIME FRAME				
	Within 1 Year	1-3 Years	3 or more Years	As available	On-Going
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.					■
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.			■		
Integrate the Cluster Development Ordinance into the Planned Unit Development (PUD) Ordinance to substantiate the Township's dedication to open space preservation.		■			
Recognizing the importance and value of tree coverage the Township will evaluate the need and feasibility of implementing a tree planting policy.		■			
Support the goals and objectives of the *Explore the Grand Region: A Community Parks and Recreation Plan in Northwest Ottawa County, 2015 – 2019* .					■
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.	■				
Incorporate the use of renewable energy whenever feasible.				■	

PROJECT	TIME FRAME				
	Within 1 Year	1-3 Years	3 or more Years	As available	On-Going
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.					■
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.e., affordable housing, senior housing, assisted living, PUD with a crop and livestock theme, etc.*).					■
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	TIME FRAME				
	Within 1 Year	1-3 Years	3 or more Years	As available	On-Going
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.e., aging in place*).					

PROJECT	TIME FRAME				
	Within 1 Year	1-3 Years	3 or more Years	As available	On-Going
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	TIME FRAME				
	Within 1 Year	1-3 Years	3 or more Years	As available	On-Going
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	TIME FRAME				
	Within 1 Year	1-3 Years	3 or more Years	As available	On-Going
Goal 7: Residents and visitors to the greater Grand Haven community will have safe and convenient access by way of the 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	TIME FRAME				
	Within 1 Year	1-3 Years	3 or more Years	As available	On-Going
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 8. FUTURE LAND USE AND ZONING PLAN

The Future Land Use Plan depicts the preferred but generalized composition of future land uses for Grand Haven Charter Township. The Future Land Use Plan is the general framework upon which land use and policy decisions for Grand Haven Charter 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 - and Corresponding Zoning Districts - 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 Charter Township.

There are two key elements to a Future Land Use Plan

Future Land Use Map. The Future Land Use Map (Map 4.3 in Appendix D) 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 implementation.

The Township should continue to develop as a place with quality residential neighborhoods, natural beauty, and limited commercial and industrial development. To ensure 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 Charter Township. However, such expansion, especially in area's 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. By clustering commercial activities near other development, including residential neighborhoods, more residents, laborers, and visitors can enjoy shopping, restaurants and other services.

FUTURE LAND USE CLASSIFICATIONS

AGRICULTURAL PRESERVATION

Agricultural Preservation

Corresponding Zoning Districts: AG Agricultural

Minimum Infrastructure Required: None

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 in certain areas of the Township.

Despite population growth in Grand Haven Charter Township, agri-business remains a significant activity, particularly those lands deemed valuable for specialty farms, such as 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, which 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), and continue to Fillmore Street.

RURAL RESIDENTIAL

Intended Land Uses

Areas planned for Rural Residential (RR) 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.

As established by a 2011 Zoning Ordinance Text Amendment, certain large scale developments with eight or more lots (includes subdivisions, site condominiums, and mixed uses) shall not be created in the RR Zoning District unless it is developed as a Planned Unit Development. This form of regulation will enable the Township to control and moderate the size, scope and impact of future projects.

Corresponding Zoning Districts

Rural Preserve (RP) and the Rural Residential (RR) zoning districts correspond to areas planned for Rural Residential. These two zoning districts require 10 acre and 45,000 square foot minimum lot sizes, respectively. The primary purpose for the RP zoning district is to preserve large areas of rural land from premature development and act as a buffer in order to reduce development pressure on agriculture land. 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. Specifically, these areas are concentrated in the Southwest quadrant of the Township. Rural Residential areas are so designated because of existing patterns of this type of land use. 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.

Rural Residential

Corresponding Zoning Districts: RP (Rural Preserve),
RR (Rural Residential)

Minimum Infrastructure Required: Direct Access from a Paved Public Roadway

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 sanitary sewer (if available within 2,700 feet), 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 (PUD) or Open Space Cluster requirements should apply to all future development in Low Density Residential areas. While these development options

Low Density Residential

Corresponding Zoning Districts: LDR (Low Density Residential)

Minimum Infrastructure Required: Direct Access from a Paved Public Roadway, Natural Gas, Municipal Water, and if available, Sanitary Sewer

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.

As established by a 2011 Zoning Ordinance Text Amendment, certain large scale developments with eight or more lots (includes subdivisions, site condominiums, and mixed uses) shall not be created in the LDR Zoning District unless it is developed as a Planned Unit Development. This form of regulation will enable the Township to control and moderate the size, scope and impact of future projects.

Corresponding Zoning Districts

The Low Density Residential District accommodates the land uses in this 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 is primarily found near Buchanan Street, west of 168th Avenue, and east of Lakeshore Drive. The Southwest quadrant is facing high development pressures to convert agricultural land into residential uses. Therefore, it is important to establish gradient buffers to preserve the valuable agricultural land. To accomplish this, LDR designations are established between Medium Density Residential and Rural Residential land uses. Another substantial pocket of an LDR designation is found along Ferris Street between US-31 and the Cutter Park Subdivision.

MEDIUM DENSITY RESIDENTIAL

Medium Density Residential

Corresponding Zoning Districts: R-1 and R-2 Single Family Residential

Minimum Infrastructure Required: Direct Access from a Paved Public Roadway, Natural Gas, Municipal Water, and if available, Sanitary Sewer

Intended Land Uses

Medium Density Residential accommodates both single and two-family residences on lot sizes ranging from 13,000 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 the overall density does not exceed the appropriate 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 include natural gas, municipal water, sanitary sewer, and direct access to a paved public roadway. For lower density residential developments, the provision of sanitary sewer should only be required where it is available within 2,700 feet of a property.

To promote high quality development, Planned Unit Development (PUD) 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.

As established by a 2011 Zoning Ordinance Text Amendment, certain large scale developments with eight or more lots (includes subdivisions, site condominiums, and mixed uses) shall not be created in the R-1 and R-2 Zoning District unless it is developed as a Planned Unit Development. This form of regulation will enable the Township to control and moderate the size, scope and impact of future projects.

Corresponding Zoning Districts

The R-1 and R-2 single family residential zoning districts correspond to the Medium Density Residential category.

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 northwest quadrant of the Township (north of Lincoln Street), and near the lakeshore (along Lakeshore Drive).

HIGH DENSITY RESIDENTIAL

Intended Land Use

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

Corresponding Zoning Districts

The R-3, R-3.5, and R-4 multi-family residential zoning districts correspond to the areas designated High Density Residential on the Future Land Use Map. The application of a PUD is 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.

General Location

Existing High Density Residential designated areas include the 43 North Condominium and Apartment PUD, Timber View Apartments PUD, Piper Lakes Apartments PUD, and the area flanked by numerous two- to four-unit structures along Clovernook Drive. These developments are all located near, or north of, Comstock Street.

Understanding the Township is expected to experience continued growth, it was necessary to identify additional locations suitable for High Density Residential development. Therefore, land south of the 43 North PUD, south of the Timber View Apartments PUD, and north of the Piper Lakes Apartments PUD have been master-planned for additional HDR. This designation also aligns with the goals found in the Robbins Road Sub-Area Plan of mixed-use development.

High Density Residential

Corresponding Zoning Districts: R-3 (Two Family Residential), R-3.5 (Restricted Multiple Family Residential), and R-4 (Multiple Family Residential)

Minimum Infrastructure Required: Direct Access from a Paved Public Roadway, Natural Gas, Municipal Water, and if available, Sanitary Sewer

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.

MANUFACTURED HOME PARK

Manufactured Home Park

Corresponding Zoning Districts: R-5 (Manufactured Home Park)

Minimum Infrastructure Required: Direct Access from a Paved Public Roadway, Natural Gas, Municipal Water, Sanitary Sewer

Intended Land Use

Manufactured Home Parks are designed for a long-term duration of stay, and must comply with the applicable requirements of Public Act 419 of 1976, as amended, and Public Act 96 of 1987, as amended, and all other applicable local, county, state, or federal regulations.

Corresponding Zoning District

The R-5 Manufactured Home Park Residential District is the only applicable zoning district.

General Location

The only area designated for this land use is the River Haven Manufactured Home Park located at the corner of Mercury Drive and 144th Avenue.

OFFICE/SERVICE

Office/Service

Corresponding Zoning Districts: SP (Service Professional)

Minimum Infrastructure Required: Direct Access from a Paved Public Roadway, Natural Gas, Municipal Water, and Sanitary Sewer

Intended Land Use

Areas planned for Office/Service should allow low-intensity commercial uses such as general office buildings, service professional offices, such as medical clinics, financial institutions, and service establishments. These land uses are desirable transitions between major thoroughfares, commercial, and residential areas. The minimum infrastructure requirements include natural gas, municipal water, sanitary 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 near existing uses, such as Robbins Road. 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 further the intent and purpose of this Master Plan are very important for the continued economic prosperity and quality of life in Grand Haven Charter 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, sanitary sewer, and direct access to a paved public roadway.

Commercial

Corresponding Zoning Districts: C-1 (Commercial) and SP (Service Professional)

Minimum Infrastructure Required: Direct Access from a Paved Public Roadway, Natural Gas, Municipal Water, and Sanitary Sewer

Corresponding Zoning Districts

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

General Location

The major areas designated as 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. Additionally, this area can accommodate higher traffic volumes, provide relatively easy access, and offers 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 the existing 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 small area 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 Wesco on Mercury Drive.

GENERAL INDUSTRIAL

General Industrial

Corresponding Zoning Districts: I-1 (Industrial), I-1A (Corridor Industrial)

Minimum Infrastructure Required: Direct Access from a Paved Public Roadway, Natural Gas, Municipal Water, Sanitary Sewer

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 important for the continued economic prosperity and quality of life in Grand Haven Charter 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 is encouraged.

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

Corresponding Zoning Districts

The I-1 Industrial and Industrial I-1A Corridor Industrial 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.

General Location

Currently, there are many industrial uses in the Township, and these 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

Extraction

Corresponding Zoning Districts: All that permit the Removal and Processing of Natural Resources

Minimum Infrastructure Required: Varies

Intended Land Use

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

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 of Lakeshore Drive, south of Hayes Street and 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.

Public/Quasi-Public

Corresponding Zoning Districts: All that Permit Public/Quasi-Public Land Uses

Minimum Infrastructure Required: Varies

Corresponding Zoning Districts

All zoning districts that permit these types of uses either by right or as a special land use correspond with the 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 Charter 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 Charter 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 Charter 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 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 Charter 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 service uses that serve local residents as well as those traveling throughout the region. The SP Service/Professional District is designed to accommodate uses such as offices, banks and other services 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 Charter Township are:

- I-1 - Industrial District
- I-1A - Corridor Industrial District

The primary purpose of these zoning districts is to provide for manufacturing, assembling, 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 9. 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

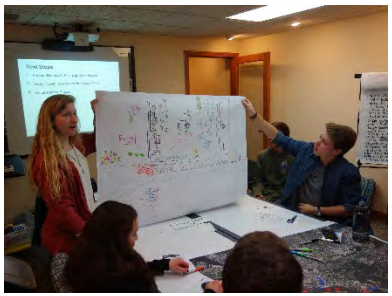
Nearly 100 people participated in the Leadership Summit, a multi-faceted workshop designed to engage citizens, public officials and community stakeholders with an in-depth discussion about community resilience. During the Summit, experts from the University of Michigan, Michigan State University's Land Policy Institute and the State's Climatology 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 7.

PUBLIC OPEN HOUSE

An open house was held on October 20th, 2015 to introduce the Plan to the public. Many residents attended the open house to view the draft plan, offer comments, and hear about the process.

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 2015, 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 called *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 10.

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 10. THE FUTURE OF GRAND HAVEN – A YOUTH PERSPECTIVE

This Chapter was written by the youth of the Grand Haven Community through the Youth Advisory Committee (YAC). 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.[1] There are a number of students who receive a Reduced Lunch in the GHAPS District. According to the United Way 2015 Community Assessment for Ottawa County 35% 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

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.

Photo Credit: Ed Post

Photo Credit: Kelly Ruffing, IFG Photography

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.).

POTENTIAL FUTURE AMENITIES FOR GRAND HAVEN:

Photo Credit: Ed Post

Photo Credit: Ed Post

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 11. SUMMARY OF CLIMATE AND SHORELINE PROCESSES

This short chapter summarizes a University of Michigan research study analyzing the shoreline of the Grand Haven community. The full report, including background information, methodology, all maps, and more detailed results are found in Appendix B.

PURPOSE OF THE PROJECT

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 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 and land use ramifications of increased flooding are also considered.

Hurricane Sandy caused an estimated 755 billion dollars worth of damage in 2012. The impacts of this Hurricane were felt on Lake Michigan, causing waves up to 33 feet.

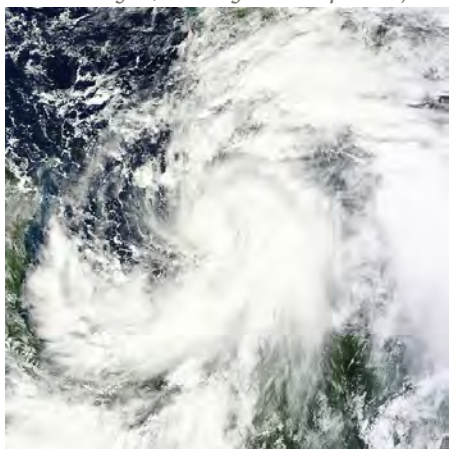


Photo Source: NASA 2012

SUMMARY OF CLIMATE VARIABILITY

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, the shoreline in Michigan is often left unprotected and misunderstood, especially in the face of a changing 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 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.

INCREASED PRECIPITATION AND STORMINESS

There is strong consensus among climate experts that storms will occur in the Great Lakes region in greater

1 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 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.

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

Damage from a 1989 storm in Grand Haven.

frequency and intensity.[3] 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."[4] As storms produce more precipitation and generate stronger sustained winds, the Great Lakes will see stronger and higher waves.[5] 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.[6] Increases in the intensity of storms also quickens the pace of erosion on Great Lakes shorelines.

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. 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.[7]

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.[8] 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.[9] Lastly, ice cover protects the shoreline during winter storms. With less ice cover, the shoreline is more susceptible to erosion and habitat disruption.

REGULATORY INVOLVEMENT

Appendix B summarizes current State, Federal, and local regulation relevant to coastline management. These include the National Flood Insurance Program (NFIP), permitting processes for wetlands, High Risk Erosion Area management, Soil and Erosion and Sediment Control ordinances, Critical Dune Area designations, and Federal and State Water Mark Lines. Only the most relevant information for the National Flood Insurance Program and Federal and State Water Mark Lines are presented in this short summary.

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3 U.S. Global Change Research Program. Global Climate Change in the United States, 2009. Cambridge University Press, Cambridge, MA.

4 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.

5 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

6 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.

7 The Heinz Center. (2000). Evaluation of Erosion Hazards. Web. Accessed July 2015. http://www.fema.gov/pdf/library/erosion.pdf

8 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.).

9 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

Figure 11.1 The shoreline in Grand Haven for various years, 2015 photo

Source: Google Earth Pro, 2015 Imagery

NATIONAL FLOOD INSURANCE PROGRAM

Of all the regulation analyzed, Grand Haven Charter Township is most interested in advancing participation in the National Flood Insurance Program through the Community Rating System. Grand Haven Charter Township joined the NFIP in 1981. Since that time, the Township has received over $229,000 in aid for 17 separate claims.

Under the Community Rating System (CRS), the Grand Haven community can receive credit for implementing several of the changes recommended in this report (see recommendations at the end of this chapter and in Appendix B). 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.[10] Participating in the CRS is a proactive approach to keeping costs low while protecting both man-made and natural resources near the shoreline.

WATER MARK LINES

There are three Water Mark Lines relevant to the State of Michigan. First, the federal Water Mark Line, administered by the United States Army Corps of Engineers. Second, the State regulatory Water Mark Line, administered by the Michigan Department of Environmental Quality. 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 with regard to public access along the shore. 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.[11] More detailed information on each Water Mark Line are presented in Appendix B.

OVERVIEW OF RESEARCH FRAMEWORK

Table 11.1 Research Framework

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

The Research Framework of this study uses scenario planning to assess environmental, fiscal, and land use conditions under different management options and Climate Futures. In this context, the project team identified two driving forces: (1) rising levels of flood waters and (2) local government management options. Each Climate Future was tested against each management option and evaluated for impacts on the environment and land use in the community.

10 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.

11 EDEN Inc. (2014). Flood Premiums Rising Dramatically. Web. Accessed July 2015. http://eden.lsu.edu/Topics/Hazards/Floods/NFIP/Pages/FloodPremiumsRisingDramatically.aspx

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. A Lucky flood projection is shown in Map 11.1.

- "Expected" Future – Under the Expected Climate Future, Great Lakes water levels will continue to fluctuate according to long-term decadal patterns. 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. Map 11.2 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. However, still-water elevation will be higher than the long-term average and closer to the long-term high (583 feet). Map 11.3 shows a Perfect Storm flood projection.

MANAGEMENT OPTIONS

The following four management options were used in the analysis. They are each defined further in Appendix B.

- Current Structures and Infrastructure
- Build-out According to Current Zoning
- Build-out According to Master Plan
- Build-out According to Best Management Practices (BMPs)

The Build-out According to Current Zoning analysis is a reflection of what Grand Haven Charter 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 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.

Map 11.4 in Appendix D 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.

The remainder of the study analyzed impacts to land use (total acres, parcels, number of structures, and

critical facilities) and environmental assets (wetlands, tree canopy, impervious surface, Critical Dune Areas, and High Risk Erosion Areas.) The following summarizes the key results for some variables analyzed. Expanded results, including a description of methods and limitations, can be found in Appendix B.

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%.

PARCELS IMPACTED BY FLOODING

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.

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. 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 important to consider in coastal management, as they help to reduce flood damage by absorbing flood water and then slowly releasing it. One acre of a typical wetland is able to absorb one million gallons of water,[12] protect adjacent and downstream land from damage,[13] and slow the speed of flooding across an area.[14]

This study analyzed existing, potential, and unprotected wetlands. Key findings include:

- There are nearly 1,400 acres of existing wetlands impacted by all three Climate Futures. These

12 Glass v. Goeckel. Michigan Supreme Court. 29 July 2009

13 . 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

14 Ibid.

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 receive flood waters in the Lucky Climate Future.

- There is some opportunity to increase wetland area in each flood zone – an increase of about 14% to 15% depending on the Climate Future.
- Wetlands 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 capacity. 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.

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. The intent of this study 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 in Appendix B.

While it is impossible to predict the number and scope of development permits that may be granted in the future, this study provides insight into parcels that may be developed in or near Critical Dune Areas.

Relatively few acres of Critical Dune Area would be impacted by flooding in any 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.

However, the potential for development in and near Critical Dune Areas is very high. 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. Great potential for development is clustered in or near Critical Dune Areas, suggesting the Township should consider new methods, beyond what is modeled in this study, to address this concern.

RECOMMENDATIONS

In total, this analysis showed that even minimal use of Best Management Practices can greatly reduce the number and size of land use and environmental assets at risk. The 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 Grand Haven Charter Township. As such, these recommendations are not included in the Goals and Objectives of this plan, and are merely suggestions of steps the Township may take. The following Best Management Practices

are organized into key goals. The list below is a summary, additional BMPs are presented in Appendix B.

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. Enact deed restrictions stating the existence of an environmentally sensitive area on public property.

e. Encourage implementation of green infrastructure through incentives, stormwater utility fees and stormwater credit manuals.

f. Encourage cluster development that allows structures to be sited in less vulnerable coastal areas.

f. Adopt performance standards that minimize on-site soil and vegetative disruptions.

g. Implement a Transfer of Development Rights program, where development rights are transferred to inland areas away from coastal hazards.

h. 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

i. Disconnect combined sewer system (stormwater and sanitary).

j. Provide incentives for on-site stormwater treatment to reduce standing water.

k. Increase capacity of stormwater sewer system to handle heavier precipitation events.

EMERGENCY MANAGEMENT

l. Ensure at least one municipal staff employee is a certified floodplain manager.

m. Identify public locations with back-up power supplies.

PROTECTING PUBLIC INFRASTRUCTURE

n. Update design standards to build roads, culverts, and bridges in adherence with updated precipitation tables.

o. Do not allow public infrastructure to be built in Special Flood Hazard Areas, or the following: VE, AE, AO, or X.

p. Ensure critical facilities are sited outside the VE/AE zones.

q. 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

r. Identify high priority public lands for wetland restoration and apply for MDEQ grants to fund restoration projects.

s. Conduct a community inventory of environmentally sensitive areas and create 50-foot buffers around all environmentally sensitive areas.

t. Require native vegetation on coastal properties, particularly near Critical Dune Areas and other environmentally sensitive areas.

u. Zone for low intensity and low density around environmentally sensitive areas.

v. 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.

PROTECTING WATER QUALITY

w. Prioritize open space protection through the master plan process for areas that are continuous, provide flood protection, and provide stormwater filtration.

x. The Master Plan should recognize the relationship between water quality and stormwater management.

y. Limit percentages of impervious surfaces in new developments (no more than 10%).

z. Adopt lakeshore setbacks to regulate tree cutting, mowing, and fertilizer use.

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. 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.

CHAPTER 12. SUMMARY OF DEFINING VULNERABILITY IN THE GRAND HAVEN COMMUNITY

Community master planning processes can increase resilience by fostering civic engagement and improving communication and cooperation between cultural and service organizations. This Chapter summarizes a vulnerability assessment conducted to help the Township build greater resiliency by identifying vulnerable populations. This summary includes a short overview of public health impacts of climate variability and an overview of several assessment findings. For full descriptions of community resilience, regional social impacts related to climate variability, and full results of the vulnerability assessment, please see Appendix C.

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.[1] Weather conditions and high heat events exacerbate poor health conditions like allergies, asthma, and obesity.

VULNERABILITY ASSESSMENTS

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.[2] 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. By assessing the potential for exposure to a hazard and the sensitivities of specific populations, maps are generated that identify areas with greater vulnerability. This tool provides direction for planning commissioners, staff and public health workers as they work to reduce risks to human health. This short summary presents information related to heat and flooding sensitivity and exposure.

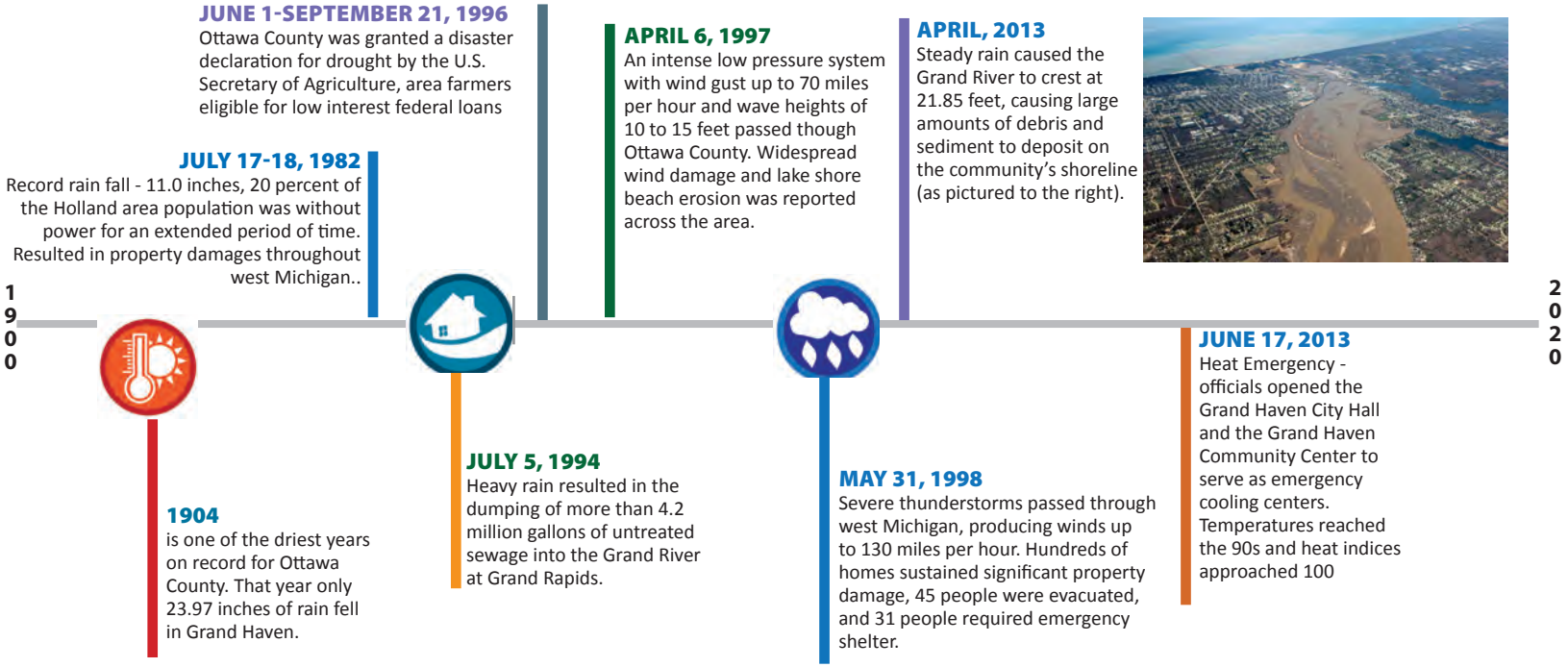
A Resilient Community Often Has:

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 National Research Council. Reconciling observations of global temperature change. Washington, DC: National Academy Press, 2000:86.
2 Foundations for Community Climate Action: Defining Climate Change Vulnerability in Detroit. University of Michigan. December 2012.

Figure 12.1 Extreme Weather Events Timeline



SEVERE WEATHER EVENTS IN THE GRAND HAVEN COMMUNITY

Figure 12.1 above summarizes a few of the major weather-related events in the Grand Haven Community and West Michigan over the past century. Oftentimes, severe weather events result in negative impacts to the local economy and to vulnerable populations within the community.

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 access to the Great Lakes, air conditioning, tree canopy, and the presence of impervious surfaces. Research shows that heat vulnerable populations tend includes those that lack access to transportation, are either under five years old or over 65, live alone or live in multistory buildings, or suffer from mental illness. Many other factors are described in Appendix C.

HEAT SENSITIVITY ASSESSMENT

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. 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. Five factors were identified as the primary contributors to the sensitivities and risks of people exposed to a heat wave:

- People over 65 years of age
- People living alone
- People over 25 with less than a high school education
- Minority populations
- People living below the poverty line

One of the sensitivity factors 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.

Studies suggest that minorities, too, 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.[3]

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.

Similarly, the University of Michigan research team found studies that demonstrate a direct link between low education attainment and poor health.[4] There is also an established correlation between lower educational attainment and income.

The Grand Haven Community Sensitivity to Excessive Heat Map (Map 12.1 in Appendix D) 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. There are a number of limitations to Census Data used in this study as described in Appendix C.

HEAT EXPOSURE ASSESSMENT

In places with a high percentage of impervious surface coverage and little tree canopy, the immediate environment can be much warmer. Urban areas typically have higher heat indexes (combinations of

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:

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

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. Temperatures have also increased by 2.5 degrees since 1950.

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

4 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.

temperature and humidity) than surrounding suburban or rural areas. This condition has been termed the "Urban Heat Island Effect."[5]

People living in settings with an 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. Increasing the tree canopy cover can 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.[6]

The project team combined the results of the two exposure maps to provide a single Community Excessive Heat Exposures Map (Map 12.2 in Appendix D), 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.

HEAVY RAIN AND FLOODING

Climate models suggest the Grand Haven Community and West Michigan can expect more frequent storms of increasing severity in the decades ahead.

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. 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. Older homes may be more vulnerable if residents have not had the financial resources to make improvements and upgrades.

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. Map 12.3 in Appendix D depicts the Community Flooding Vulnerability.

5 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.

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

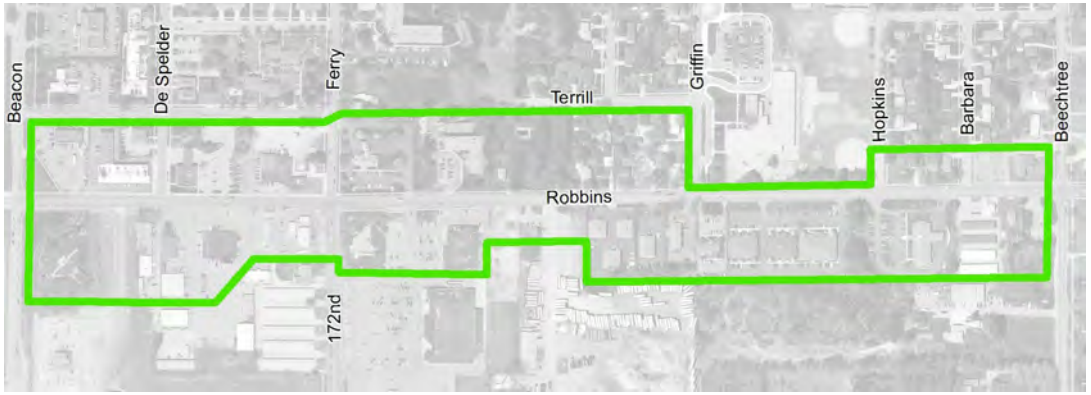
APPENDIX A. 2009 ROBBINS ROAD SUB AREA PLAN

INTRODUCTION

While a Master Plan must recognize broad development patterns, it is also important to structure realistic objectives and recommendations. As such, many land use and development challenges respond effectively to area-wide solutions and approaches. However, portions of any community face unique opportunities or challenges that respond best to focused attention. This is the case for the Robbins Road corridor. Its unique circumstances are made somewhat more complex since both the City of Grand Haven and Grand Haven Township have control over the area.

Recognizing that the corridor's future affects both communities and that the decisions of one will affect land uses in the other, the township and city cooperated in the development of this Sub Area plan. The plan identifies corridor liabilities and assets and presents a strategy to overcome obstacles and to maximize opportunities. While the Robbins Road Sub Area is distinct, it is nevertheless important to consider its relationship to the larger community. Therefore, this Chapter provides recommendations for the Robbins Road corridor and its improvement that are consistent with the greater Township Master Plan.

Given that both communities were updating their Master Plans simultaneously in 2009, the Township and City coordinated their planning activities recognizing that the decisions of one community affect land uses in the other.



The Robbins Road Sub Area extends from US-31 on the west to Beechtree/168th on the east.

METHODOLOGY AND CITIZEN INPUT

The Robbins Road Sub Area plan began with extensive research and site visits. The consulting team walked and drove the corridor and prepared an extensive inventory of photos and noted its key features, development patterns, unique land uses, traffic patterns, as well as aesthetic and land use strengths and weaknesses. This work concluded on August 14, 2008, with a joint meeting of both the city's and township's Master Plan Steering Committees. The meeting began with a description of the planning

process and initial impressions of the sub area. Participants then divided into two groups, (each included representatives of both jurisdictions) who then undertook a SWOT (Strengths/Weaknesses/Opportunities/Threats) assessment. The following table summarizes those results:

Strengths	Weaknesses
♦ Traffic volumes ♦ Vacant land to south ♦ Twp. desire to contain commercial growth in nodes and near City ♦ Viable commercial area ♦ Area-wide resource ♦ Deeper Lots ♦ Larger Ownership ♦ DDA West End	♦ Tight Access at Meijer (division between jurisdictions) ♦ Poor pedestrian safety ♦ People avoid light by cutting through Res. On Ferry & Despelder ♦ Lack of left turn lanes results in rear end accidents ♦ Disorganized onsite circulation ♦ Difficult lefts at 168th and Beechtree ♦ Twp. lacks control of roads ♦ 66' R.O.W. ♦ Solvent plume in ground water ♦ Shallow ground water ♦ Narrowness of properties on North Side – West End ♦ Bad past planning (need to redevelop) ♦ A lot of commercial property exists today ♦ Lack of pedestrian connections
Opportunities	**Threats**
♦ Realign Whittaker Way with Despelder ♦ Reduced curb cuts at Walgreen's ♦ Meijer out lots ♦ Brownfield Redevelopment Authority, in both City and Township ♦ DDA in Township ♦ Commitment to cooperate across boundaries ♦ US-31 Bypass, by 2012 (?) ♦ Infrastructure ♦ Expansion of public transit ♦ Corridor TIF Plan ♦ Architectural character standards ♦ Size of parcels South of road ♦ Intersection – Meijer ♦ 3 – Lane Road	♦ Possible dev. to south w/access to Robbins Road ♦ Possible lack of cooperation from stakeholders ♦ Ottawa County Rd. Commission ♦ Revenue source ♦ Economics today ♦ Amount of commercial ♦ By Pass ♦ Lack of transportation choices ♦ Nothing happens with redevelopment

Based on the preliminary research and the SWOT input, an existing features map, (using 2004 aerial photos) and a site analysis were prepared. These were assembled as "Walking Audit Packets", which the township and city staffs and local residents used to self-guide tours of the Sub Area. This approach helped all gain a better understanding of the Sub Area and its issues and opportunities.

To maximize public involvement, local residents and business owners were notified by mail, phone, and

newspaper articles, and through the City of Grand Haven Master Plan website about the Robbins Road Sub Area planning process. They were also invited to obtain a "Walking Audit Packet" either at the township, city, or to download it from the project website and to participate in a planning charrette for the area. A charrette is a short-duration, intense planning and design session that directly involves the public, local stakeholders, and a consultant led planning and design team. The charrette process allows planners and designers to work in a focused manner with the immediate input from participants.

The planning charrette began on the evening of September 15, 2008, with a trolley bus tour of the corridor. Participants identified and discussed various land use and design-related issues that were addressed in greater detail during a facilitated brainstorming session later that evening. This discussion included a facilitated evaluation of liabilities, assets, needs, and desires, and helped focus input on commonly held beliefs and how the character of the Sub Area affects perceptions. Participants then voted and ranked priority issues and opportunities.

Significant area-wide liabilities included a lack of:

- Sidewalks on the south side of Robbins Road
- Street trees and landscaping,
- Clearly defined internal circulation patterns
- A dedicated left-turn lane.

Using the input from the brainstorm sessions, alternative responses to each sub area's challenges were developed

However, several "dreams and desires" were identified including:

- Greater corridor design consistency
- Slower traffic speeds
- Planned development south of the corridor

Participants were invited to return the next day to view progress and to offer further input. The opportunities for immediate feedback created a very dynamic atmosphere and resulted in innovation that might not otherwise have been possible. Consequently, a number of ideas were tested, re-worked, and either embraced, or rejected.

An open house was held at the close of the charrette process to review the draft Sub Area plan. The informal atmosphere helped further engage stakeholders and decision-makers in a dialogue about planning assumptions; it offered an opportunity for residents and business owners to see the initial outline of the Sub Area plan, and allowed a discussion about the remaining work.

The resulting joint community plan for the Robbins Road corridor was finalized and then integrated, as this chapter, into the Grand Haven Township Master Plan.

The open house offered an opportunity for residents and business owners to see the initial outlines of the sub area plans

ROBBINS ROAD CORRIDOR

Successive layers of pavement have nearly overtopped the curb, further exacerbating access management in this area

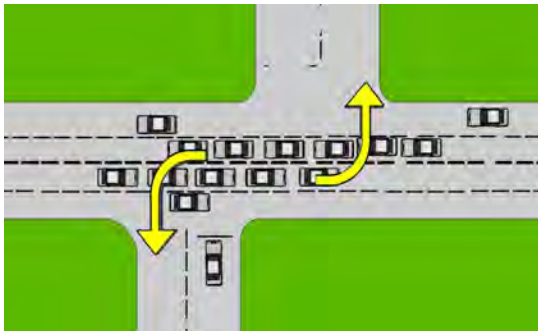
Robbins Road is controlled by the City of Grand Haven; however, since it is a jurisdictional boundary, properties along its north side fall within the city while properties to the south fall primarily into the township. Initially, the corridor study area extended about 250 - 300 feet north and south of Robbins Road and from US-31 to Beechtree Street/168th Avenue. The planning area was about 48 acres and included properties developed as a variety of commercial uses at the west end, but with office and residential toward the east. To gain a better understanding of land uses and development opportunities it was later broadened to approximately 100 acres, taking in more land to the south.

Much of the recent activity in and adjacent to the corridor has occurred in the township, however, more land remains there to be developed. As such, the township seeks a plan for this area that focuses development, taking advantage of existing infrastructure, committed development patterns, and targeted land uses that create a better sense of place for this key community gateway.

During the planning process several challenges and assets were identified; these are more fully developed below:

TRANSPORTATION

Robbins Road has four travel lanes (two in each direction) and carries upwards of 12,000 vehicle per day at its west end and about 9,800 at the east. While the US-31 and Robbins Road intersection is signalized, south bound US-31 movements require an indirect left. The Robbins Road, 172nd Avenue/Ferry Street and 168th Avenue/Beechtree Street intersections are also signal controlled.



Ineffectively aligned opposing intersections create the potential for "left turn lock-ups"

The majority of vehicle crashes on Robbins Road (22 out of 25 reported accidents in 2008 through August) occurred between US-31 and 172nd Avenue/Ferry Street. This is where commercial activity is concentrated and multiple and poorly defined curb cuts are located. Many accidents in this vicinity are rear-end crashes, most likely due to the lack of a dedicated left turn lane and poor access management.

With forty-nine access points along Robbins Road, left-turn movements are common. As a result, the inside lanes are often encumbered with turning cars and weaving traffic as drivers change lanes to avoid vehicles and queues. Furthermore, many opposing driveways are poorly aligned, creating several potential left-turn lock-up situations. There is also a lack of uniform access to and from the roadway, although this disorganized pattern is much more prevalent west of Ferry Street/ 172nd Avenue.

About 800 feet east of US-31, parking lots extend right up to the street resulting in an oppressive, asphalt-dominated environment with little room to sort out parked cars from drive aisles and to define sidewalks. Successive layers of pavement in this area have nearly overtopped the curb, further exacerbating access management.

AN ENTRY OPPORTUNITY

The US-31/Robbins Road intersection is a major community gateway. The broad highway boulevard and

indirect left turns work well to regulate traffic, but missing are elements that support aesthetics and create a memorable "arrival experience" that enhances both communities.

PARKING LOT LAYOUT

Many parking lots along Robbins Road interconnect and yet while this cross access is poorly defined, overall it likely helps reduce traffic congestion. These interconnections could be enhanced and made

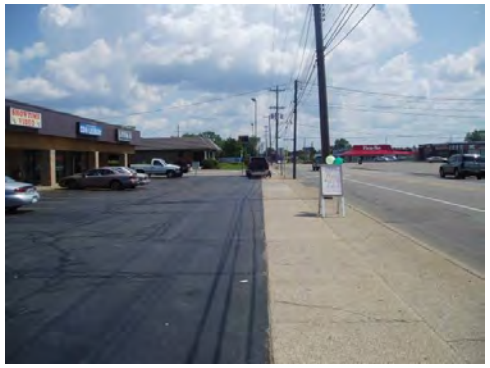
The lack of definition within the parking areas may lead to confusion for drivers and an unsafe environment for pedestrians

safer by improving pavement markings and clearly channelizing internal parking lot traffic. The current situation, with poorly defined access and internal drive aisles not only leads to confusion, it also makes walking in this area unfriendly at best, and dangerous, at worst.

These challenges are also exacerbated by what may be an oversupply of parking, especially at the southeast corner of Robbins Road and 172nd Avenue. It appears that additional commercial development could be accommodated there, strengthening the vitality of the area and making more efficient use of vast parking lots without overburdening sites or roadways. Care must still be taken to carefully integrate any new uses with existing development.

PEDESTRIAN ACCESS

The corridor does not accommodate pedestrians very well as sidewalks are only consistently located along the north side of Robbins Road. On the south side, immediately east of 172nd Avenue, only about 500 feet of sidewalk exists. West of 172nd Avenue there is little, if any parkway between the road, pedestrian zones, and parking lots. Consequently, pedestrians are very exposed to fast moving traffic.



The quality and safety of pedestrian areas vary significantly across the corridor

Given traffic volumes and turning movements, crossing Robbins Road on foot can be a daunting experience that must be addressed by appropriately designed sidewalks, tree lined parkways and safe and clearly defined pedestrian crossings.

SITE AND ARCHITECTURAL DESIGN

Site and building design and architectural character vary tremendously along the corridor; from outdated commercial strip development to more modern office settings. Some structures, however, may be reaching the end of their useful life. While Southtown Plaza, a 1960s strip center, is about to be replaced with a modern Walgreens pharmacy and convenience store it should not deter a continued focus on the importance of architectural design and character. In fact this new development should be viewed as a catalyst opportunity to establish a set of consistent corridor design principles for the city and township, guaranteeing consistency in theme, the location and placement of buildings and parking, building materials, signs and lighting.

AN AREA OF STRONG POTENTIAL

Despite traffic and access issues, the Robbins Road Sub Area provides vital commercial and retail services to the township and city. Immediately to the south, Meijer and Wal-Mart have expanded their retail reach attracting shoppers beyond just the surrounding area. In terms of total sales volume, the Sub Area and its environs rivals many other shopping areas in West Michigan. In addition, Pinewood Place, located on Ferry Street just north of Robbins Road, is undergoing an expansion; providing more senior housing and added employment opportunities.

Vacant and underutilized lands in the township also provide future opportunities. Several large parcels are planned and zoned for medium to high density residential and/or commercial uses, creating the potential for more traffic. Yet, if done correctly this development can lessen roadway impacts by promoting more walkable environments within the context of a mixed land use district, one with jobs, housing and shopping all within close proximity. In addition, the Meijer PUD has yet to be built out.

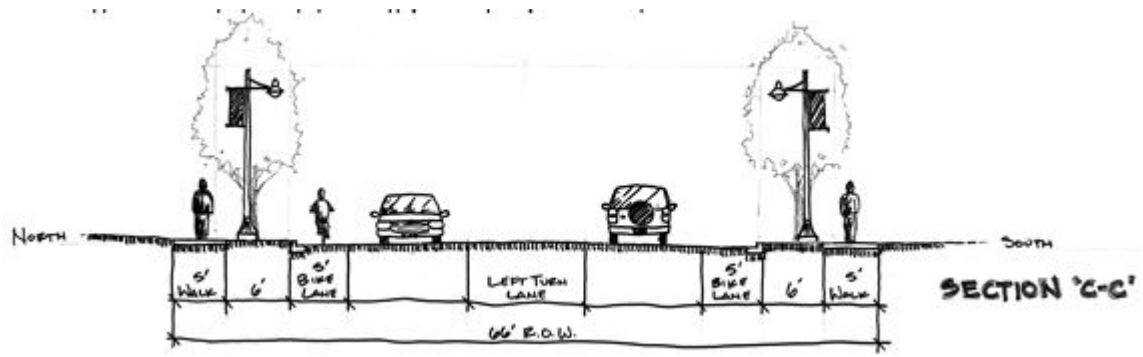
PLAN DESIGN POLICIES

Several transportation, and planning and design policy recommendations have been identified through this effort. These will help resolve issues and enhance the Robbins Road corridor so that it can continue to serve commercial and residential interests in both the township and city.

1. DEDICATED LEFT TURN LANE

Robbins Road traffic volumes vary considerably from west (with the highest levels) to the east; however, the lack of a dedicated left turn lane encumbers the entire corridor. This issue was identified and potential solutions were discussed during the process to gain citizen input.

The recommended alternative reconfigures Robbins Road to a three-lane section (possibly with right-turn lanes at appropriate high-volume locations, such as 172nd Avenue and the newly proposed Whittaker Way/DeSpelder intersections). A five-lane cross-section with a dedicated left was also considered, but



ultimately rejected based on the modest traffic volumes and the relatively narrow right-of-way.

The proposed three-lane section accommodates a travel lane in each direction and a dedicated center left. This configuration better and more safely accommodates traffic flow and left turn movements than the current four lane pattern and should result in reducing crashes.

The figure above illustrates the proposed three-lane section within a 66-foot wide right-of-way. It also demonstrates sufficient area to accommodate changes to the roadway; leaving five-foot wide bicycle lanes, six-foot wide parkways to accommodate street trees and five-foot wide sidewalks on both sides of the road.

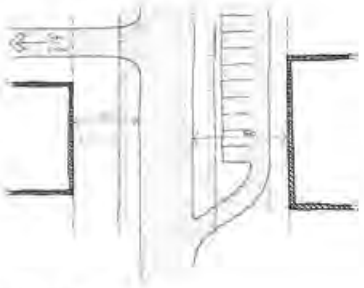
2. UNIFORMITY AND CONSISTENCY OF DESIGN

With some properties reaching obsolescence and others being considered for redevelopment, now is the time to improve the character and functionality of Robbins Road by applying consistent site, building, and architectural design standards that are coordinated between the city and township. In fact, citizens ranked uniform and consistent design standards as among their highest priorities. Such an approach would benefit both municipalities and assure compatible development within the corridor; of course, not all sites are poised for new development or redevelopment. Therefore, any standards must be flexible enough to address current uses while anticipating enhancements as new investment occurs. Design standards will also need to recognize that uses transition from west to east; shifting from relatively intense regional commercial on the west, to employment and residential on the east.

This Plan recommends the following required site development standards that at a minimum address the standards on the following page.

Robbins Road Conceptual Uniform Design Standards

Setbacks, variables
- Without front parking
- With front parking (and screening)

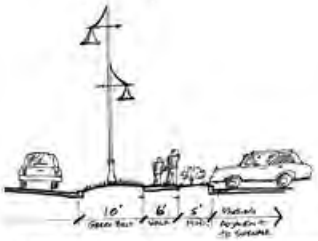


Landscape Treatment
- Buffer depth along roads
- Trees, size and quantities
- Shrub screens for parking lots

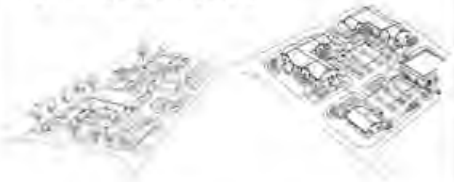
Signage
- Size (area and height)
- Illumination
- Freestanding and Building

Lighting Standards
- Cutoff Fixture Types
- Wattage Limitations

Sidewalks
- Size
- Location options



Building Design, by type
- Height, Roofline
- Minimum/Maximum footprint
- Finish architecture



Site Layout
- Access management (spacing and offsets)
- Shared drives, parking & Cross Access

Low Impact Storm Water Management
- Landscape for detention
- Rain gardens

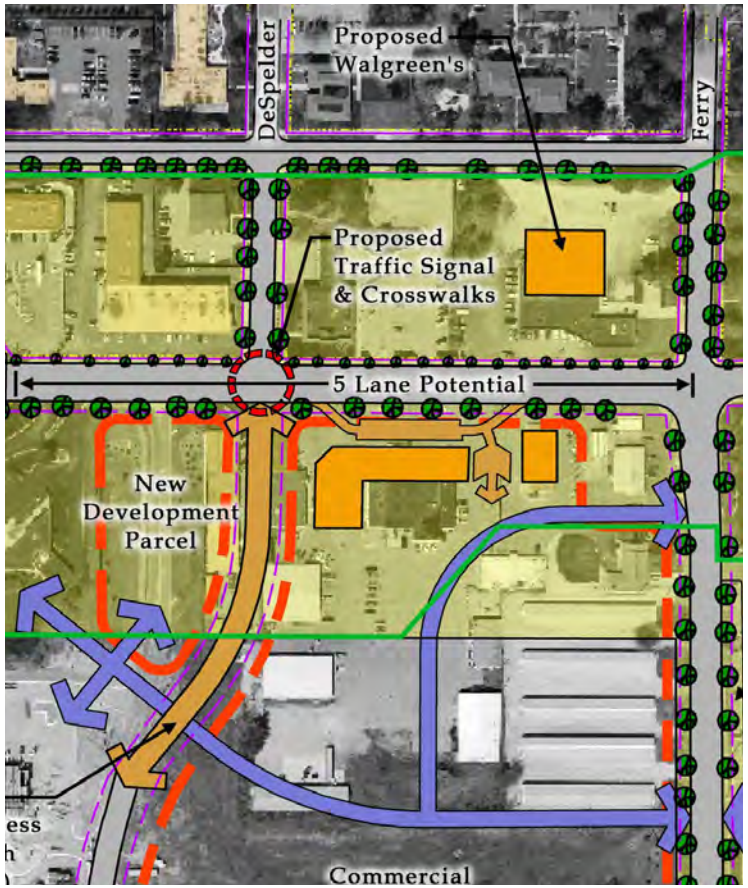
3. NEW ROADS AND INTERCONNECTIONS

The vacant lands to the south present an important opportunity for the township, but without carefully considered implementation strategies the wrong kind of development could trigger additional traffic issues and undermine efforts to manage growth. While some properties have direct access to Robbins Road, others will require connections to 172nd or 168th Avenues. Interestingly, charrette results ranked "better connectors among all areas" as one of the top implementation strategies for the Plan.

As such, the Plan recommends an expanded and interconnected system of public streets to serve future development and to better distribute traffic. Specifically, an east-west street, located about 900 feet south of Robbins Road, is proposed between 172nd and 168th Avenues. Griffin Street should also be extended south to meet the new street and a round-about explored for that intersection. Eventually, a further extension of Griffin south to Comstock Street should be considered.

Whittaker Way (the Meijer access drive to Robbins Road) should also be realigned to connect with DeSpelder Street. Not only would this improve traffic circulation, but it would also expand development opportunities for properties to the west. To accomplish this, however, will require demolition and redesign of existing sites; but as the area transitions, affected businesses can be relocated to new corridor development.

New roads to better serve the Meijer PUD and the larger parcels to the east are also recommended to enhance circulation and development potential. Finally, streetscape enhancements, including sidewalks, should apply to all new and existing roadways.



Aligning Whittaker Way and Despelder would improve the efficiency of the intersection and create a new development parcel

4. TRADITIONAL NEIGHBORHOOD DEVELOPMENT (TND) CONCEPT

The area south of Robbins Road, between 172nd and 168th avenues, is ideally suited for a Traditional Neighborhood Development. A TND emphasizes compact, mixed-use, transit and pedestrian-oriented development and offers a blueprint based on traditional town patterns. Neighborhoods, sized for easy walking distance, would function as the basic building block. Such neighborhoods should further emphasize human-scale design, town and neighborhood centers, public spaces, civic uses and other features that foster a sense of community. TNDs are also characterized by an interconnected network of narrow streets. Narrow street widths, on-street parking, street trees and other features are intended to slow local traffic and create a safe, attractive environment for pedestrians, in addition to cars. Transit and bicycle travel are also accommodated. The grid pattern of streets includes collectors and arterials, but also provides a variety of routes for local traffic. Service alleys are also a hallmark of TNDs.

Since this area has convenient access to shopping, restaurants, employment, and schools, and is also served by the area's public transportation system, Harbor Transit, it is a natural extension of the traditional development patterns located to the north of Robbins Road in Grand Haven. TND design principles should, therefore, apply to all new development using the following criteria:

- Mixed Land Uses – Land uses should include a blend of single and multiple-family residential, office, and regional and neighborhood-serving commercial, either integrated horizontally across the Sub Area or vertically within buildings.

- Varying Densities and Unit Types – Lot sizes, densities and residential types should vary and allow a compact design form. Setbacks should be replaced with build-to lines that locate buildings in a predictable pattern near the street, without intervening parking lots. Minimum building heights should be established and allowed to exceed 2.5 stories and 35 feet.

- Interconnected Streets – Narrow, inter-connected streets, with on-street parking should be laid out in a grid pattern. New connections between Robbins Road and Comstock Street, and 172nd Avenue and 168th Avenue should be made with respective extensions of DeSpelder Street and Timberview Drive. Streets should be lined with trees and sidewalks, and illuminated by street lights that not only serve the automobile, but pedestrians as well.

- Quality Design – Buildings (including residential, commercial and office) should have a distinct architectural character that supports TND principles. These include: clearly defined front doors that face the street; ample windows that support CPTED (Crime Prevention Through Environmental Design) principles by orienting to public spaces and increasing "eyes' on the street"; pitched roofs for residences and quality building materials.

- Parking in the Rear – In TNDs automobiles are accommodated, but they are not allowed to dominate. To promote pedestrian-friendly neighborhoods, parking areas should be situated at the rear of a building and be accessed via alleys. Garages should be either set back from the front façade of a home or they should be located at the rear to avoid dominating the street scene with blank walls and parked cars. On-street parallel parking should be allowed to provide a buffer between traffic and pedestrians on the sidewalks.

5.PEDESTRIAN CONNECTIONS

Other than sidewalks along the north side of Robbins Road the corridor lacks crosswalks or crossing signals. This was ranked among the highest liabilities identified by the public. Consequently, crosswalks should be added at Robbins and Griffin, including alternative crosswalk paving to further delineate pedestrian zones.

6. ENTRY FEATURE

The US-31 and Robbins Road intersection is a recognized community entrance which offers an excellent opportunity for enhancements. One example of an entry feature enhancement is an archway that extends over US-31, welcoming visitors to Grand Haven. The historic entry archway in Frankfort Michigan and the archway at the Grand Valley State University Allendale campus entrance are both good examples of such an entry feature.

The wide boulevard intersection of US-31 and Robbins Road offers an excellent opportunity for an entry feature such as these archways at Frankfort and Grand Valley State University

IMPLEMENTATION STRATEGIES

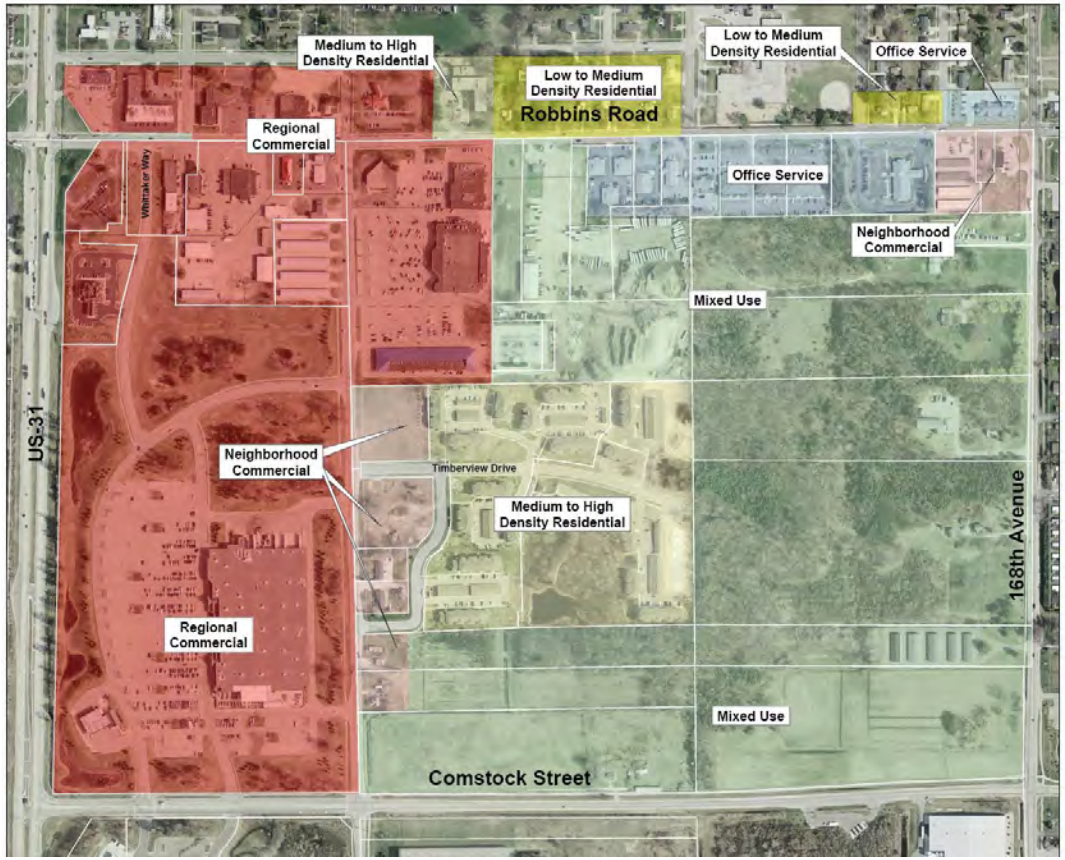
The following recommendations help establish an agenda for further action by the township and city, either working separately or jointly:

1. FUTURE LAND USE AND ZONING ADJUSTMENTS.

The township recognized the need to develop a more detailed concept for the Robbins Road Corridor, which is reflected in this plan. Recommendations include a diversity of land uses that vary by type, density, and design. Since this is a shared vision, uniform standards for design and site access must be developed and all new development must be required to meet them.

FUTURE LAND USE CONCEPT

Future land use patterns along Robbins Road are designed to transition from commercial in the west to residential in the east; development densities should also be varied. As vacant properties develop in the township they should be interconnected with a new network of streets that link to Robbins Road, Comstock Street, and 168th 172nd Avenues. Such vacant lands should be developed with a mixture of land uses, preferably as a Traditional Neighborhood Development, as described earlier in this Chapter.



The following future land use designations are proposed for the township's portion of the Robbins Road Sub Area. The Office Service and Medium to High Density Residential designations are not included due to the fact that these uses are already built out and are not anticipated to change.

REGIONAL COMMERCIAL

Land uses generally include larger single or multi-occupant structures providing products and services in an auto-oriented environment. However, future development must be designed to provide a safe and inviting place for both pedestrians and drivers. Sites should interconnect using existing and planned drives enabling patrons to access more than one use without being forced back onto a major road. Landscaping should be used to define sites, access drives, and streets, and to soften the regional scale of development.

NEIGHBORHOOD COMMERCIAL

A location for small-scale retail and service facilities, these land uses primarily serve nearby residents. Buildings should generally be residential in character, with pitched roofs and sites carefully designed offering safe and inviting environments for pedestrians, bicyclists, and motorists alike. Parking should be convenient, but not configured so that nearby sidewalks and streets are dominated.

Buildings should generally be residential in character with pitched roofs

MIXED USE

This Plan recommends that the areas planned for Mixed Use are developed in accordance with the TND principles outlined earlier in this Chapter Appropriate land uses include a mixture of single- and multi-family residential, commercial and office that are compactly integrated at varying densities and are located in buildings of varying scale and design.

The area should be developed around a grid-form street network that branches off two main street extensions; an extension of Griffin Street south to Comstock Street, and an extension of Timberview Drive east to 168th Avenue. All streets should include sidewalks, landscaping and decorative lighting to promote a safe and comfortable pedestrian environment. The graphic on the previous page provides an illustrative concept of a TND plan for the Robbins Road Sub Area.

ZONING

Areas in the township are regulated under the C-1 (Commercial) and SP (Service Professional) zones, while four zoning districts apply in the city. These are Commercial, Multiple-family Residential, Single-Family Residential and Office Service. West of Ferry/172nd zoning is consistent – "C" in the city and "C-1" in the township and permitted and special land uses are comparable in both codes. The township's C-1 district requires a minimum lot size of 35,000 sq. ft. with a minimum width of 110 feet. However, the city's code relies on setback and lot coverage standards to regulate parcel dimensions. A front setback in the township is 50 feet while it is 25 feet in the city.

These differences point out the need for uniformity and consistency; therefore, adjustments to both the city's and township's ordinance standards will be necessary to implement plan goals. However, since the defined zoning districts may apply elsewhere in either jurisdiction, care must be taken to avoid unintended conflicts. Therefore, a mixed use zoning district, if considered in the township, must be tailored specifically to the objectives of this plan. In addition, the township's PUD provisions (if those district regulations are used to implement recommendations) should be evaluated so that they reflect the land use objectives of this Plan. Alternative approaches, including adopting a uniform set of design standards as an overlay applying to both jurisdictions, should be explored. Other approaches include a form-based code or a pattern book used as a development guide. While either approach would provide uniform standards, mandatory requirements will only guarantee positive change.

Implementation of the portion of this Plan relating to the TND concept is dependent on the township's prior adoption of specific zoning district regulations that will allow for (1) additional flexibility in site design (flexibility, that is, beyond what is afforded under the current PUD Ordinance), (2) the intended quality and variety of building characteristics, (3) the compatible integration of mixed land uses, and (4) such other regulations as are deemed necessary to implement the township's goals of promoting high quality development, based on the TND principles outlined earlier in this Chapter. *Therefore, no TND proposals will be considered or approved by the township until such time the township has formulated and adopted the necessary zoning regulations to effectively regulate such a development concept.*

2. ROAD RECONSTRUCTION

A redesign of Robbins Road is recommended to better manage traffic, including left-turns and since it falls under the city's jurisdiction, Grand Haven is in a position to take leadership role for improvements. But it will be important to involve adjoining property owners; and the city and township should collaborate bringing the Ottawa County Road Commission and MDOT together to achieve consensus on its ultimate design, roadway landscaping, the configuration of intersections and, ultimately, the potential redesign of the US-31 intersection. A combination of funding sources will certainly be necessary to accomplish this, but the initial step would be to move from the concepts outlined in this plan to testing their feasibility and preliminary design.

3. PLANNED NEW ROADS

The Plan contemplates an expanded and interconnected network of streets to better channel traffic, to reduce pressure on a limited number of key intersections, and to permit efficient use of the lands adjoining the corridor. While part of this area may be outside the current planning boundaries, attention must still be paid to the implications of anticipated growth that could impact Robbins Road. The township should, therefore, work with the affected property owners to evaluate roadway options, curb cuts, and access management. As new development proposals occur in this area, the Planning Commission should use the Master Plan to guide the type and location of changes to its transportation system.

4. REALIGNED WHITTAKER WAY AND DESPELDER INTERSECTION

An adjustment to the Meijer PUD is recommended that would result in shifting Whittaker Way (its northerly access road) to the east about 150 feet to align with Despelder Street. This change, together with the proposed Robbins Road three-lane cross section, will significantly enhance access and the market potential of surrounding properties. It will also make possible a signalized intersection and designated crosswalks to improve pedestrian access. Additional stacking and left-turn movements may also be enhanced. Of course, this alignment will require property acquisition and the demolition and relocation of some existing buildings and businesses. But, it also creates an expanded development area to the west that currently lacks visibility and exposure.

Shift the Whittaker Way, Robbins, Despelder intersection for better alignment

5. CONSIDER A CORRIDOR IMPROVEMENT AUTHORITY

Act 280 of 2005 authorizes municipalities to establish a tax increment financing authority to plan and implement improvements along a defined commercial corridor. This statute uniquely contemplates cooperation between jurisdictions to address the challenges of boundary roads. Two such entities would need to be established individually by the township and city, but they could work jointly on a development and financing plan. The act allows tax increment financing as a funding source for improvements. These could include some or all of the costs of road reconstruction, streetscape improvements, land acquisition, site redevelopment, and others. The tax increment captured by the authority would include township and city levies, as well as the levies of other taxing jurisdictions that agree to participate.

6. WORK WITH MDOT AND THE CITY OF GRAND HAVEN ON ENTRY FEATURE IN INTERSECTION

Given that US-31 is a state highway, and Beacon Boulevard and Robbins Road are both city-controlled roadways, coordination with MDOT and the City of Grand Haven is critical to the development of an entry feature at the US-31 and Robbins Road intersection.

Robbins Road Corridor Sub Area - West Site Analysis

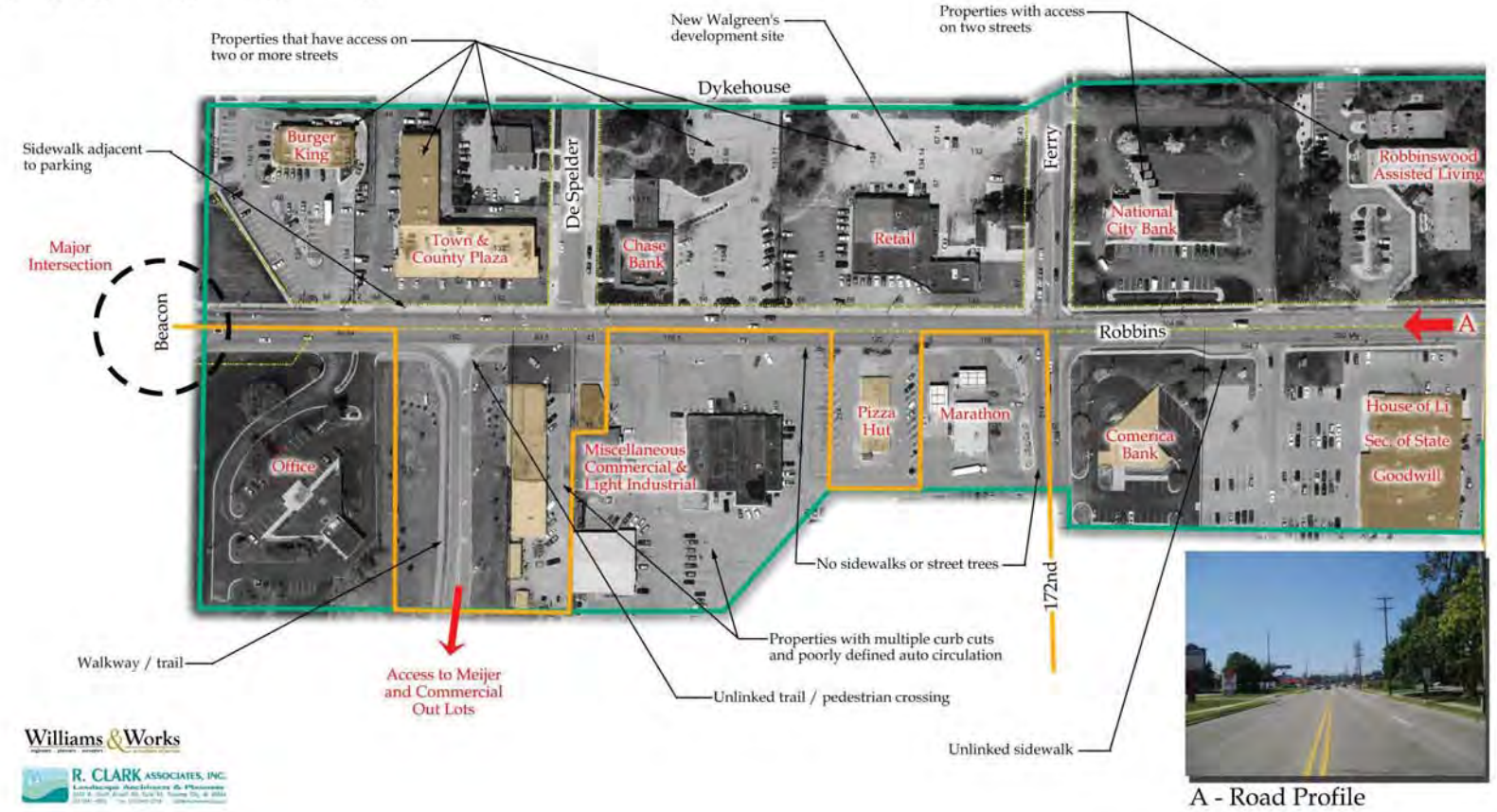
Robbins Road Corridor Sub Area
City Limits
Building Footprint
Right-of-Way
Parcel Boundary
Sensitive Area
Floodplain (approx)

N

0 60 120 240 360 480 Feet

Inventory Notes:
- Power lines are located primarily on the north side of Robbins Rd.
-Continuous sidewalk on the north side of Robbins Rd. only. The south side of Robbins Rd. has two unconnected sections of sidewalk

Analysis Notes:
-Mixture of land uses throughout the corridor
-Large variety of building scales and setbacks
-High volume traffic flows (4 lanes) - no left turn lane
-Large variety of sign sizes



A - Road Profile

Williams & Works

R. CLARK ASSOCIATES, INC.

Robbins Road Corridor Sub Area - East Site Analysis

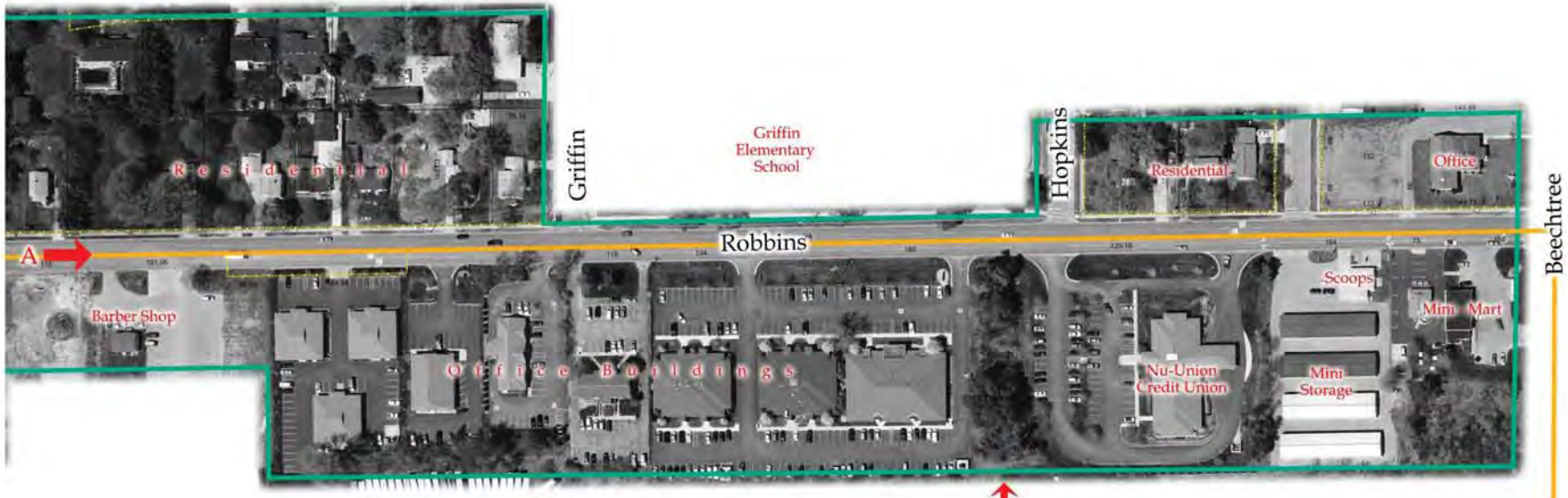
A - Road Profile

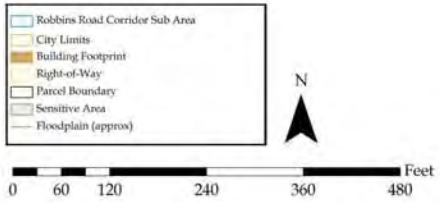
Inventory Notes:

-Power lines are located primarily on the north side of Robbins Rd.
-Continuous sidewalk on the north side of Robbins Rd. only.
-No crosswalks provided on Robbins Rd.

Analysis Notes:

-Parcels on the south side of Robbins Rd. are typically larger and deeper than the lots on the north side of the street
-Corridor provides services for a large area (city and township)





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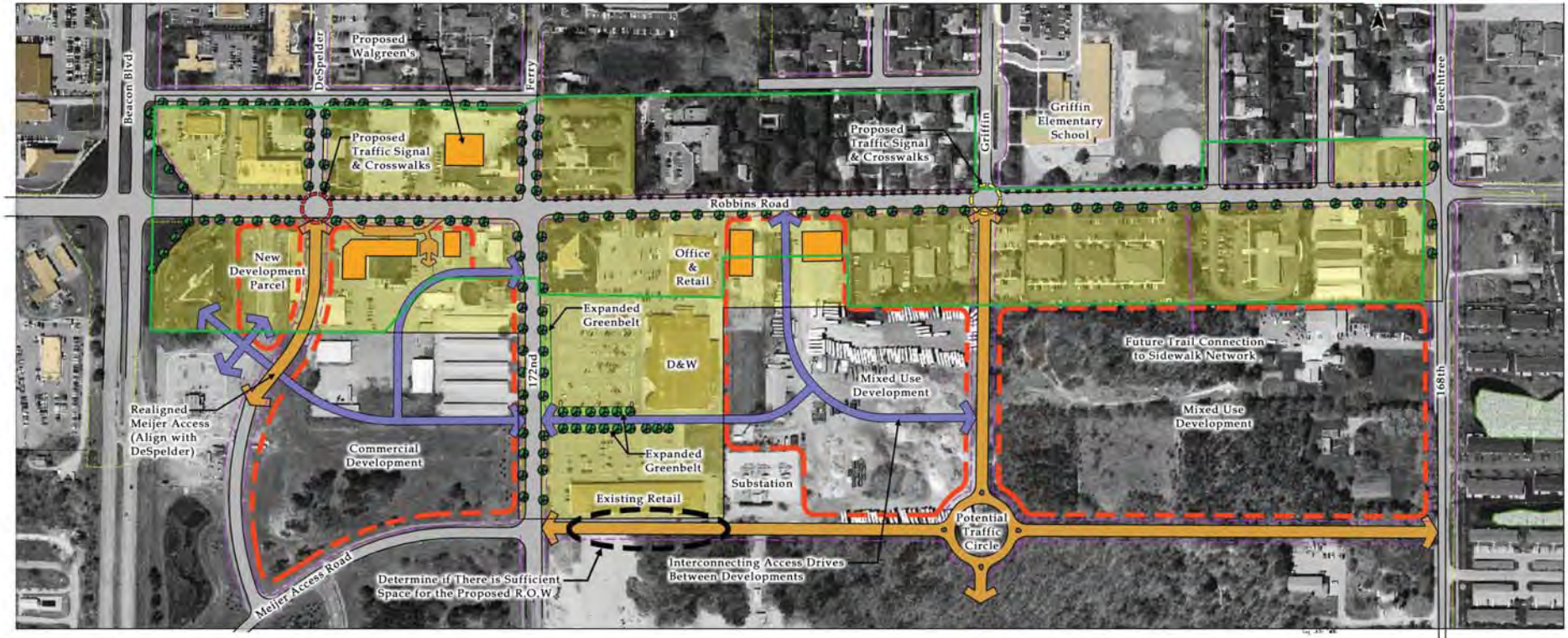
Robbins Road Corridor Sub Area Plan

Williams & Works

R. CLARK ASSOCIATES, INC.



Legend

- Future Development Areas
- Existing Sidewalks
- Proposed Sidewalks
- Existing Roads
- Proposed Roads
- Unification Guidelines Area
- Conceptual Alignment of Future Connections
- Relocated Intersection with Signal
- Future Traffic Signal and Crosswalks
- New Entry Feature
- Potential New Development Sites
- Proposed Street Trees

Scale: 0' 150' 300' 600'

APPENDIX B. 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.[33]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 forest lands, 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

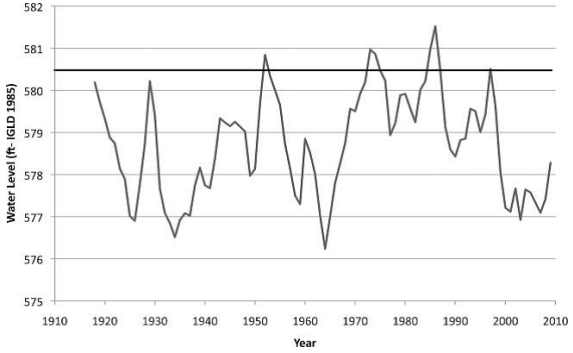
The Great Lakes function differently than other inland water bodies and tidal oceans. Understanding these dynamics can help Grand Haven Township plan for naturally occurring changes along the shoreline.

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, and larger increments seasonally and over the course of years and decades. Long-term water levels fluctuate by multiple feet as shown in Figure B.1.

The Great Lakes are in a period of rising lake levels. Since the early 2000s, water levels have remained low,

Figure B.1 Oscillating water levels of the Great Lakes and the mean water level



Source: NOAA, 2011

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.

2 Ardizone, Katherina A. and Mark A. Wyckoff, FAICP. Filling the Gaps: Environmental Protection Options for Local Governments, 2nd Edition. 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)

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

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]

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 high in speed and strong in 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

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.

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.

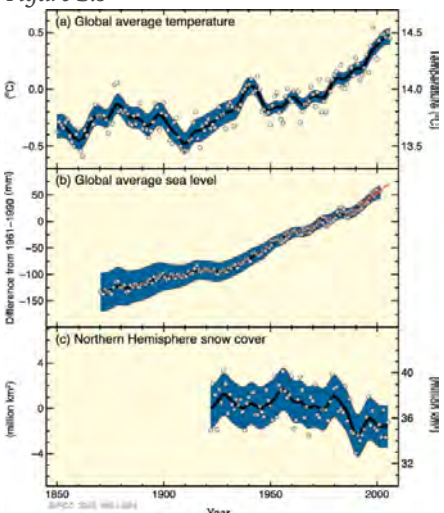
13 Dorr, J. A., and D. F. Eschman. 1970. Geology of the Great Lakes. Ann Arbor: University of Michigan Press.

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

Figure B.2 The shoreline in Grand Haven for various years, 2013 photo

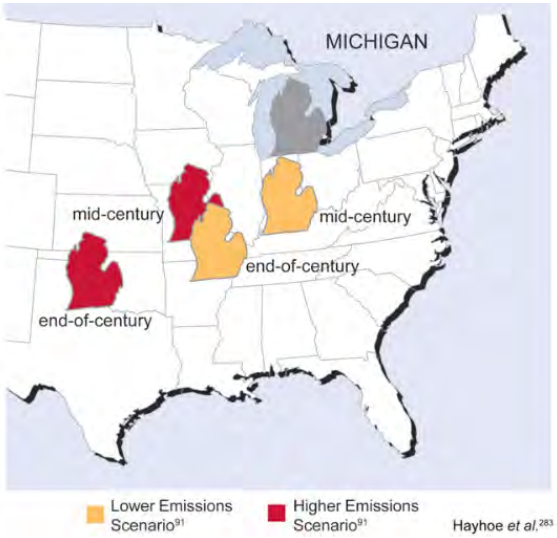
Source: Google Earth Pro, 2013 Imagery

Figure B.3



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

Figure B.4



Source: National Climate Assessment, 2009

change in water levels.[15] Figure B.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 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 century shows a trend toward warmer global temperatures, higher sea levels, and less snow cover in the Northern Hemisphere (see Figure B.3). Scientists 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 2.3 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

15 Ibid.

16 Intergovernmental Panel on Climate Change. (2007). Observed changes in climate and their effects. Web. Accessed July 2015.

17 Ibid.

18 Intergovernmental Panel on Climate Change (2013). What is a GCM? Web. Accessed July 2015.

19 Great Lakes Integrated Sciences and Assessments (2015). Temperature. Web. Accessed July 2015.

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 B.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]

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]

Hurricane Sandy caused an estimated 755 billion dollars worth of damage in 2012. The impacts of this Hurricane were felt on Lake Michigan, causing waves up to 33 feet.

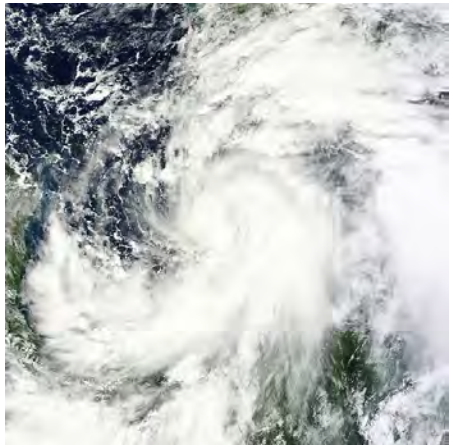


Photo Source: NASA 2012

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.

25 Great Lakes Integrated Sciences and Assessments. Climate Change in the Great Lakes Region. GLISA, 2014. Web. Accessed July 2015.

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.

28 Dinse, Keely. Preparing for Extremes: The Dynamic Great Lakes. Michigan Sea Grant. Web. Accessed July 2015.

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.

Damage from a 1989 storm in Grand Haven.

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, a project team from the University of Michigan has collaborated with LIAA, with funding from the University of Michigan Water Center, to identify and analyze hazard areas and work with community groups to plan

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.

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.

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.

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 Maigret (UM Architecture); Guy Meadows (Michigan Tech Great Lakes Research Center); Paul Webb (UM School of Natural Resources and Environment); and Lan Deng (UM Urban and Regional Planning).

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 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

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:

Table B.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

- 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]

40 FEMA (2013). Great Lakes Coastal Flood Hazard Studies. Web. Accessed July 2015.

41 FEMA (2005). Floodplain Management Requirements: A Study Guide and Desk Reference for Local Officials. Web. Accessed July 2015.

42 FEMA. https://www.fema.gov/media-library/assets/documents/26319

43 Ibid.

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 B.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 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

44 FEMA (2013). Great Lakes Coastal Flood Hazard Studies. Web. Accessed July 2015.

45 EDEN Inc. (2014). Flood Premiums Rising Dramatically. Web. Accessed July 2015.

46 Environmental Protection Agency (2001). Functions and Values of Wetlands: Wetland Fact Sheet. Web. Accessed July 2015.

47 Ibid.

48 Ibid.

49 Ibid.

50 Ardizone, Katherina A. and Mark A. Wyckoff, FAICP. Filling the Gaps: Environmental Protection Options for Local Governments, 2nd Edition. 2010.

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.

A property owner must obtain a permit from the State before building 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]

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.

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.

58 Maryland Department of the Environment. Wetland Disturbance and Impact. Web. Accessed July 2015.

59 Ibid.

- 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

60 Ardizone, Katherina A. and Mark A. Wyckoff, FAICP. Filling the Gaps: Environmental Protection Options for Local Governments, 2nd Edition. 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. 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. 2010.

66 Ibid.

67 Ibid.

68 Ibid.

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 deposition 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 adminsters 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

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.

71 Ardizone, Katherina A. and Mark A. Wyckoff, FAICP. Filling the Gaps: Environmental Protection Options for Local Governments, 2nd Edition. 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. 2010.

76 Ibid.

77 Ibid.

78 Ibid.

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

79 Ibid.

80 Ibid.

81 Ibid.

82 Ibid.

83 Ibid.

84 Ibid.

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 above sea level for Lake Michigan. 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 above sea level for Lake Michigan.

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 with regard to access along the shore. 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 and 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 B.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

85 Glass v. Goeckel. Michigan Supreme Court. 29 July 2009

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 B.1 at the end of this Appendix.

Table B.2 Research Framework

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

- "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 substantially damaged, and in some instances 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 B.2 at the end of this Appendix 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 substantially damaged, and in some instances completely destroyed. The Perfect Storm Climate Future also accounts for riverine flooding. Map B.3 at the end

of this Appendix shows a Perfect Storm flood projection.

MANAGEMENT OPTIONS

1. Current Structures and Infrastructure

   Under this option, the Grand Haven Community will continue to manage land in the same manner it currently 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 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 Map B.4 at the end of this Appendix 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 Map B.4 at the end of this document 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 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 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 forseeable future regarding flooding and local government management options. Each scenario has a different impact on the land use 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 B.3 shows the total acres of land impacted under each future flood forecast in Grand Haven Township.

Table B.3 Total Land Acres Impacted by Flooding

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

PARCELS IMPACTED BY FLOODING

As Table B.4 shows on the next page, 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 additional 5% (37 parcels) are zoned agricultural, and nearly 3% (19 parcels) are zoned for Planned Unit Development.

Table B.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%

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 B.5, B.6, and B.7 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 B.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 implemented

Table B.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

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 B.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 B.8, B.9, and B.10 either are, or are likely to be, a wetland. Table B.7 shows the innundation of existing wetlands is relatively

Table B.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%

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 B.8, B.9, and B.10.

Potential wetlands are areas with hydric soils, are not currently developed, and have been identified by the National Wetland Inventory as potential wetland restoration areas. Table B.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 B.11, B.12, and B.13.

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 B.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 B.14, B.15, and B.16.

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 B.17 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 the orange and purple points in Map B.17.

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 B.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 (i.e., not including private property) in each flood zone. Map B.18 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.

Table B.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%

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 shown in Map B.19. Table B.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.

Table B.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%

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

86 Flinker, AICP (2010). The Need to Reduce Impervious Cover to Protect Water Quality. Web. Accessed July 2015.

the future, we were able to provide some insight into parcels that may be developed in or near Critical Dune Areas (Maps B.20 and B.21).

Table B.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%

Table B.10 shows that relatively few acres of Critical Dune Area would be impacted by flooding in any 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 B.20 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 B.21 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 B.22 shows 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 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 Management 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 mantain 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%).

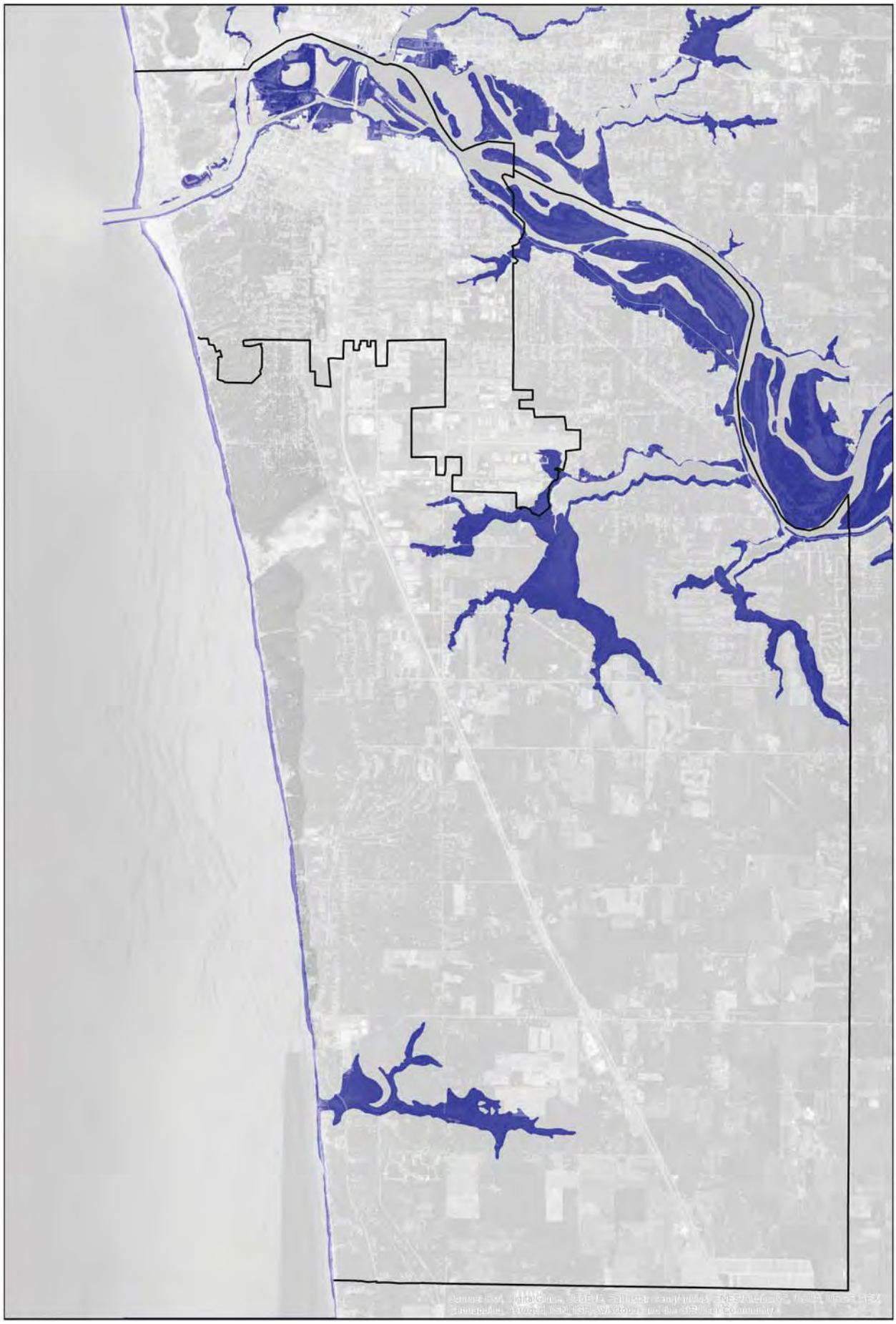
kk. Adopt lakeshore setbacks to regulate tree cutting, mowing, and fertilizer use.

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.

Map B.1 "Lucky" Climate Future



"Lucky" Flood Scenario

1:42,000 0 0.25 0.5 1 1.5 2 Miles

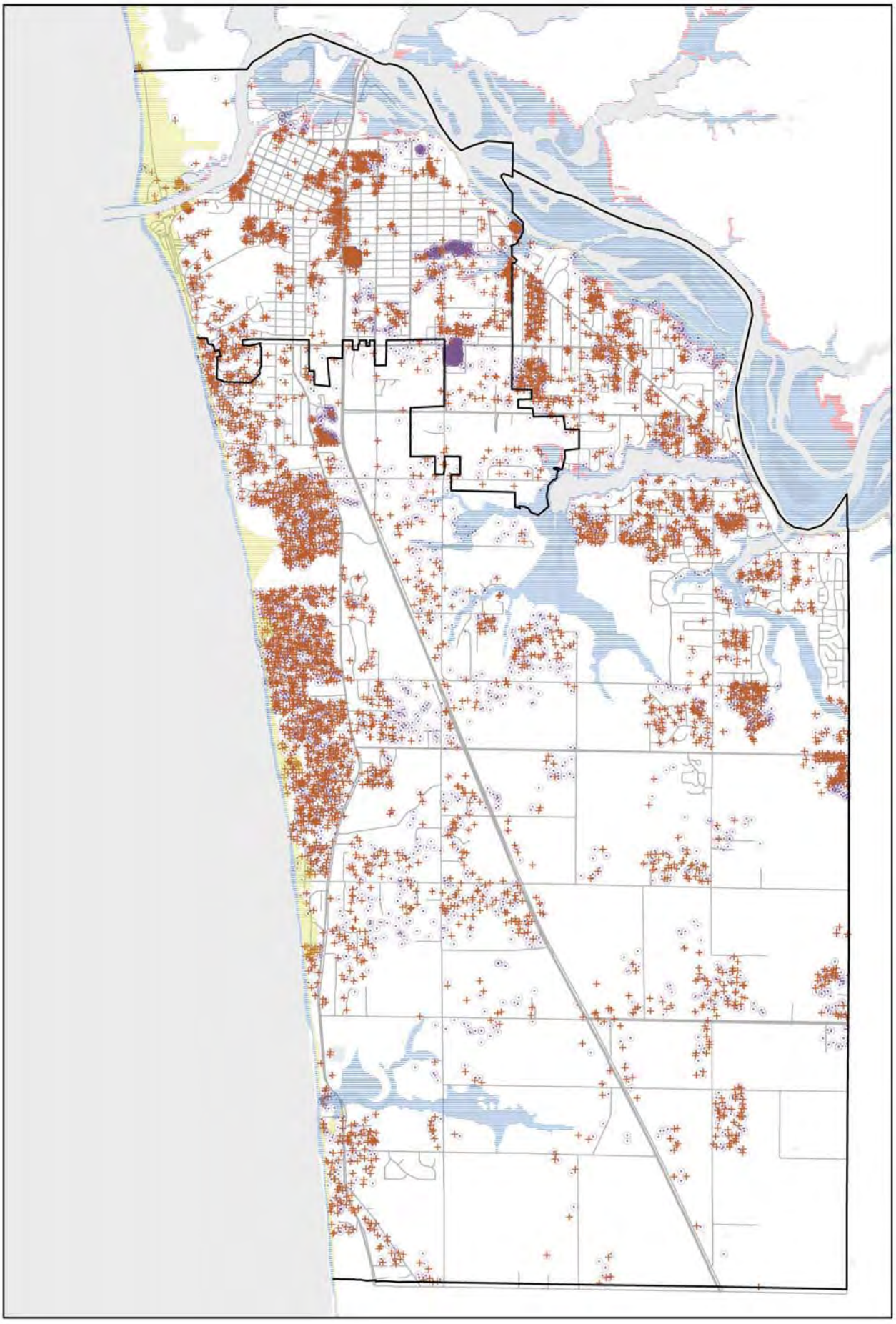
Map B. 2 "Expected" Climate Future

Map B.3 "Perfect Storm" Climate Future

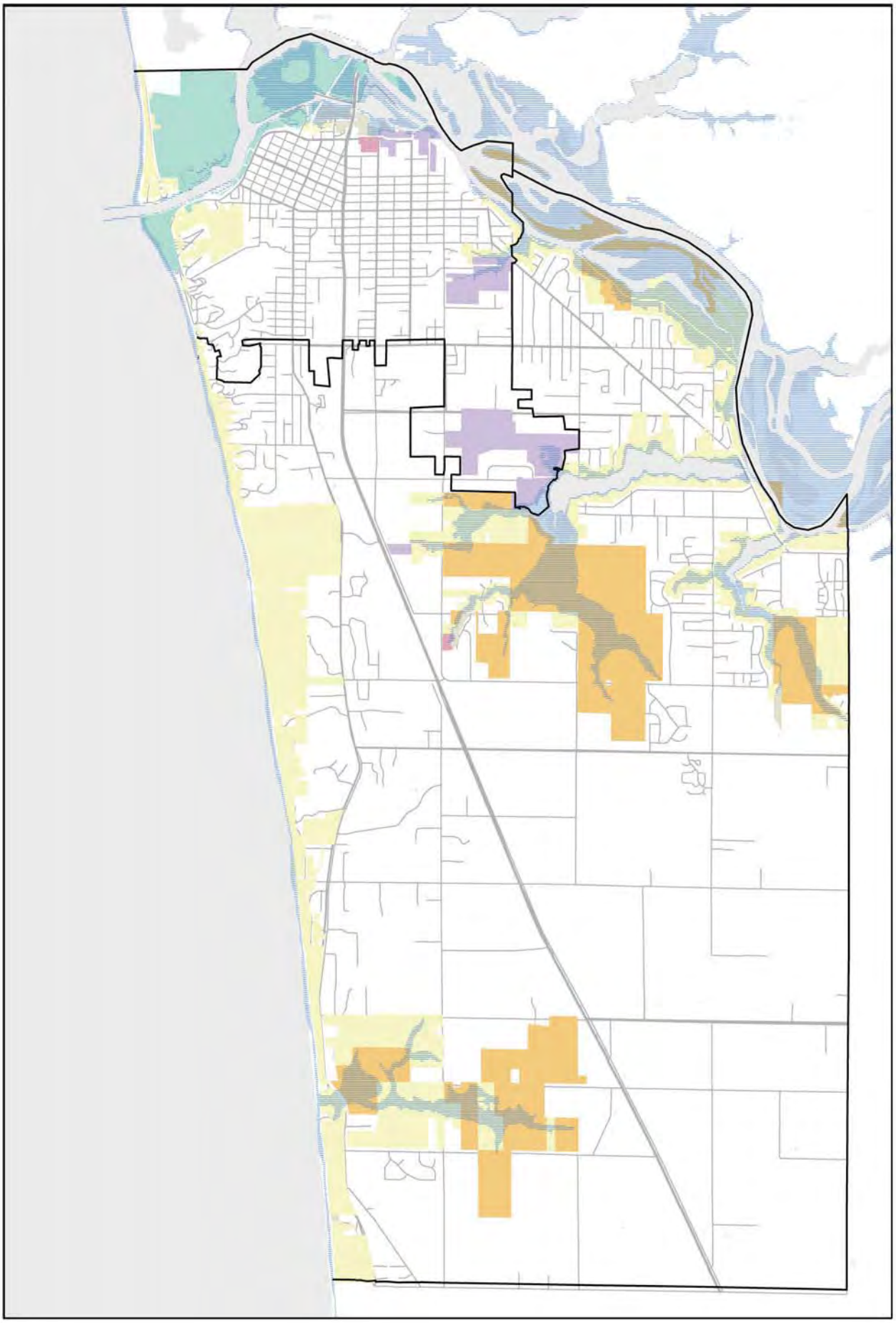
"Perfect Storm" Flood Scenario

1:42,000 0 0.25 0.5 1 1.5 2 Miles

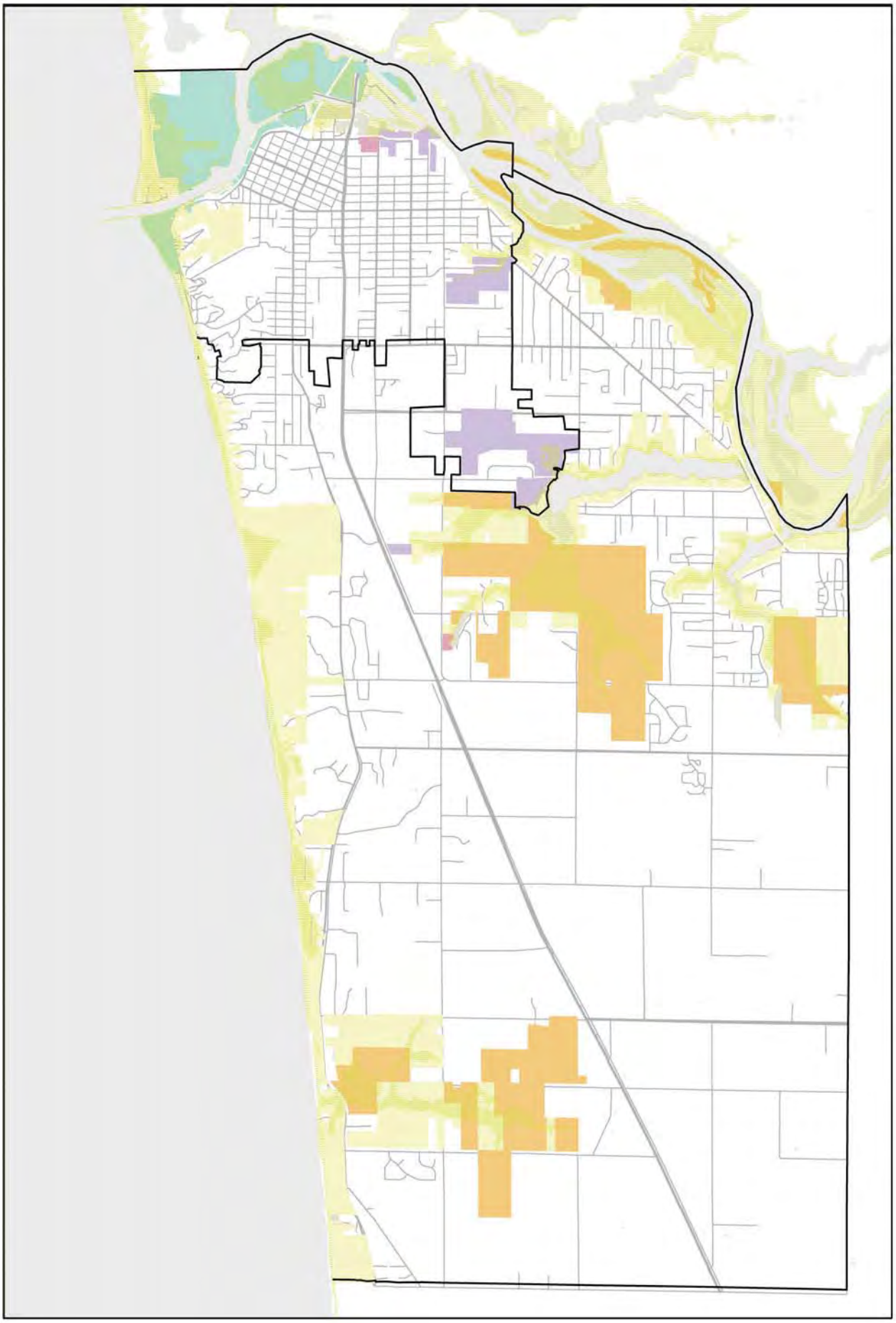
Map B.4 Build-out Management Options and Climate Futures



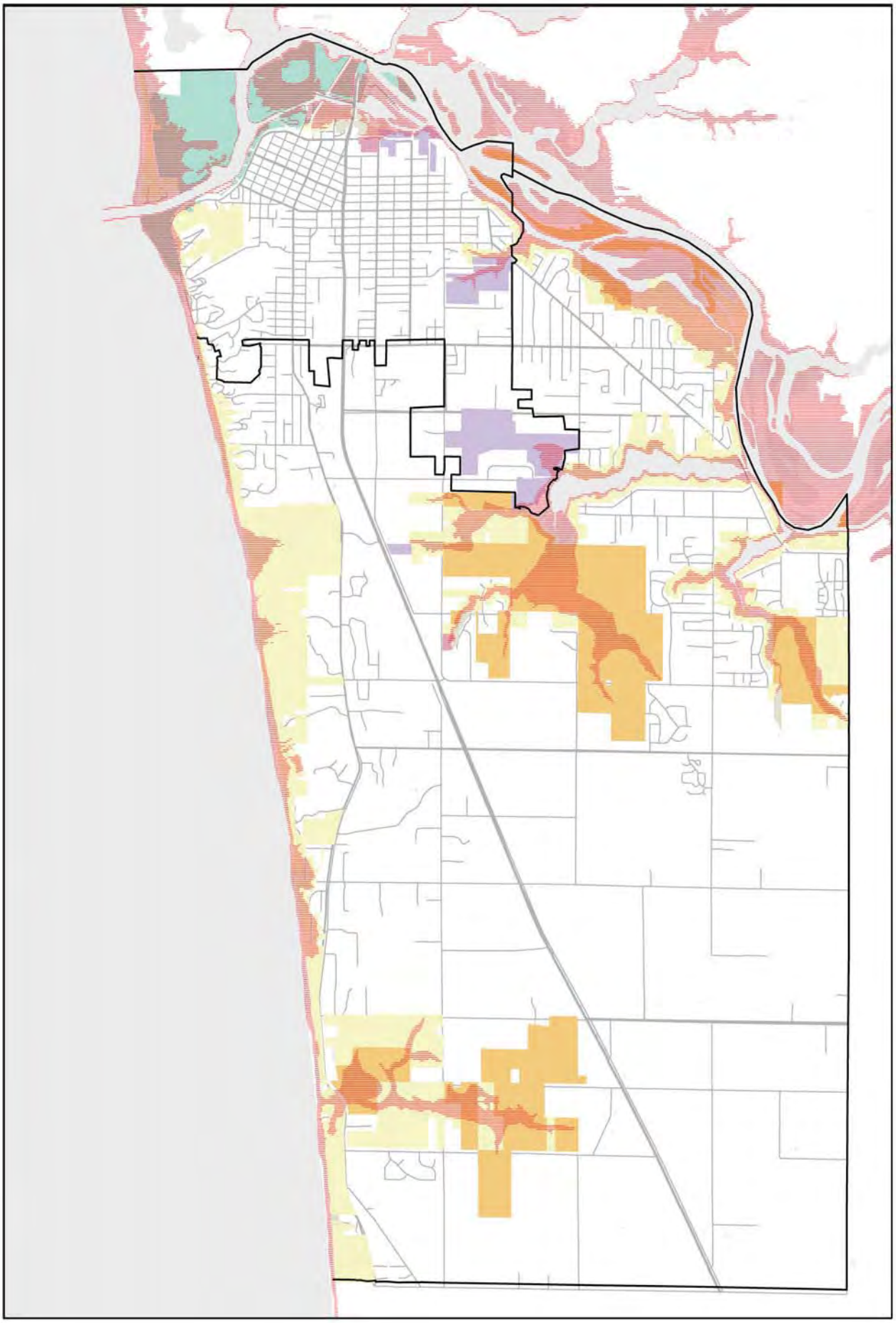
Map B.5 Parcels Affected in the "Lucky" Climate Future



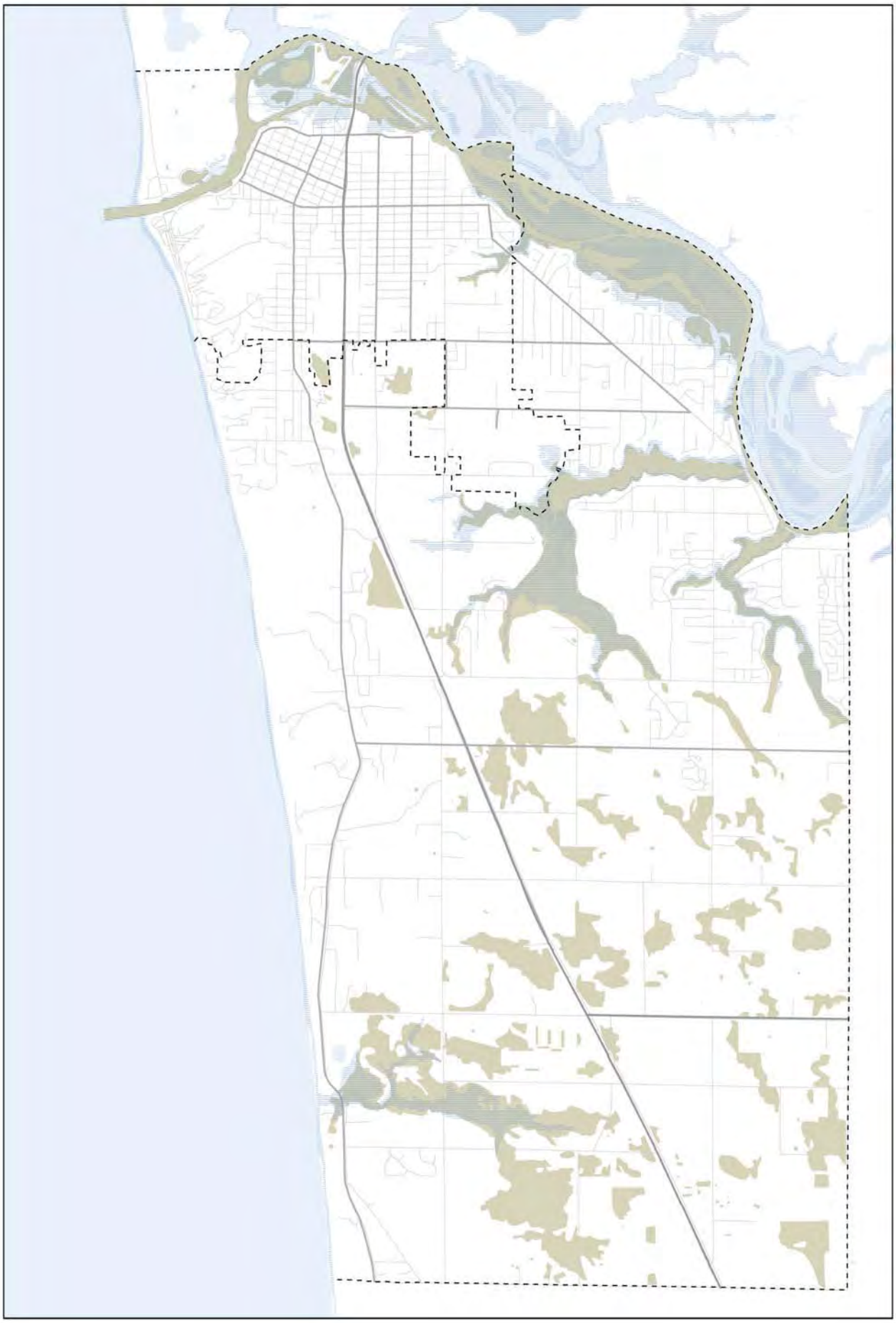
Map B.6 Parcels Affected in the "Expected" Climate Future



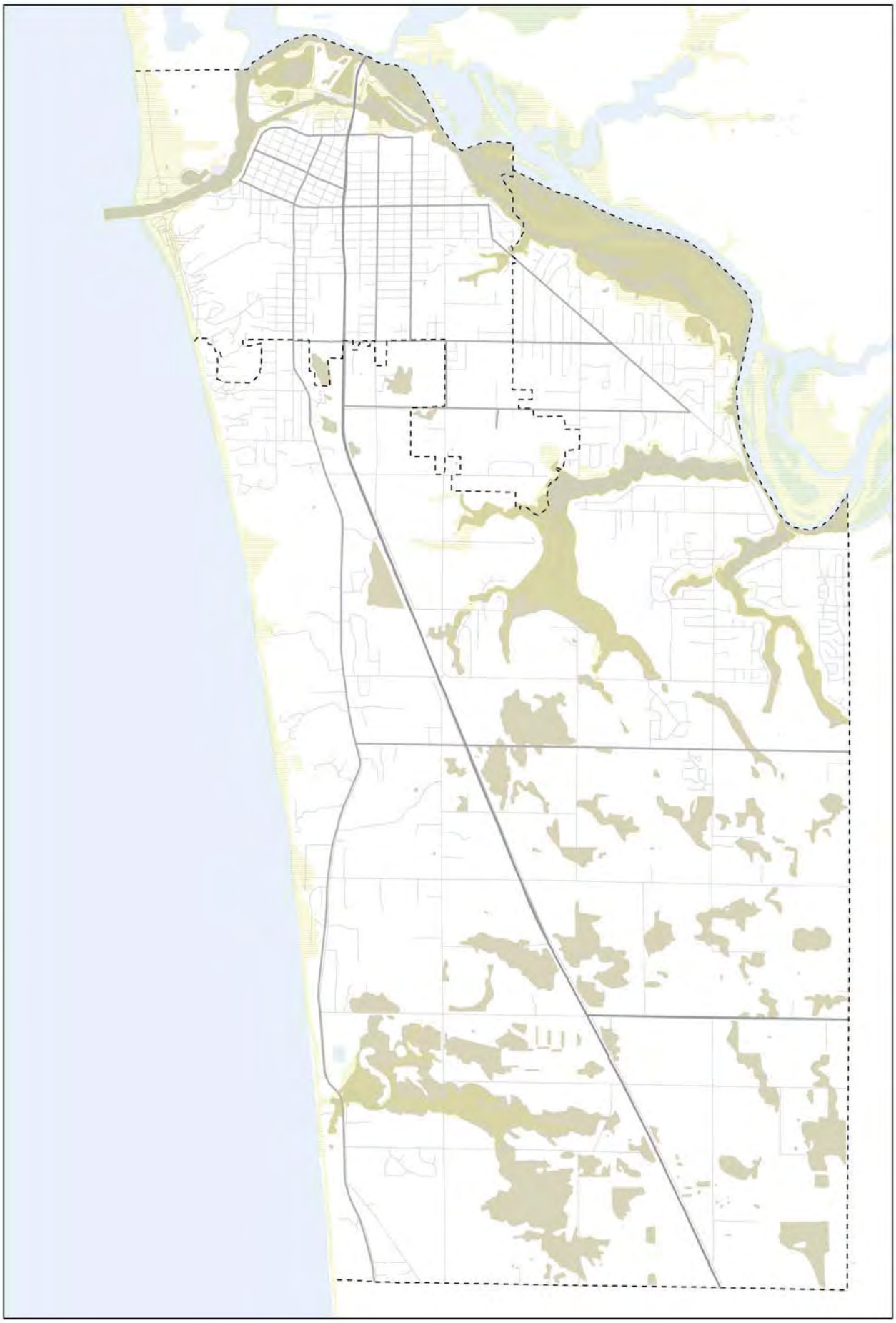
Map B.7 Parcels Affected in the "Perfect Storm" Climate Future



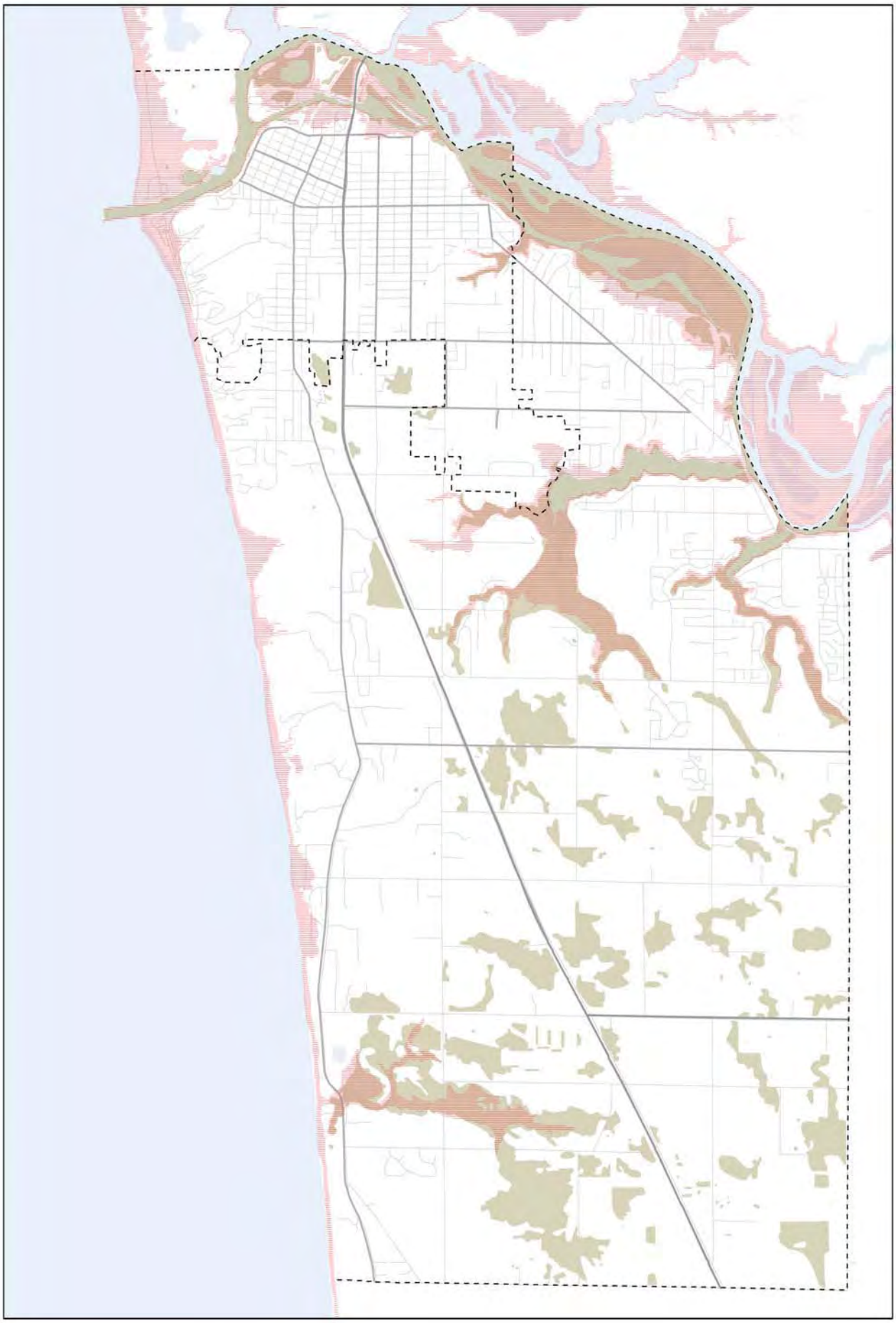
Map B.8 Existing Wetlands under "Lucky" Climate Future



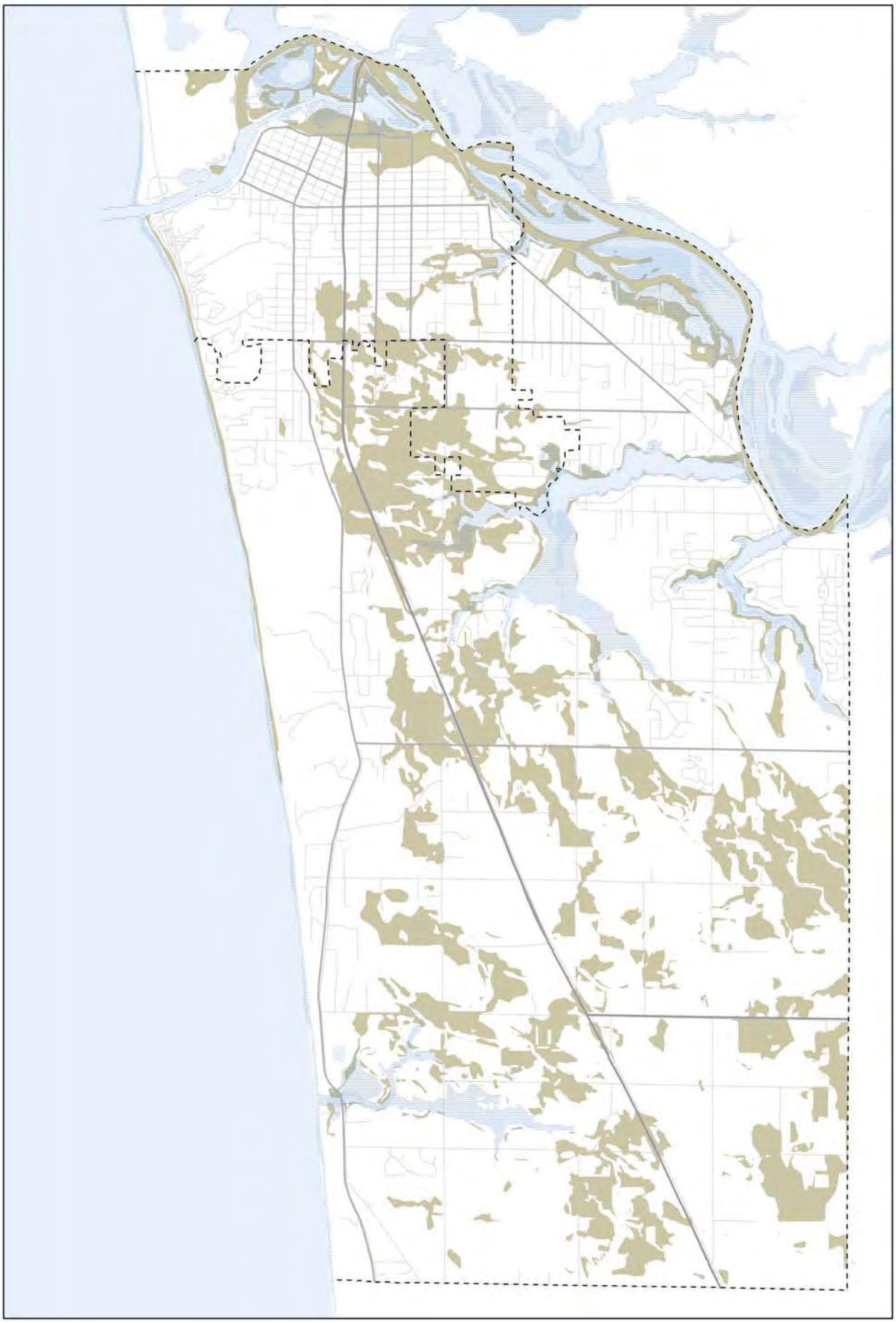
Map B.9 Existing Wetlands under "Expected" Cimate Future



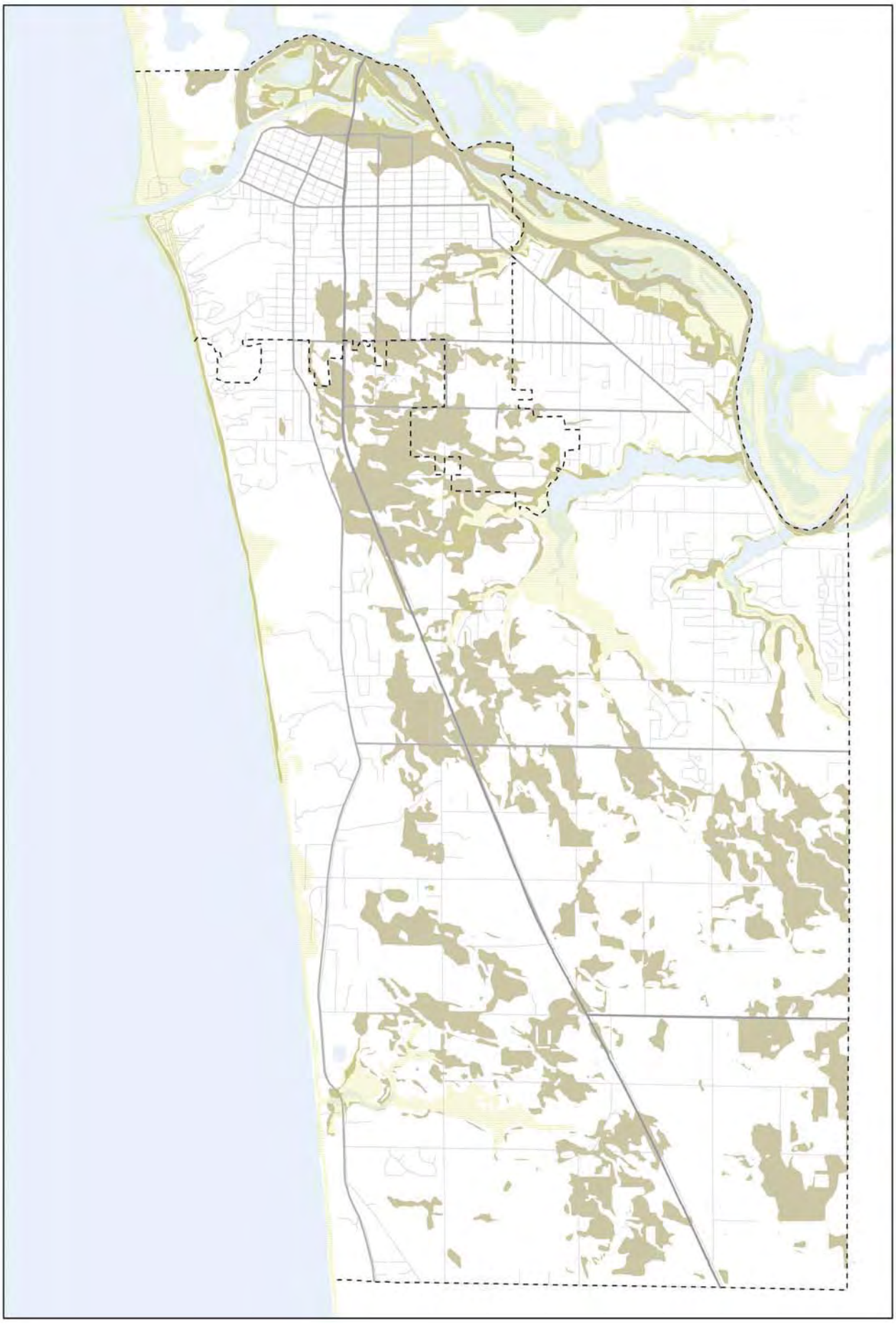
Map B.10 Existing Wetlands under "Perfect Storm" Climate Future



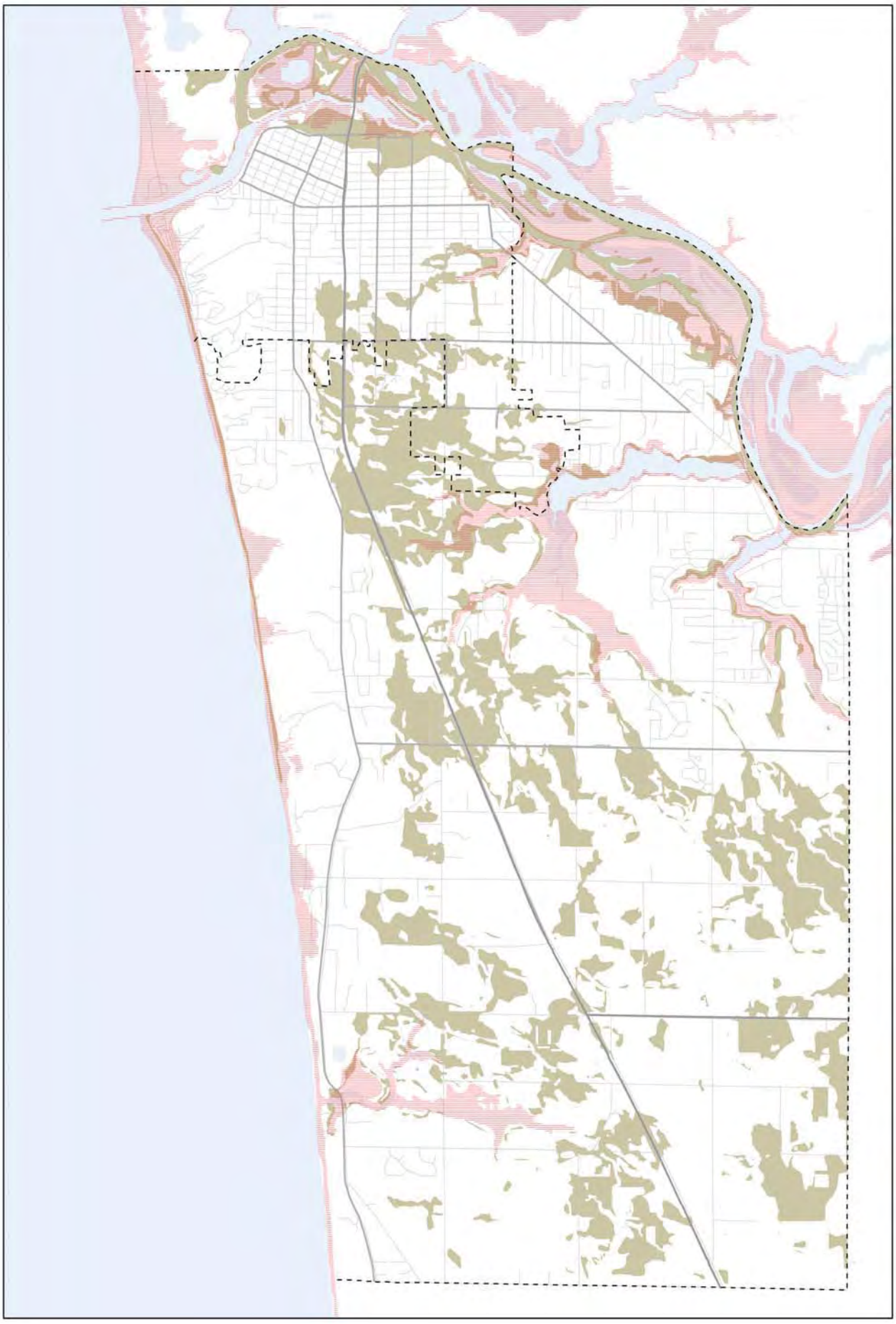
Map B.11 Potential Wetlands under "Lucky" Climate Future



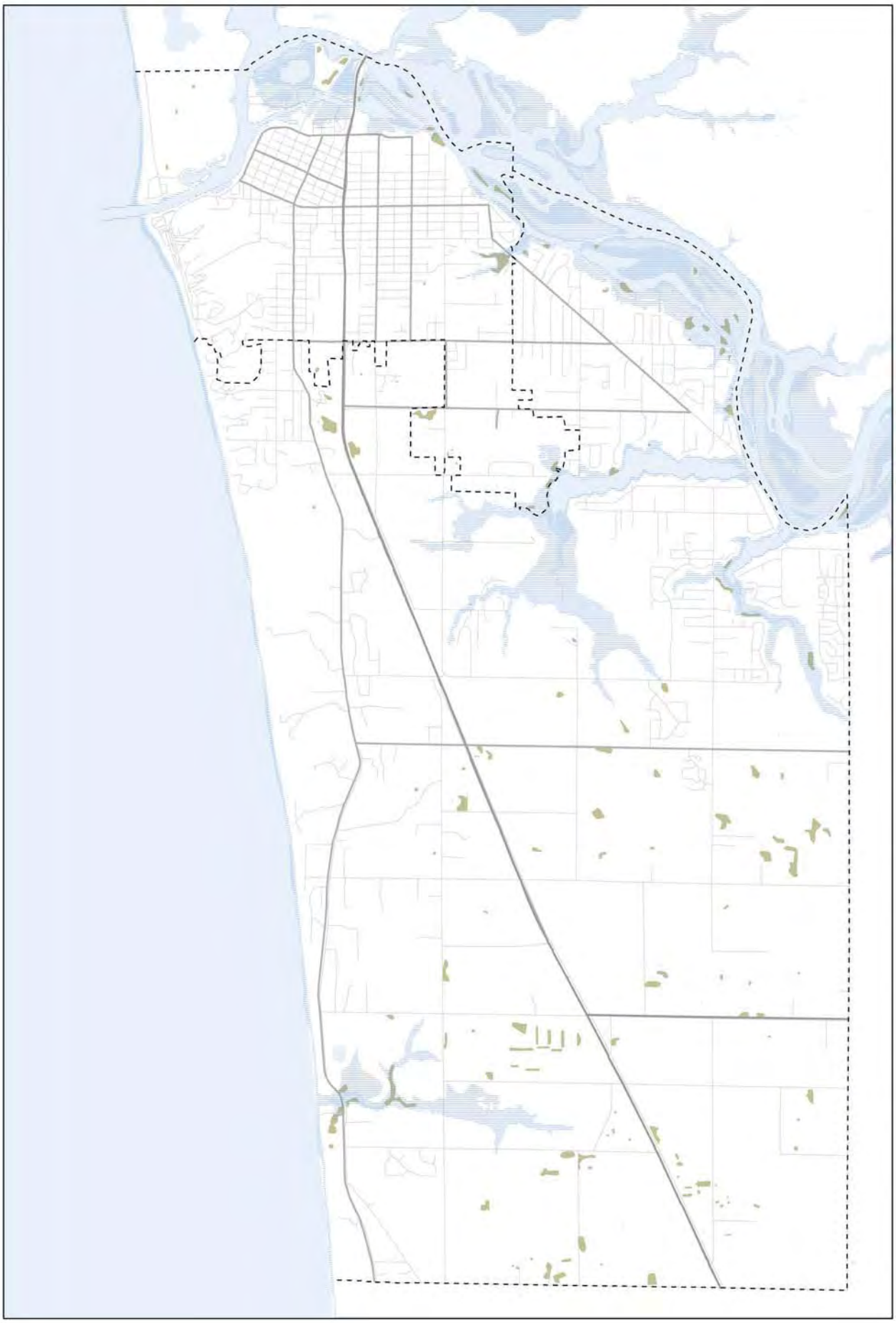
Map B.12 Potential Wetlands under "Expected" Climate Future



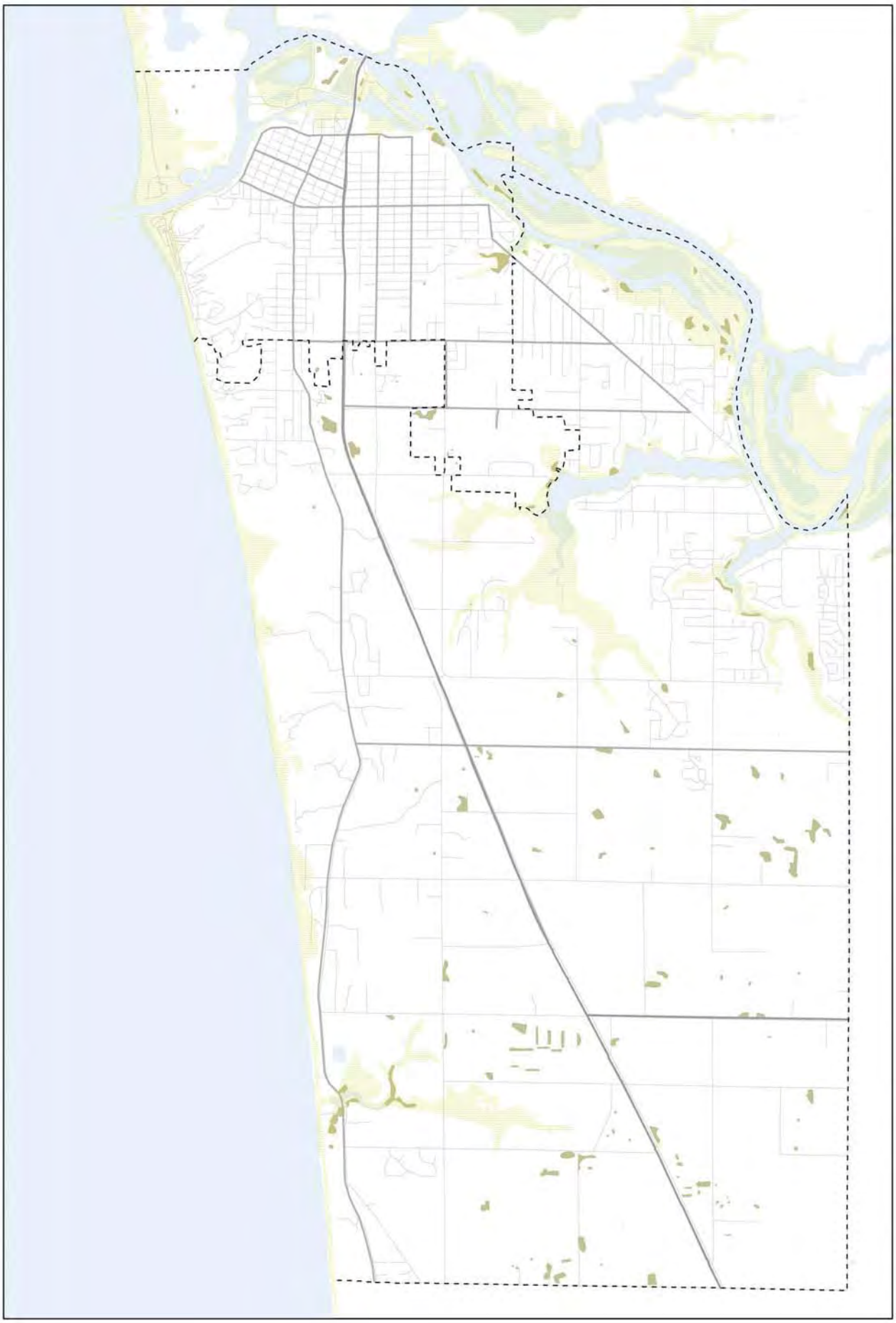
Map B.13 Potential Wetlands under "Perfect Storm" Climate Future



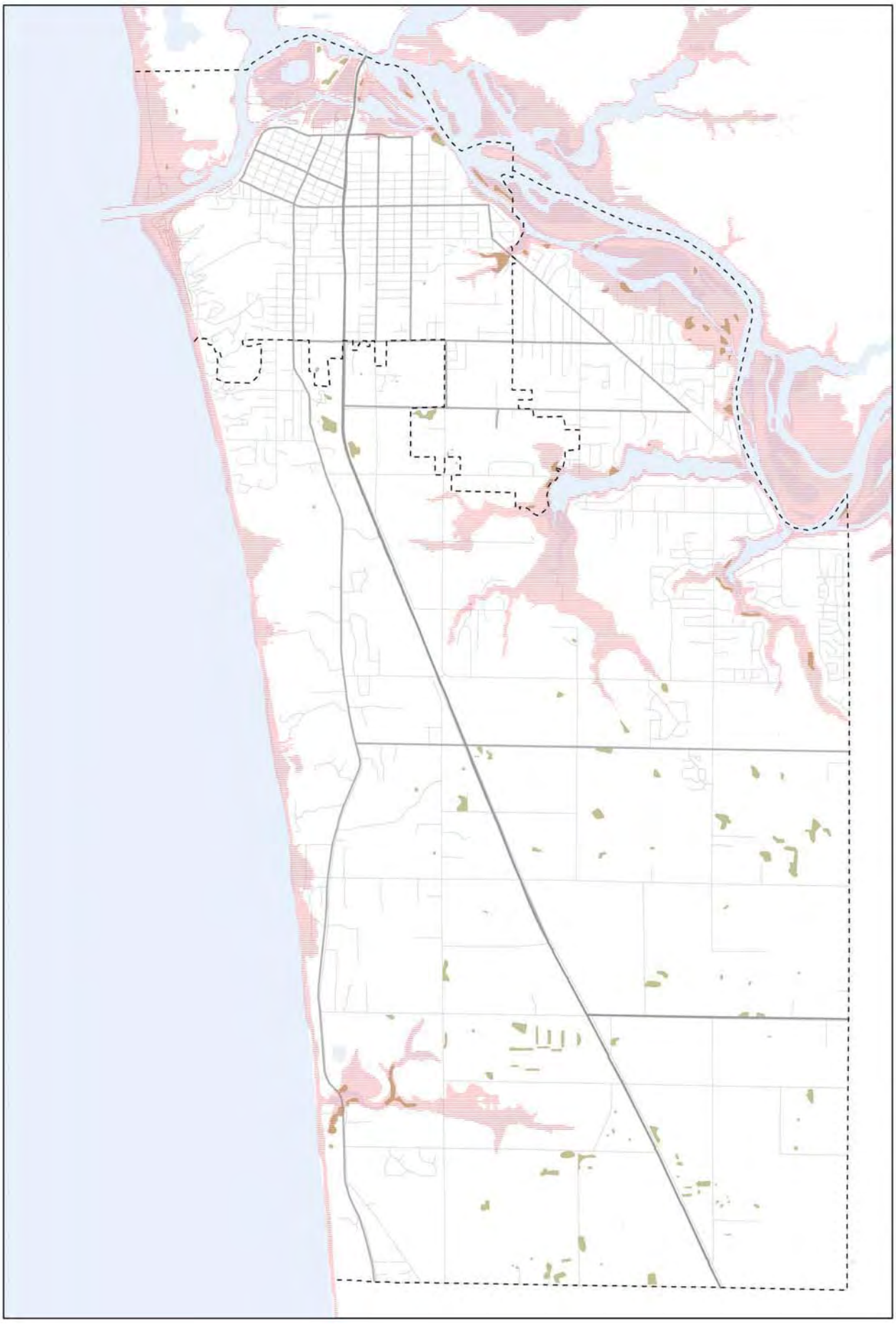
Map B.14 Existing Wetlands under 5 Acres under "Lucky" Climate Future



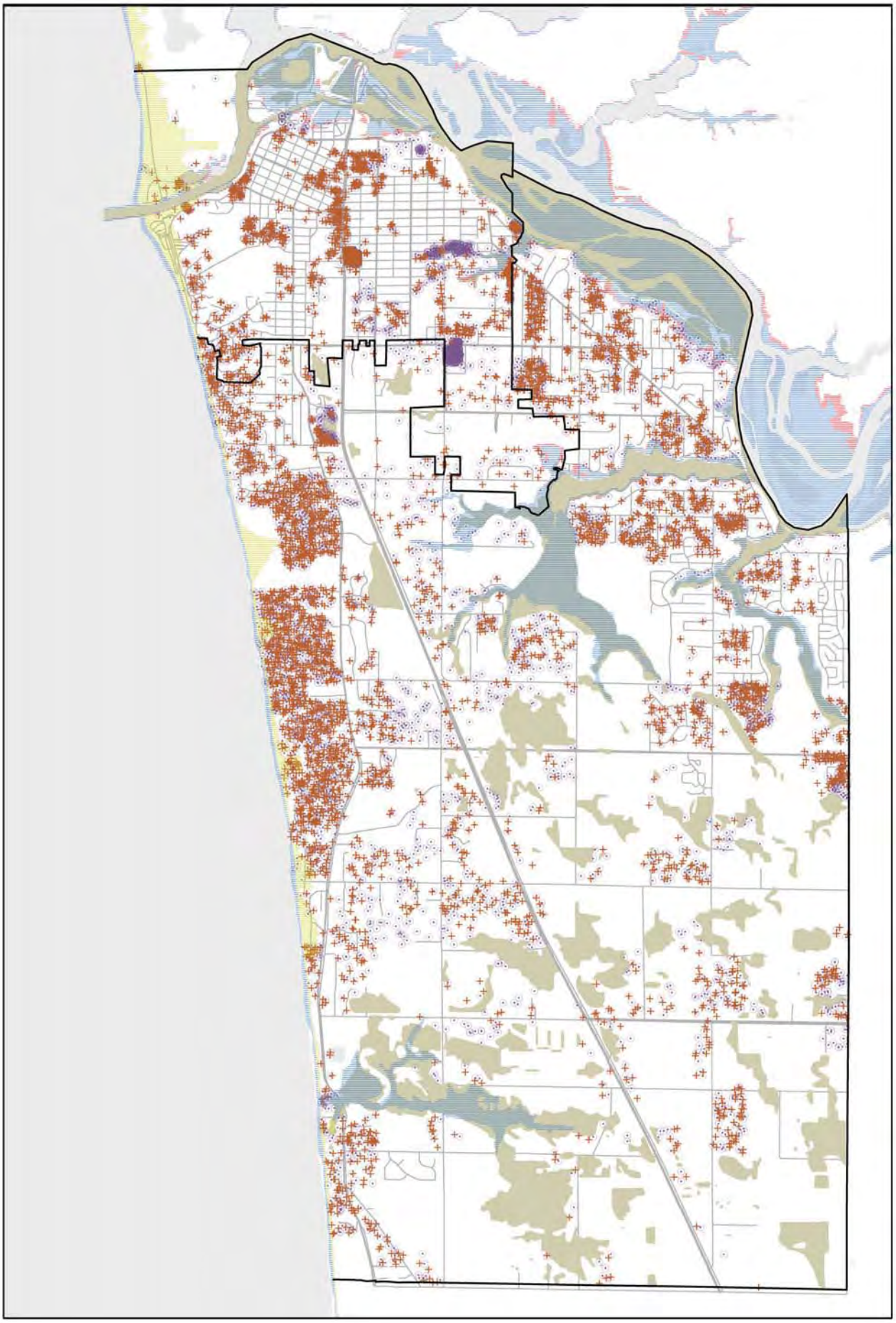
Map B.15 Existing Wetlands under 5 Acres under "Expected" Climate Future



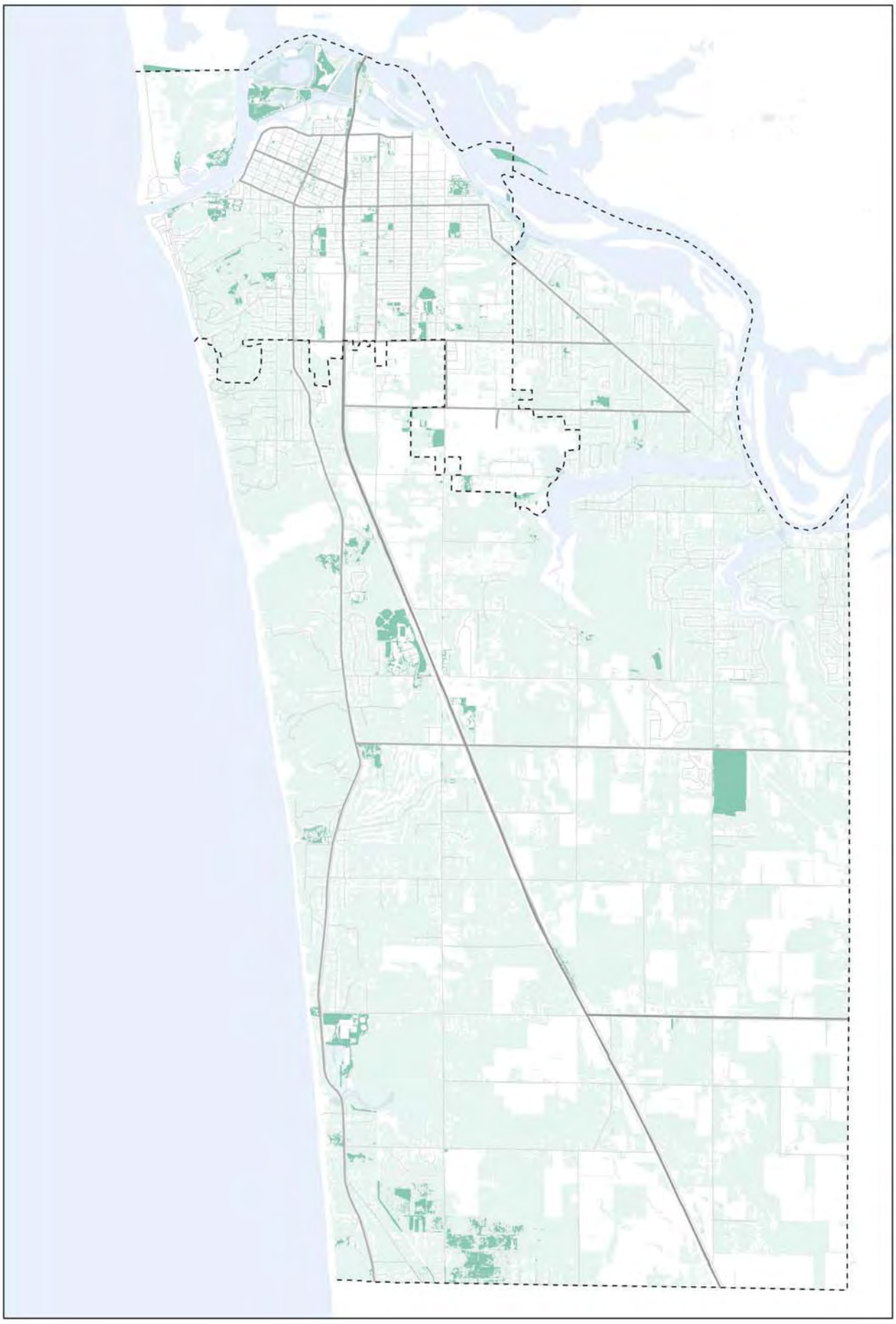
Map B.16 Existing Wetlands under 5 Acres under "Perfect Storm" Climate Future



Map B.17 Existing Wetlands with Climate Futures and Management Options

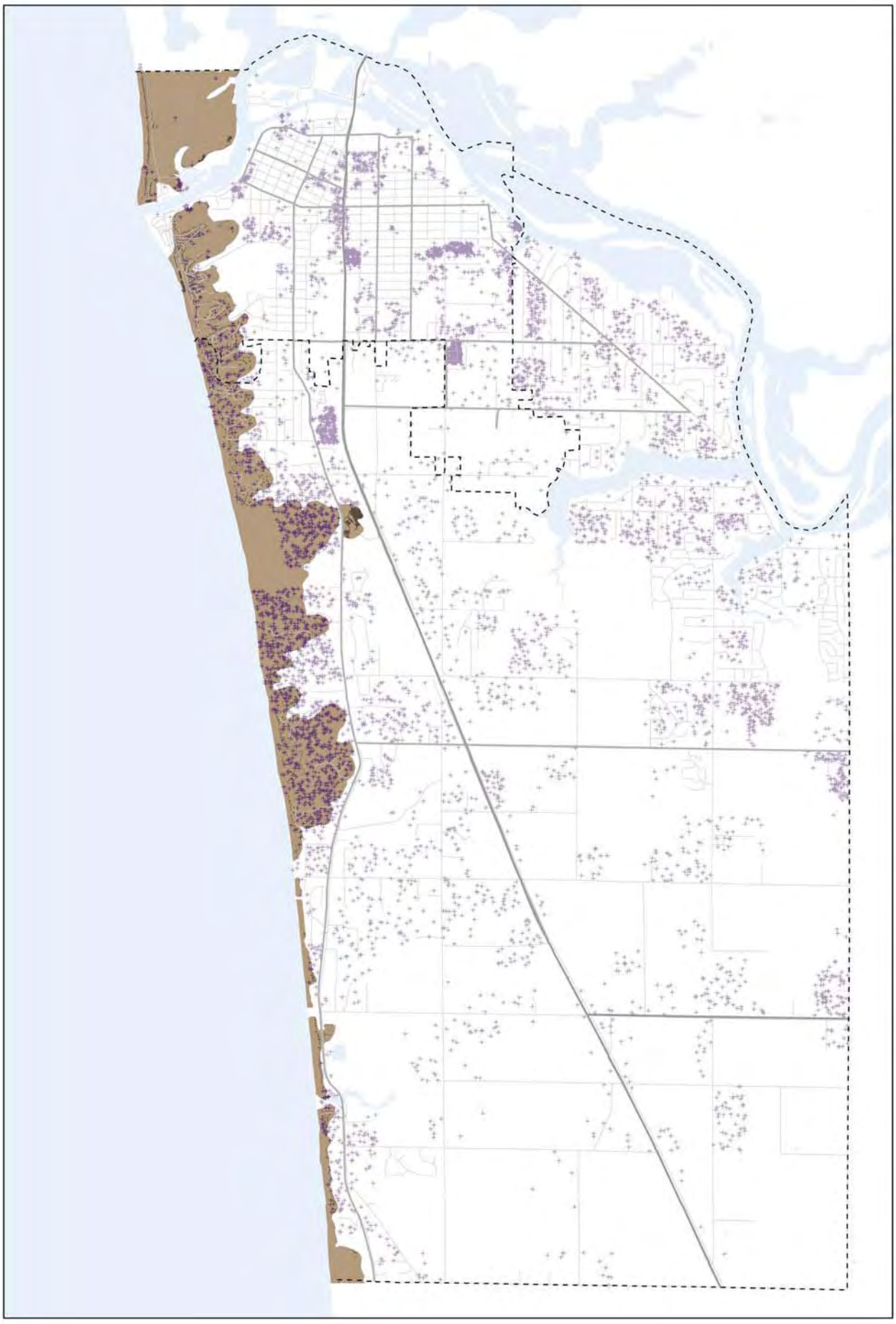


Map B.18 Existing and Potential Tree Canopy

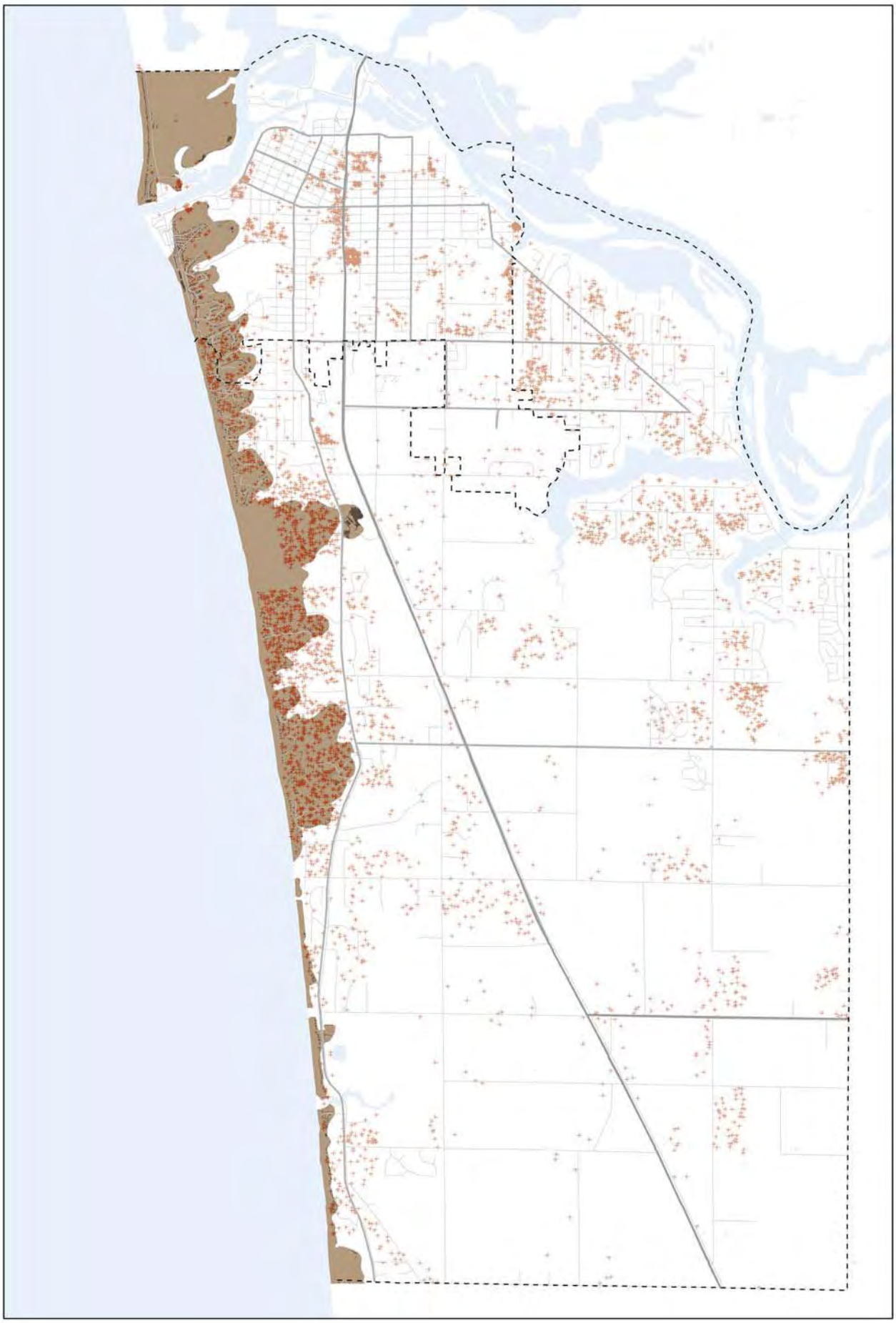


Map B.19 Impervious Surface under Climate Future Scenarios

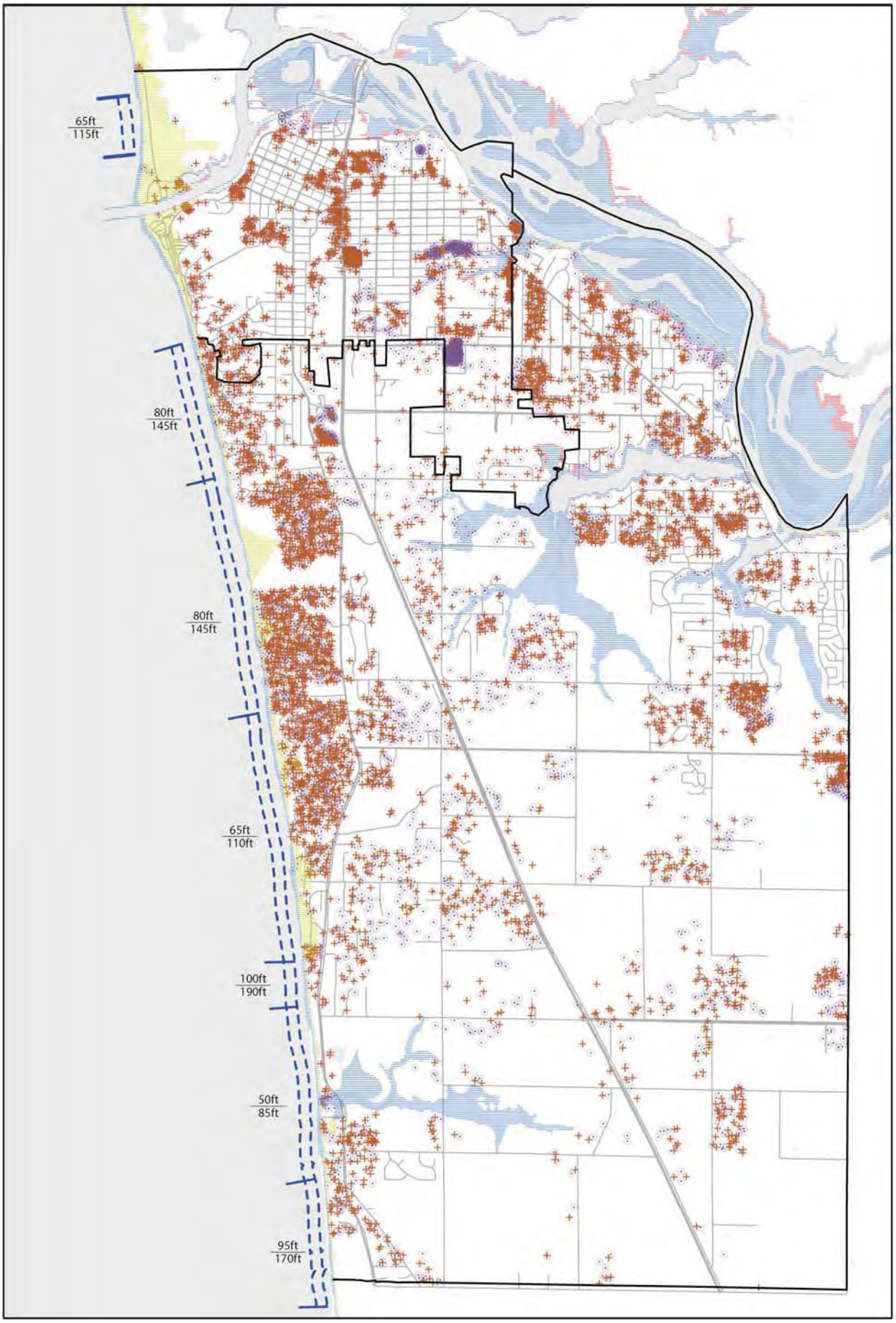
Map B.20 auild-out According to Current Zoning and Critical Dune Areas



Map B.21 Build-out According to Best Management Practices and Critical Dune Areas



B. 22 High Risk Erosion Area and Climate Futures



APPENDIX C. DEFINING VULNERABILITY IN THE GRAND HAVEN COMMUNITY

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 quickly adapt 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 every community is unique and not all indicators or characteristics are needed to be "resilient."

Community master planning processes 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.

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

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.

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.

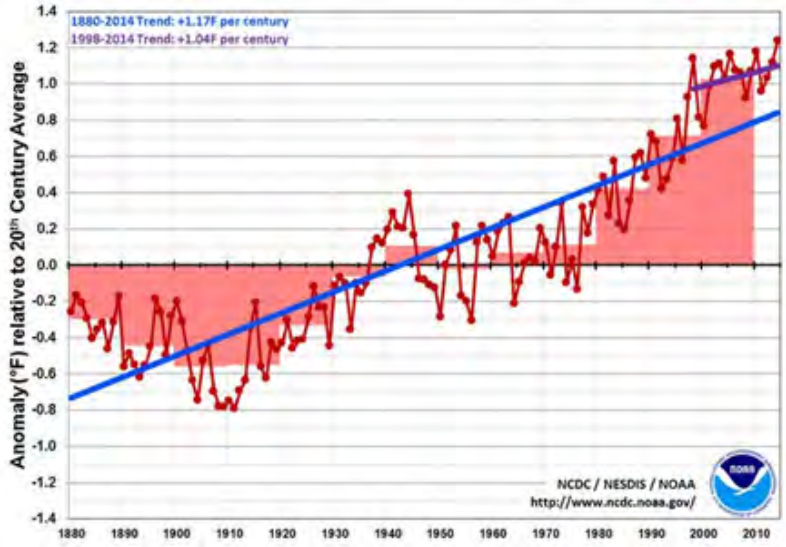
In completing the assessment, factors such as demographics, environmental conditions, locations of critical facilities and essential services, and the built environment were considered. This assessment informs recommendations throughout this Master Plan.

CLIMATE CHANGE AND VARIABILITY

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 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.*

Figure C.1. Annual Global Temperature (Combined Land and Ocean)



Source: NOAA, http://www.ncdc.noaa.gov/

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 combined average air and ocean temperatures around the globe (Figure C.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 C.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, with Lake Ontario experiencing the greatest loss.[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 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

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.

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:

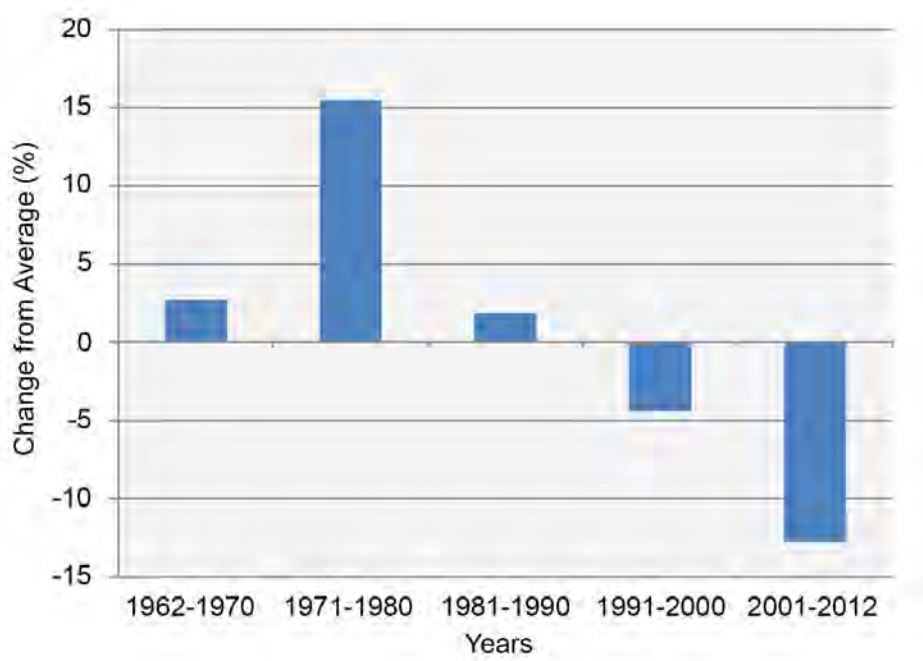
- Storms are expected to become more frequent and more severe.
- Increases in winter and spring precipitation
- Less precipitation as snow and more as rain
- Less winter ice on lakes
- Extended growing season (earlier spring/later fall)
- Greater frequency and intensity of storms
- More flooding events 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 droughts 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 positive and negative effects on the Grand Haven Community.

What About the Winters of 2014 & 2015?

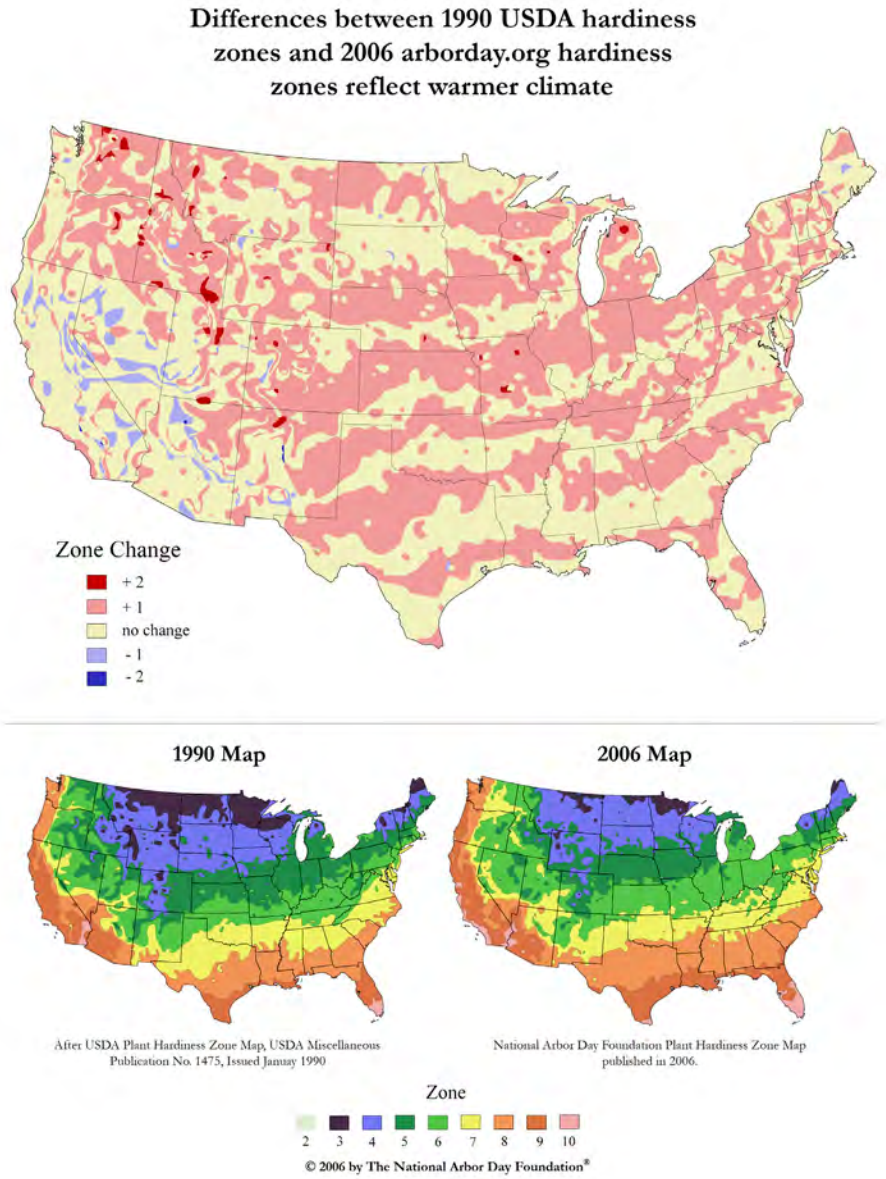
Remember, weather reflects the short-term conditions of the atmosphere while climate is the average daily weather for an extended period of time. This difference was never more evident in Michigan than over the last two years. Although most of the Great Lakes froze during the winters of 2014 and 2015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

Figure C.2 Great Lakes Ice Cover Decline



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

Figure C.3. Hardiness Zones



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

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 C.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.

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 100 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 C.4. Severe Weather Events Timeline

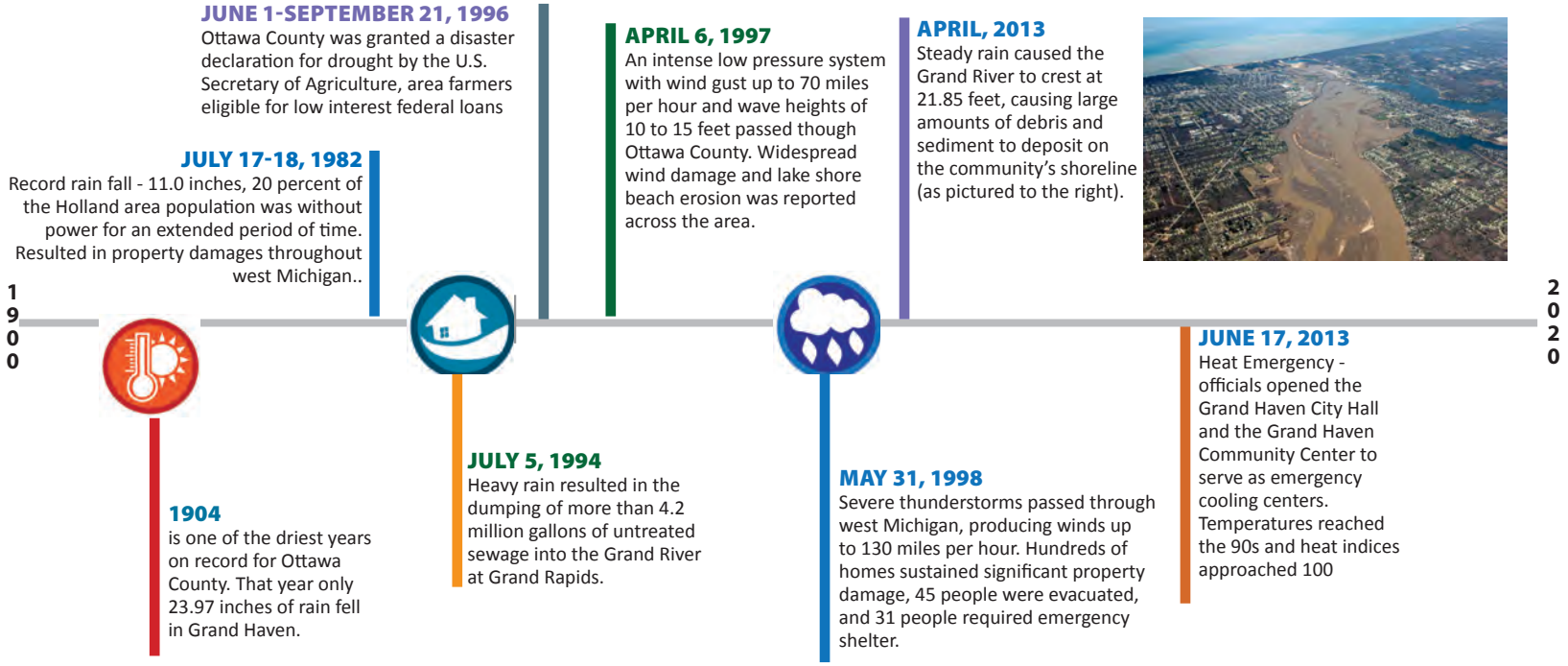
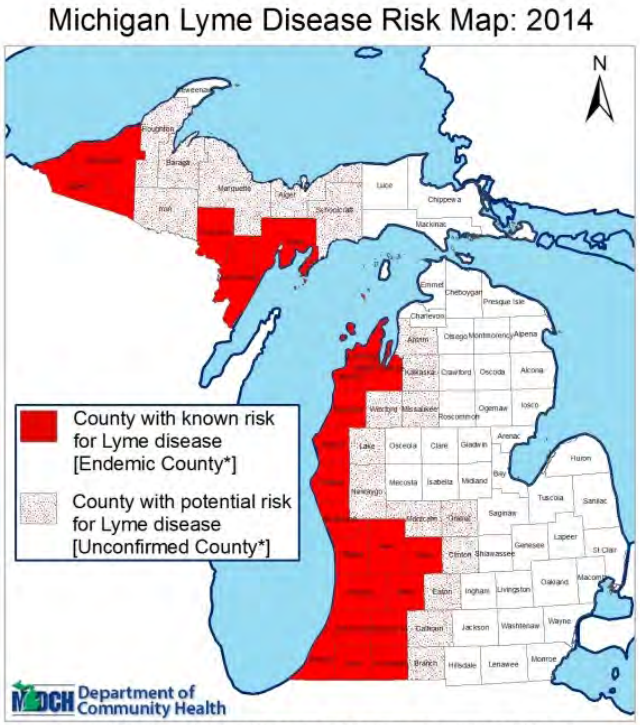


Figure C.4. Distribution of Lyme Disease Risk in Michigan



Source: MDCH 2014, Disease and Special Projects Section

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, security, and supply. For example, backlegged 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 the number of cases reported will continue to increase due to public and medical personnel education, and expanding tick ranges. Figure C.4 illustrates the distribution of the risk for lyme disease 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 focuses on Grand Haven Charter Township and the City of Grand Haven.

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 NAACP,[9]

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

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)

vulnerability and its relationship to adaptation,[10] 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 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 2009-2013 American Community Survey (ACS). This data includes information on housing, income, and education characteristics of the populations in geographic areas called Census 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 data was obtained from Ottawa County and tree canopy cover was 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.

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.

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
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.

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:

- People over 65 years of age
- People living alone
- People over 25 with less than a high school education
- Minority populations
- 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 C.1) depicts the relative concentration of older adults in the community by Census Block.

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 Street 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 (Census Blocks with no population were not included). Map C.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

[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.

downtowns generally have a greater supply of live-work units, single apartments, and condominium 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 C.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 C.4).

Similarly, the 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 C.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 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 could 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 C.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

[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.

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 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 sunshine which 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 and 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 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, two separate exposure maps were created. The first exposure map

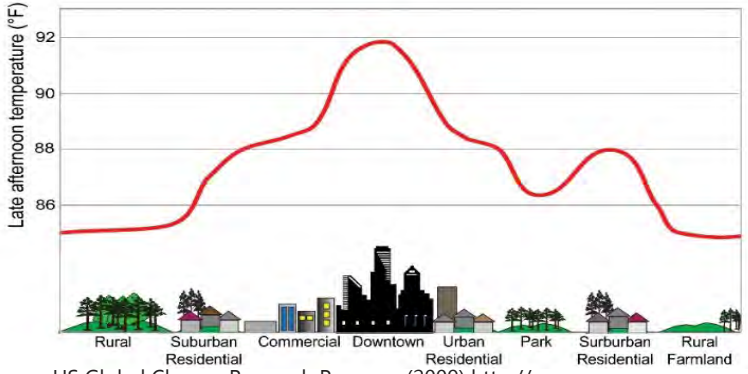
[19] Mapping Community Determinants of Heat Vulnerability. Environ Health Perspectives 117:1730–1736 (2009). doi:10.1289/ehp.0900683 available via http://dx.doi.org/ [Online 10 June 2009]
[20] Basu and Samet. (2002) Relation between Elevated Ambient Temperature and Mortality: A Review of the From the Department of Epidemiology, Bloomberg School of Public Health, Johns Hopkins University, Baltimore, MD.
[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]

depicts the percentage of impervious surfaces within each Census Block, as used in the sensitivity assessment (Map C.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 a rating of 5 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 C.8) and scored using a similar five category process. As illustrated on Map C.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 C.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.

Figure C.5 Urban Heat Island Effect



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

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 C.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 22 to 27 (red) have residential populations that may be particularly vulnerable to extreme heat events.

HEAVY RAIN AND FLOODING

Climate models suggest 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 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, collapse or move, 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 C.6 illustrates recommendations

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.

from FEMA for retrofitting homes to make them more resilient to flooding events.

EXPOSURE TO FLOODING HAZARDS

The Digital Elevation Model Map (Map C.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 red colors identify the highest elevations.

The Federal Emergency Management Agency (FEMA) develops Flood Insurance Rate Maps (FIRMs) for may counties in the United States (see Map 5.6 in Appendix D). 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 percentages are only probabilities, not forecasts.

Figure C.6. FEMA recommendations for retrofitting homes to make them more resilient to flooding events

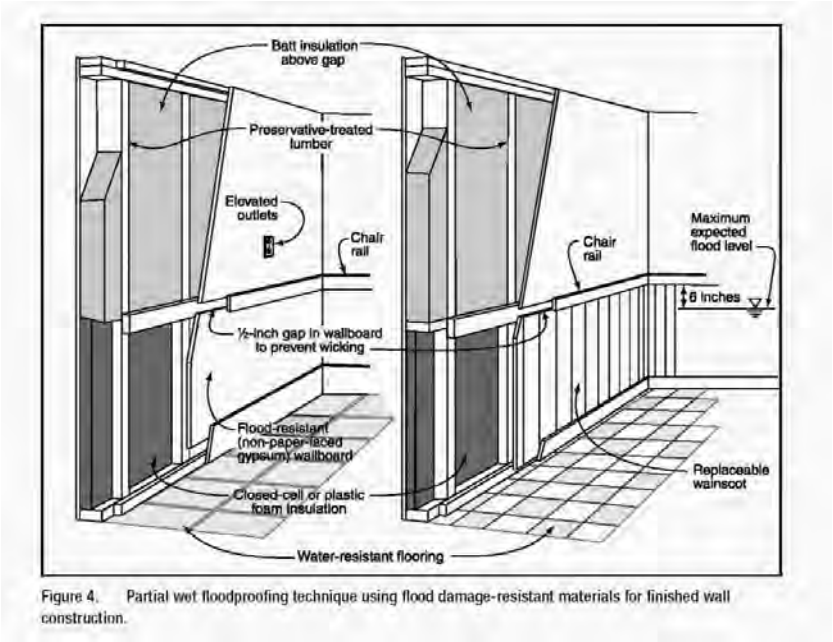


Figure 4. Partial wet floodproofing technique using flood damage-resistant materials for finished wall construction.

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 C.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 C.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 C.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.

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]

Map C.15 shows locations of critical facilities within the Grand Haven Community. Critical facilites include:

- 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 C.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

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

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 C.17 identifies neighborhoods within Grand Haven Charter Township that are located within one mile of a full service grocery store.

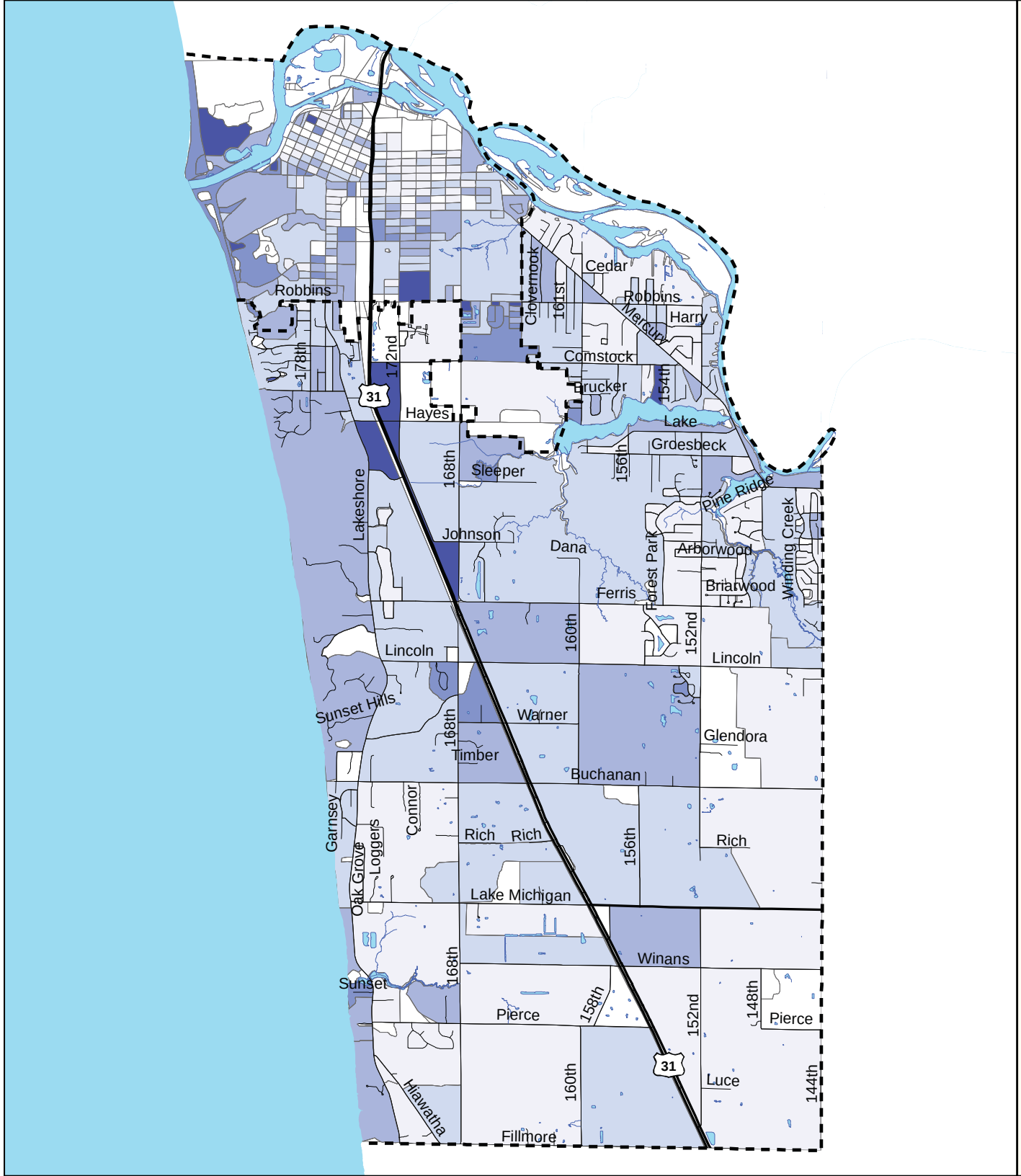
[24] http://americannutritionassociation.org/newsletter/usda-defines-food-deserts

ADDITIONAL RESOURCES DRAWN FOR THIS APPENDIX:

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)



Grand Haven Charter Township Percent of Population 65 Years and Older (male and female) Map C.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

0 2 Miles

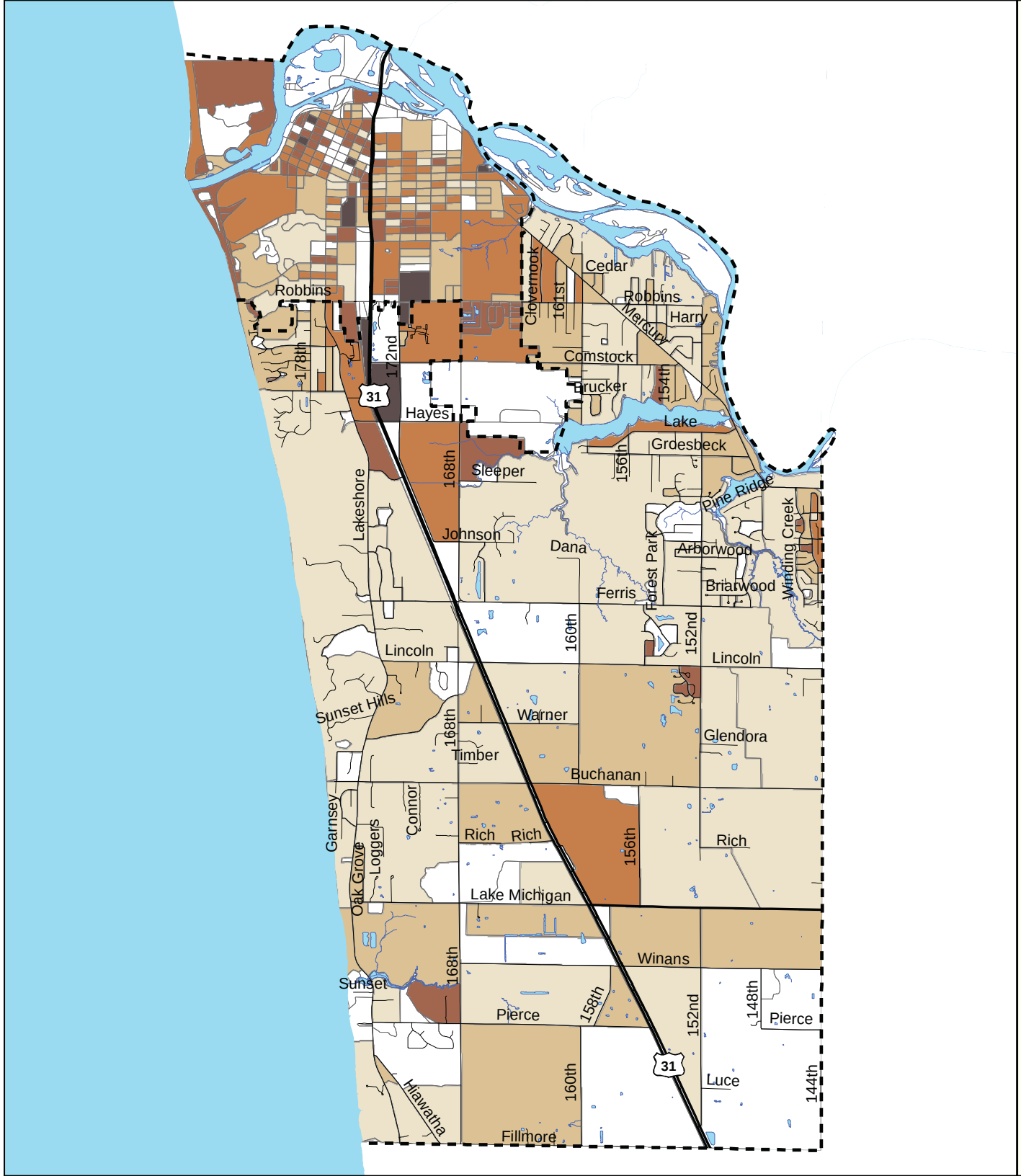
Data Sources:
U.S. Census Bureau, Block Level Data (2010), ACS data (2009-2013)
Grand Haven Charter Township
Michigan Geo. Data Library
Ottawa County GIS

N

Prepared August 2015 by:

Resilient GRAND HAVEN!

LIAA



Grand Haven Charter Township
Percent of Households with People Living Alone
Map C.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

0 2 Miles

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

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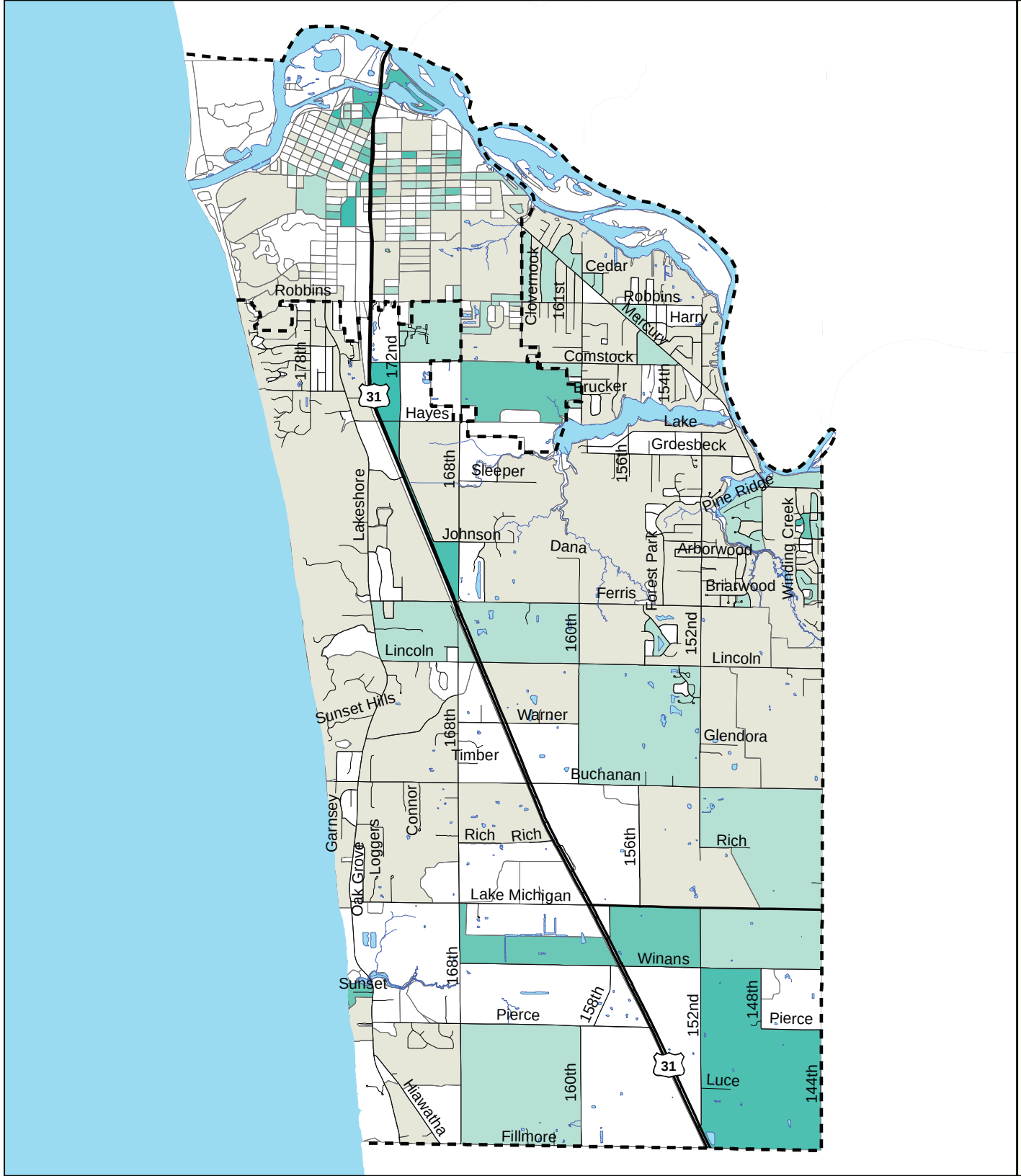

Grand Haven Charter Township
Percent of Non-white Population
Map C.3

- 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

Miles
0 2

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

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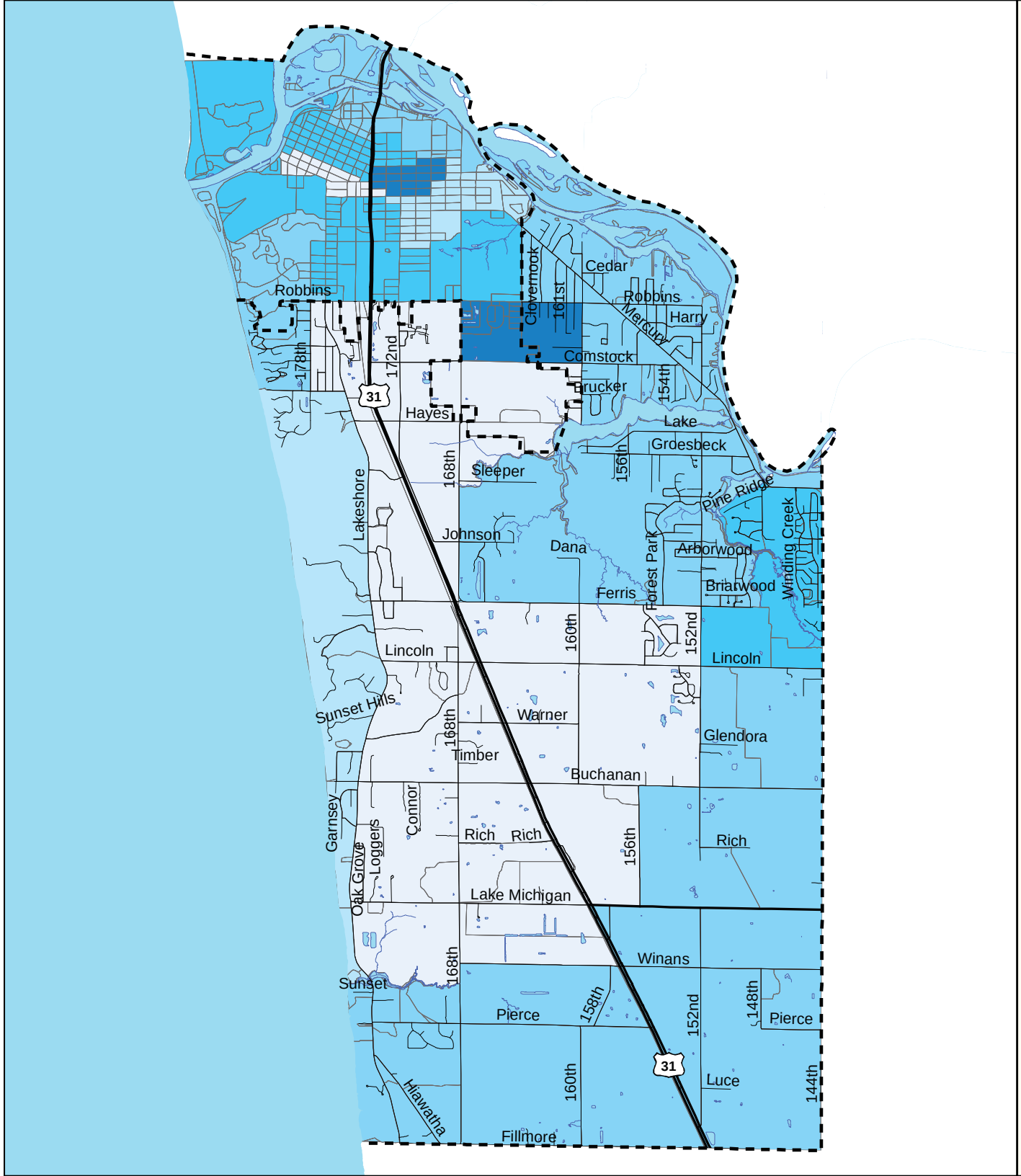

Grand Haven Charter Township
Percent of Households Living Below the Poverty Threshold
Map C.4

- 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

0 2 Miles

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

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Prepared August 2015 by:

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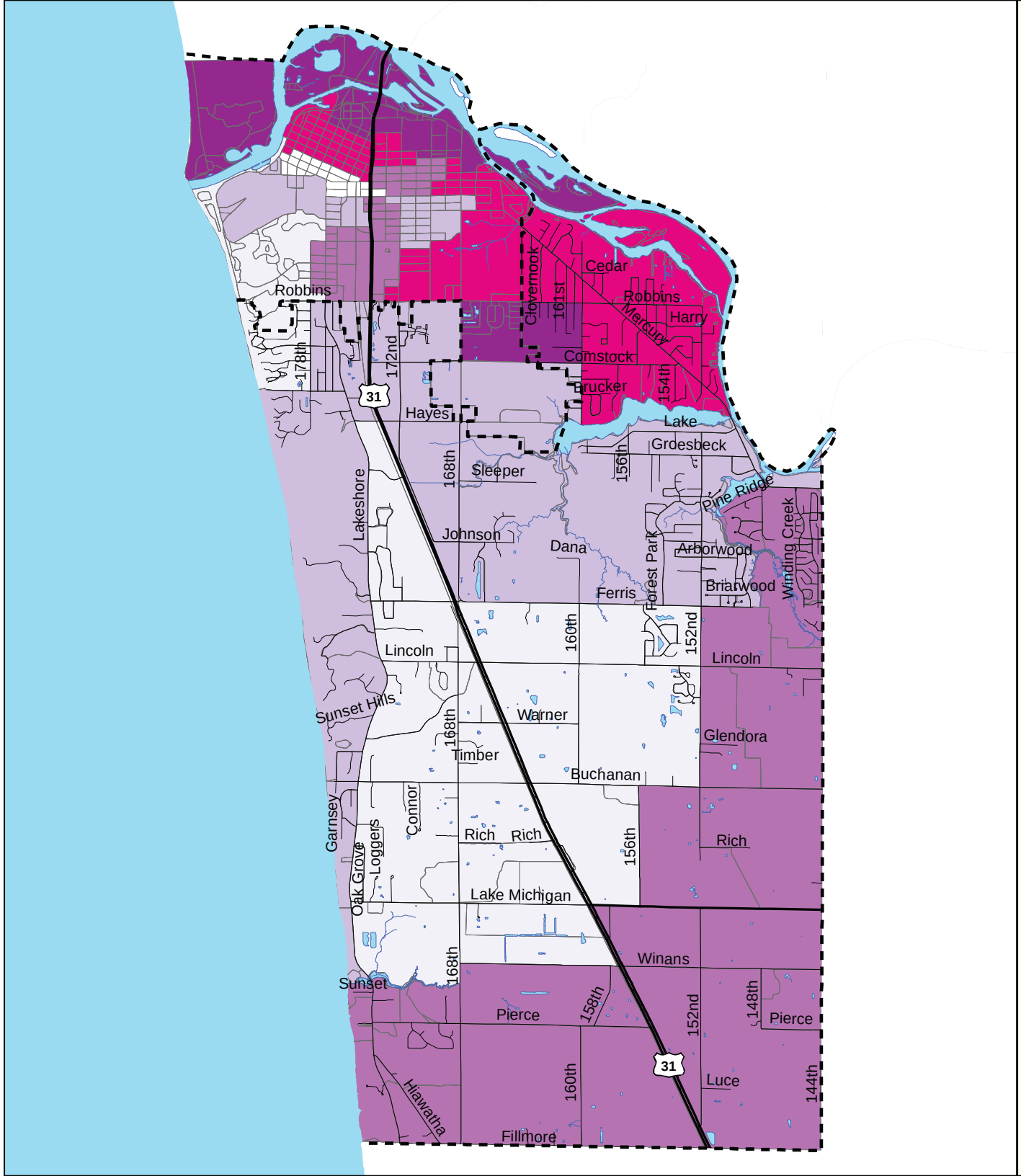

Grand Haven Charter Township Percent of Population 25 years and Older with less than a High School Education Map C.5

- 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

0 2 Miles

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

N

Prepared August 2015 by:

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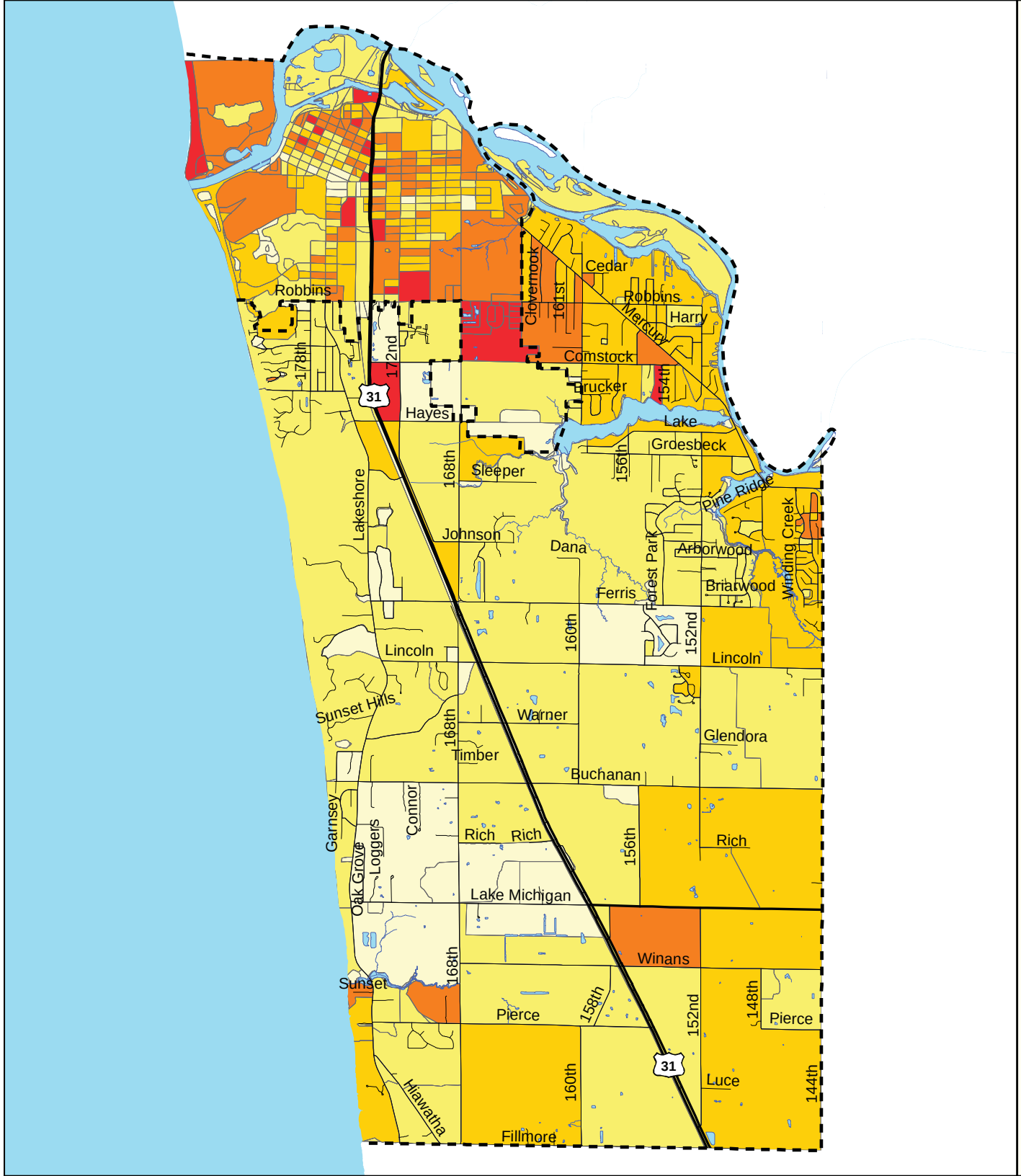

Grand Haven Charter Township
Relative Sensitivity of Populations to Extreme Heat Events
Map C.6

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

Miles
0 2

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

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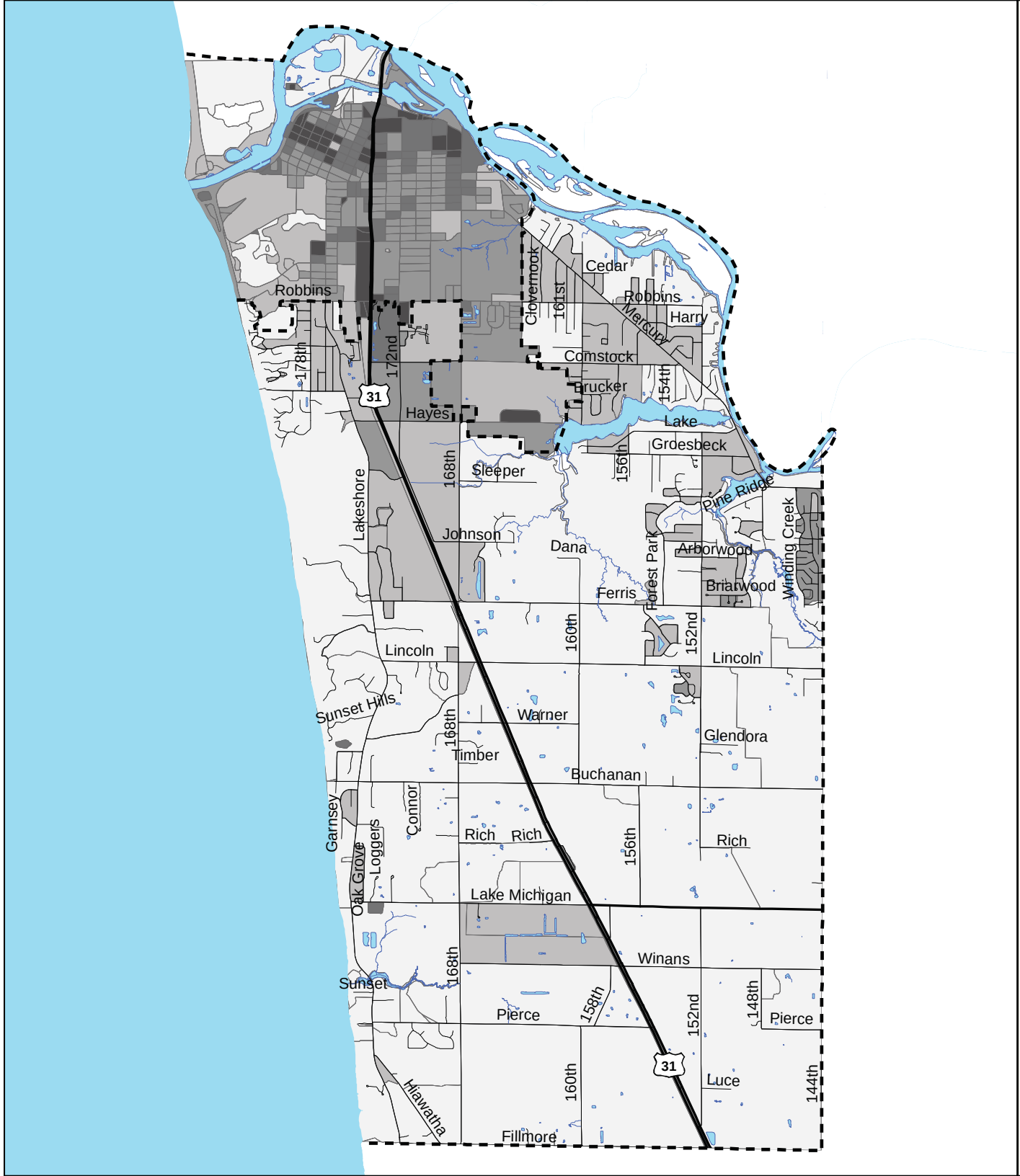
Grand Haven Charter Township
Percent Impervious Surface Exposure
Map C.7



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

Miles
0 2

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

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Prepared August 2015 by:

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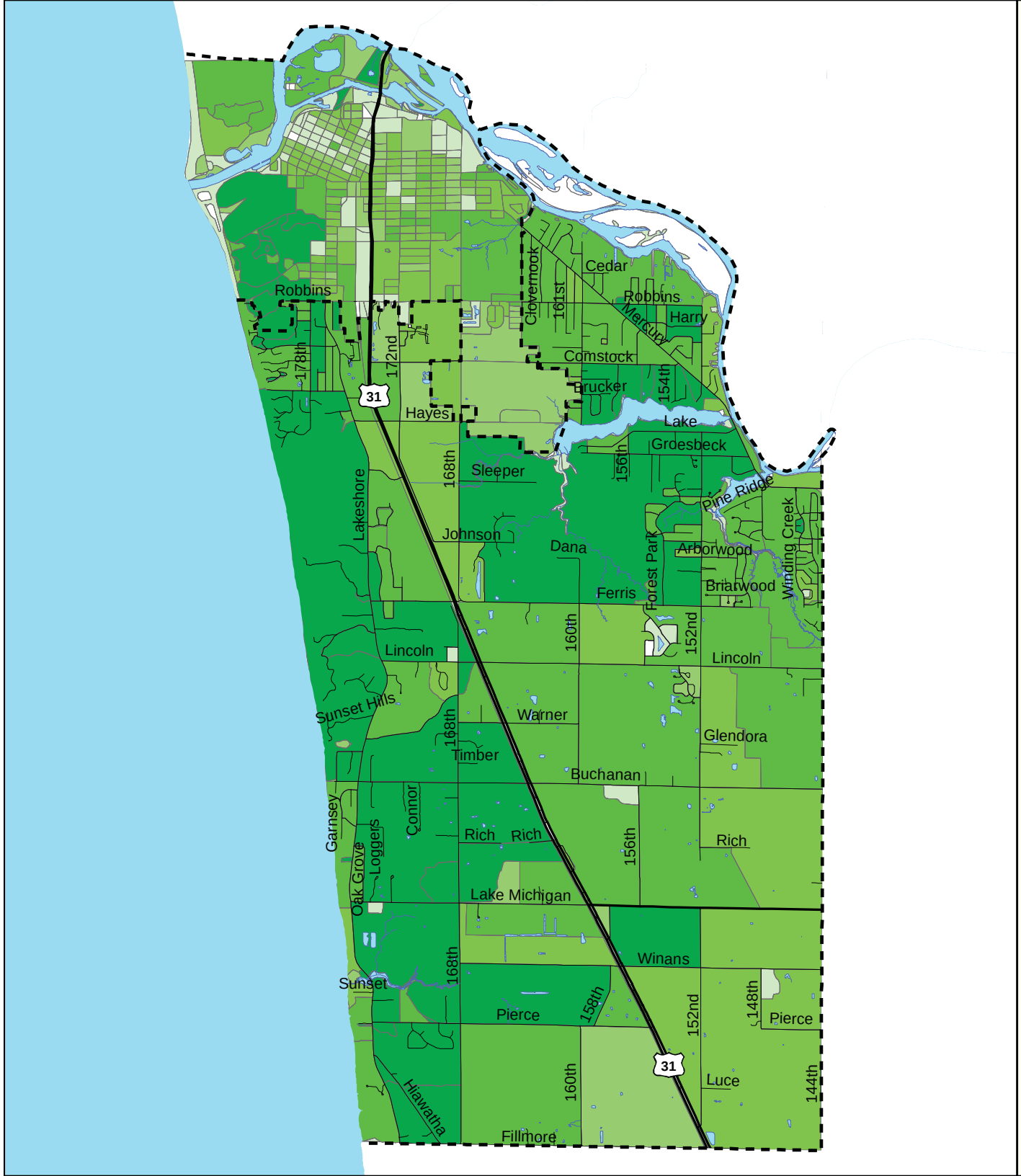


Grand Haven Charter Township
Percent Tree Canopy
Map C.8

- 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

0 2 Miles

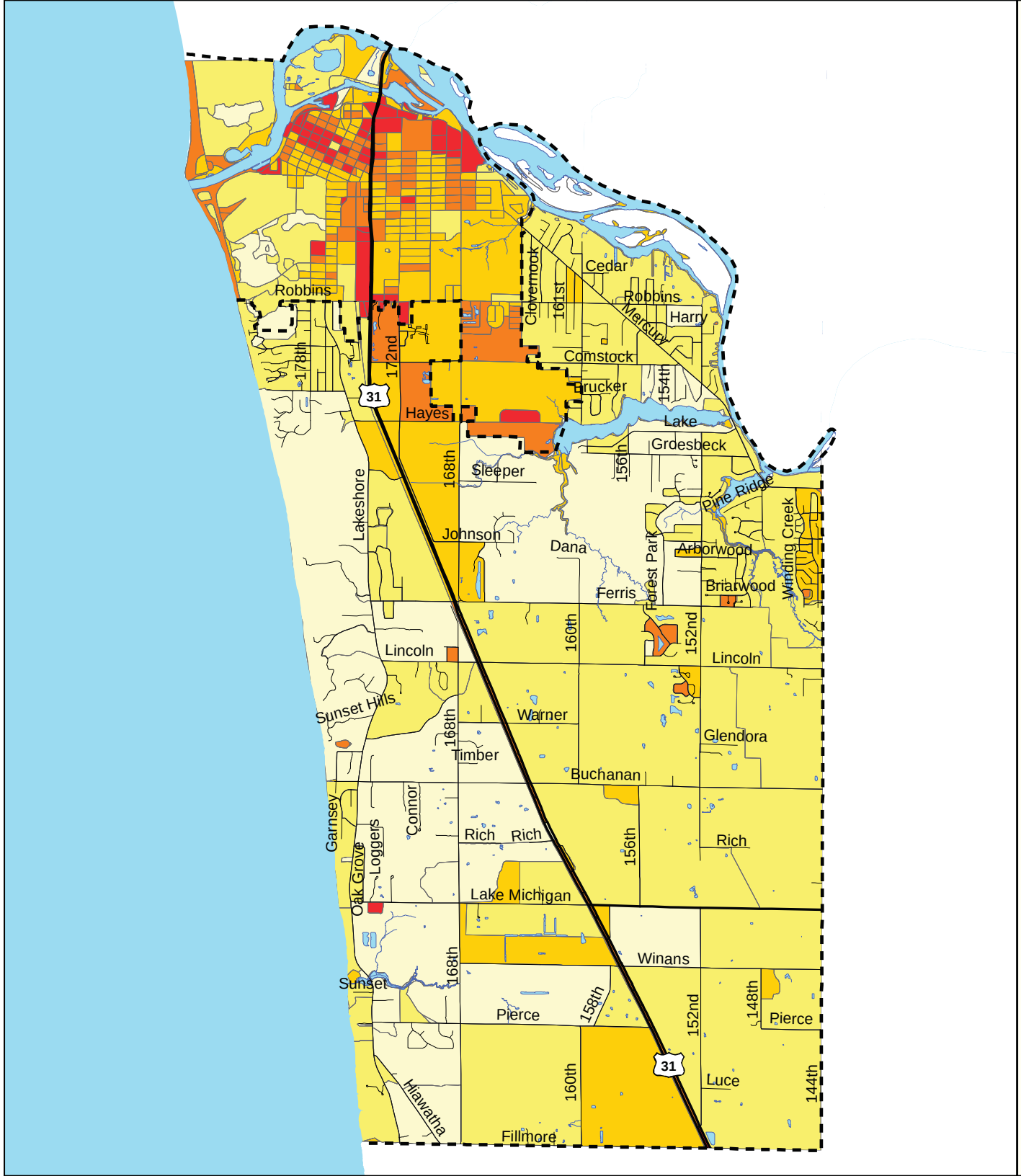
Data Sources:
U.S. Census Bureau, Block Level Data (2010), ACS data (2009-2013)
Grand Haven Charter Township
Michigan Geo. Data Library
Ottawa County GIS

N

Prepared August 2015 by:

Resilient GRAND HAVEN!

LIAA



Grand Haven Charter Township
Relative Exposure of Populations to Extreme Heat Events
Map C.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

0 2 Miles

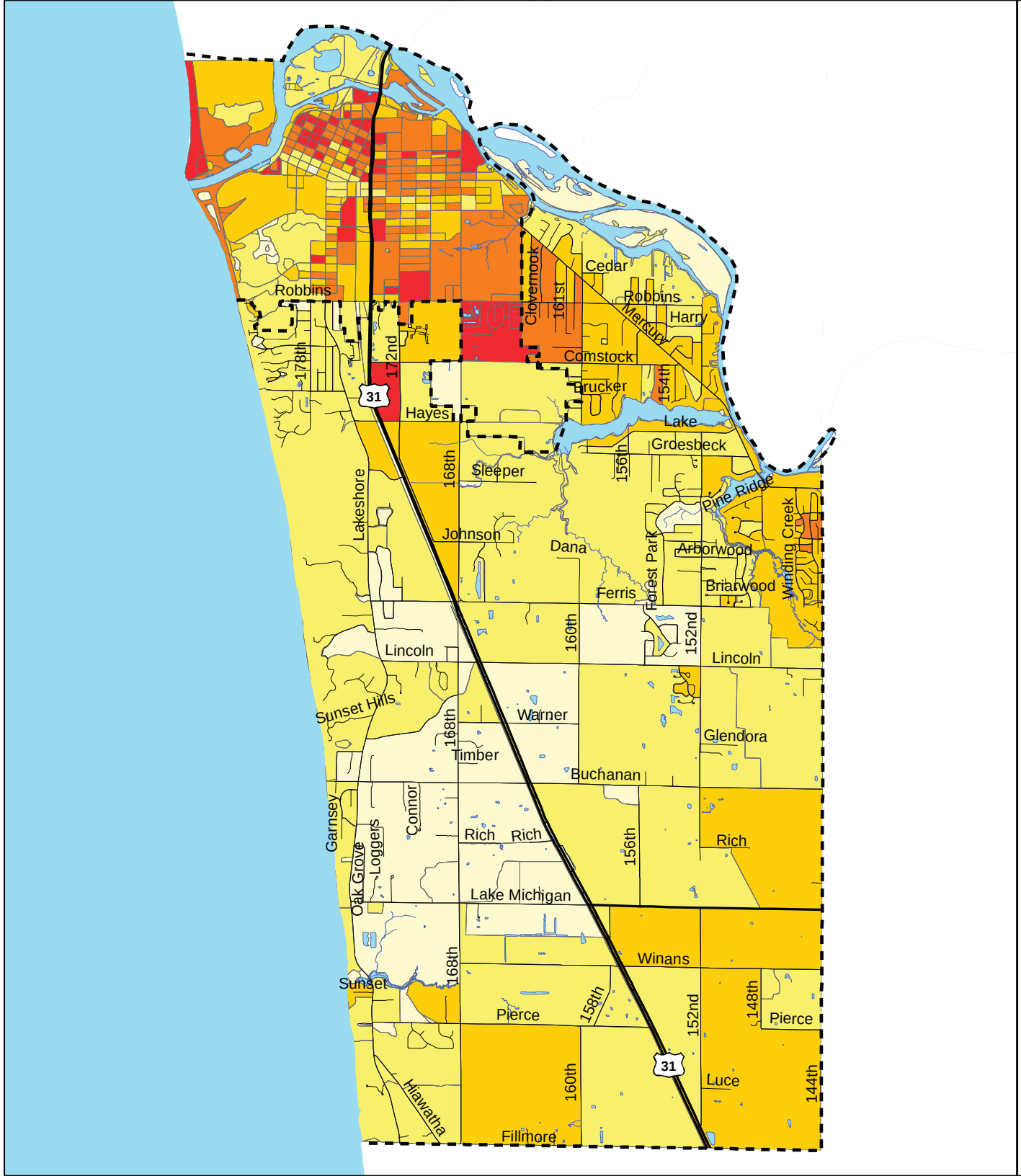
Data Sources:
U.S. Census Bureau, Block Level Data (2010), ACS data (2009-2013)
Grand Haven Charter Township
Michigan Geo. Data Library
Ottawa County GIS

N

Prepared August 2015 by:

Resilient GRAND HAVEN!

LIAA



Grand Haven Charter Township Population Vulnerable to Extreme Heat Events Map C.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

0 2 Miles

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

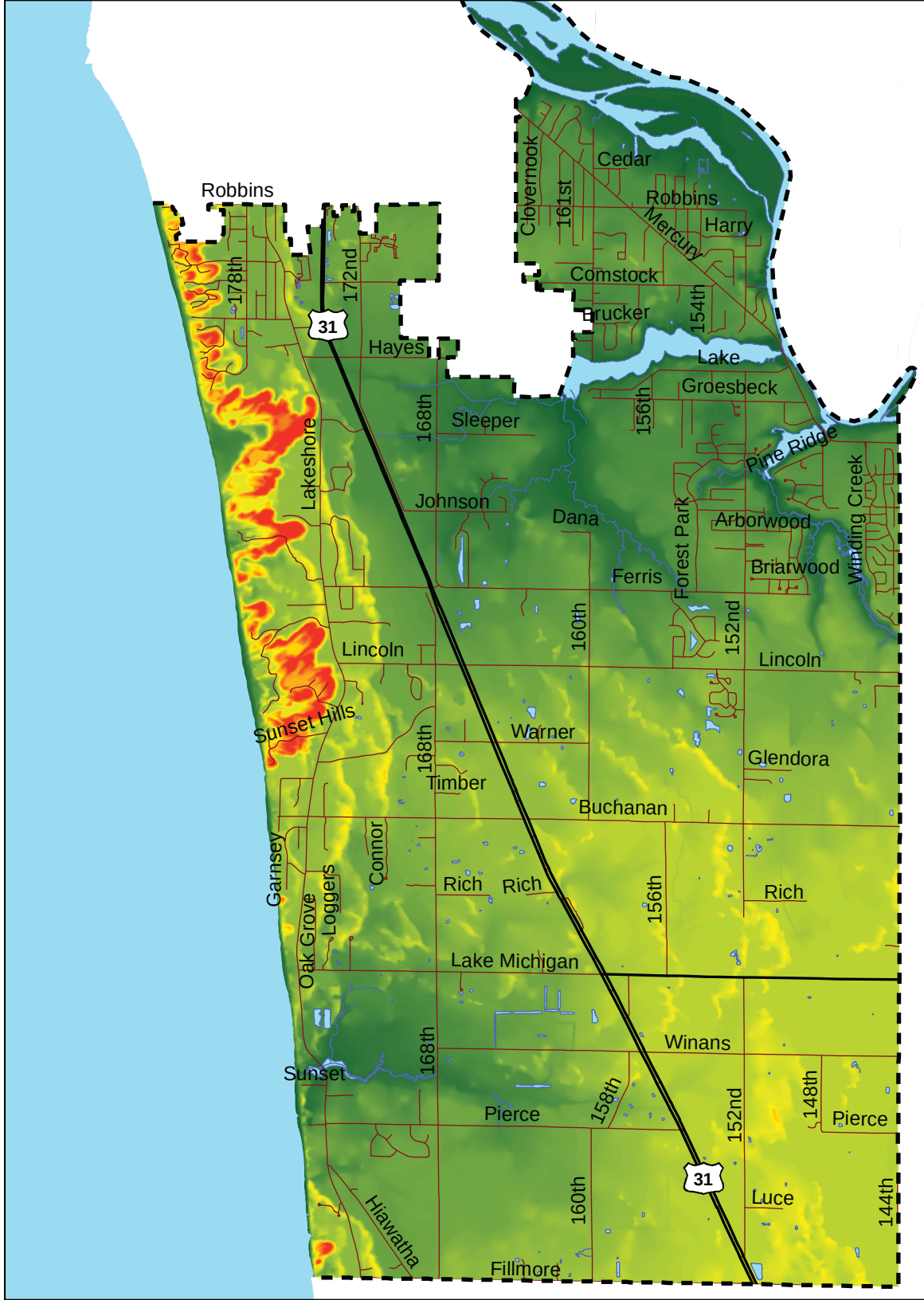
N

Prepared August 2015 by:

Resilient GRAND HAVEN!

LIAA

Grand Haven Charter Township
Digital Elevation Model
Map C.11



High : 829.7 ft

Low : 578.4 ft

- Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams

Miles

0 2

Data Sources:
USDA-NRCS Geospatial Data Gateway
Michigan Geo. Data Library
Ottawa County GIS

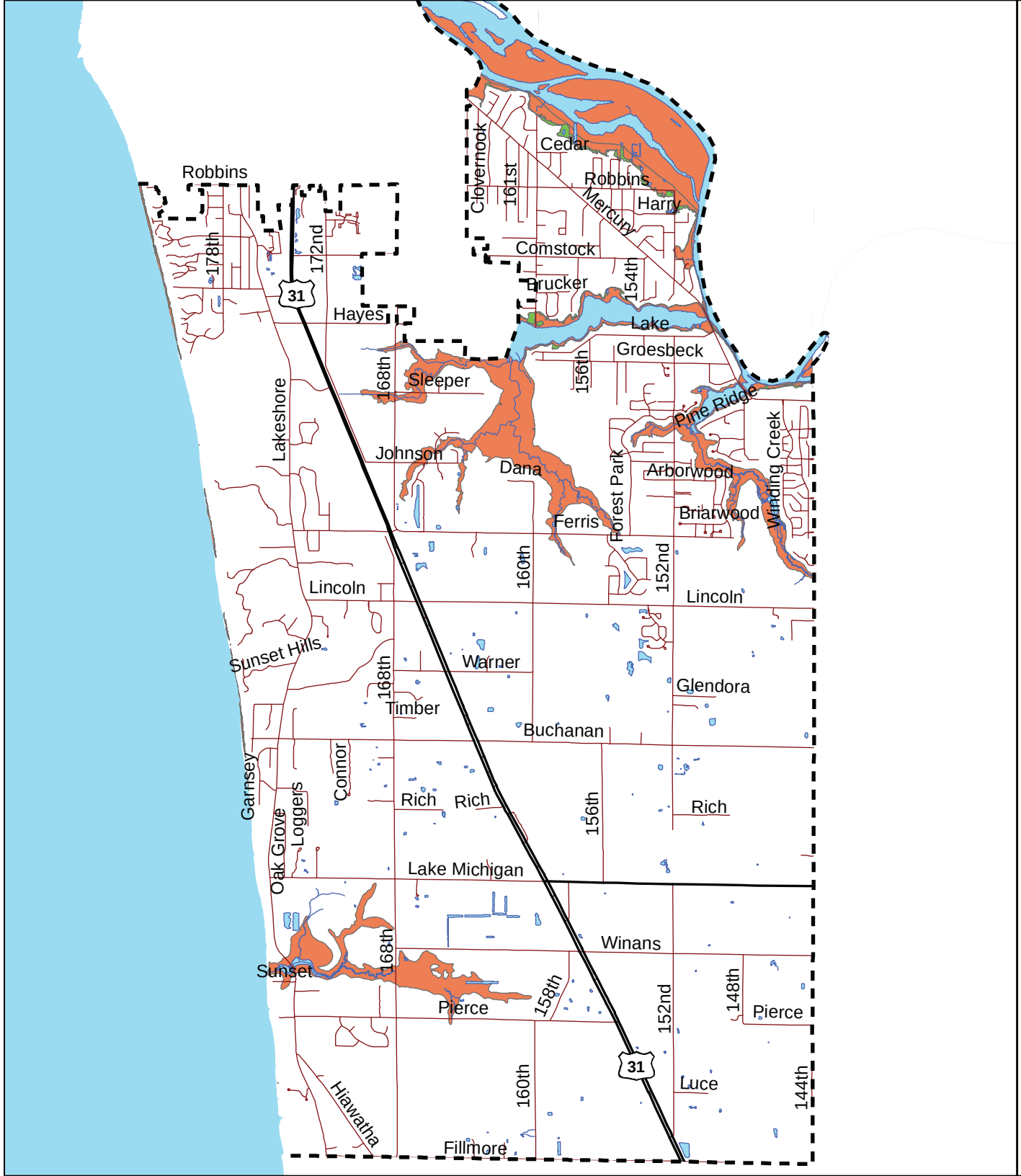
N

Prepared August 2015 by:

Resilient GRAND HAVEN!

LIAA

Grand Haven Charter Township
FEMA - 100 & 500 Year Flood Zones
Map C.12



500 year Flood Zone
100 year Flood Zone
Jurisdiction Boundary
Highways
Roads
Lakes
Streams

0 2 Miles

Data Sources:
FEMA
Michigan Geo. Data Library
City of Grand Haven
Ottawa County GIS

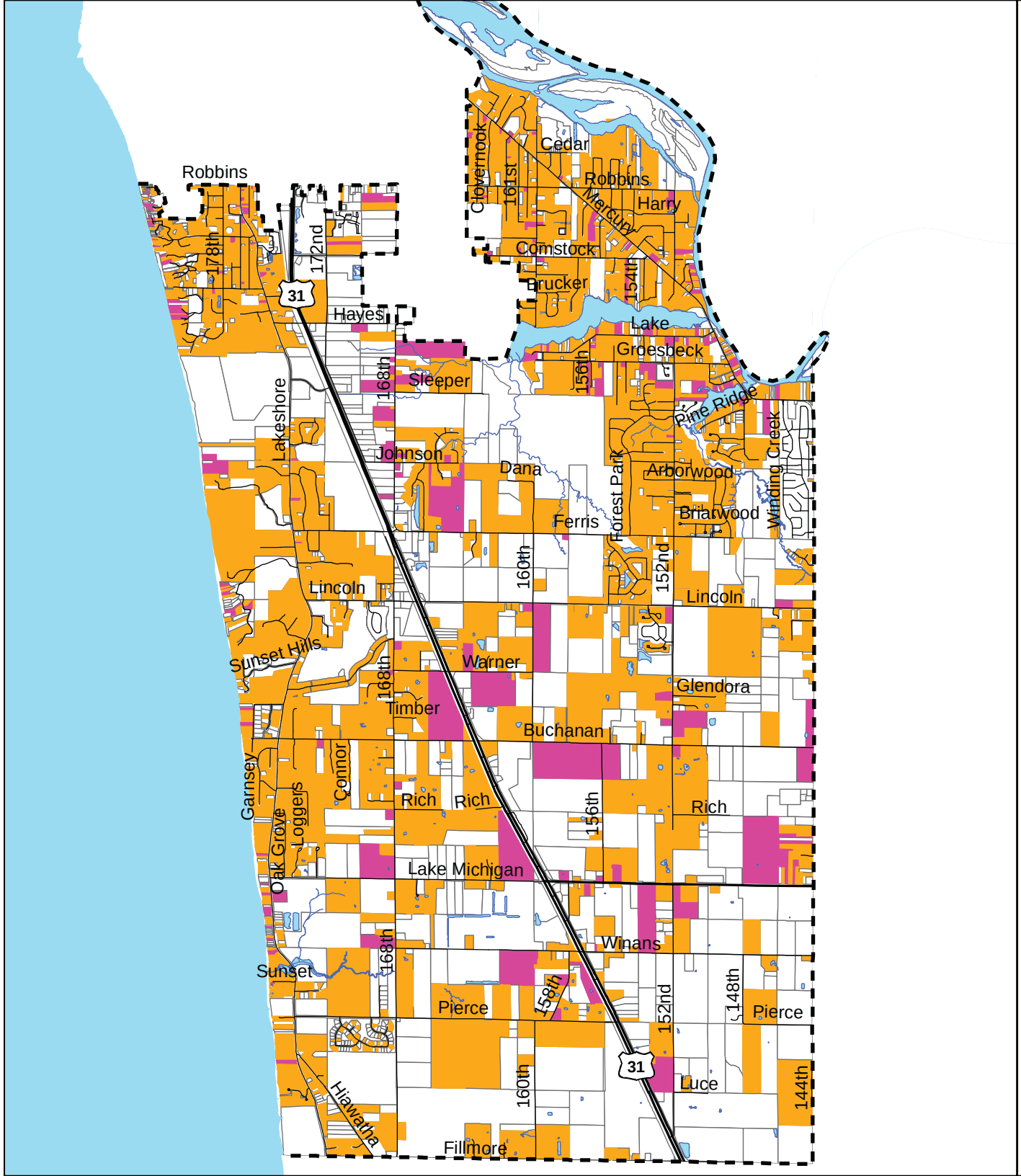
N

Prepared August 2015 by:

Resilient GRAND HAVEN!

LIAA

Grand Haven Charter Township
Year Home was Built
Map C.12



Legend

- Home built 1940 & earlier
- Home built after 1940
- No data available
- Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams

0 — 2 Miles

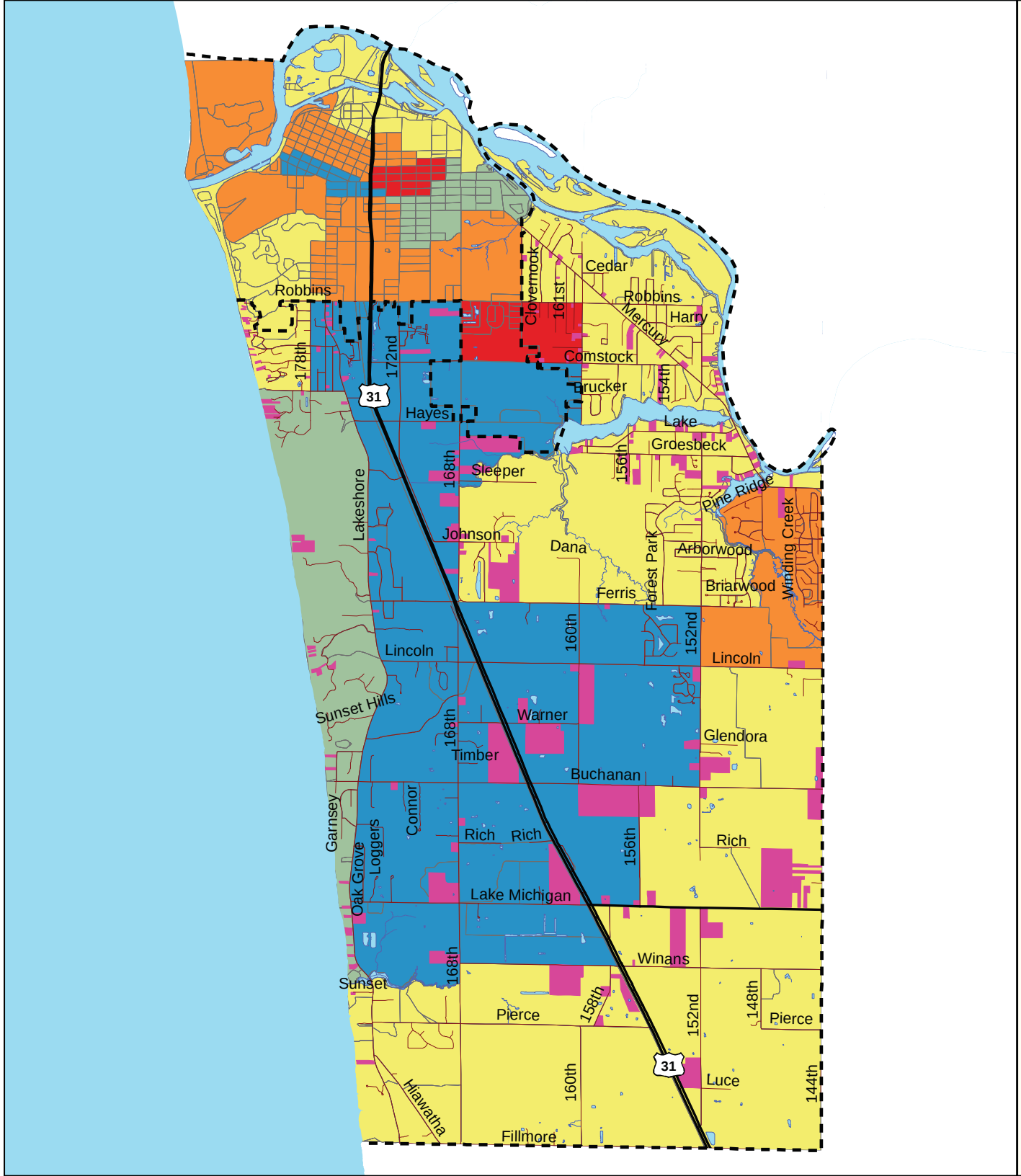
Data Sources:
Grand Haven Charter Township
Michigan Geo. Data Library
Ottawa County GIS

N

Prepared August 2015 by:

Resilient GRAND HAVEN!

LIAA



Grand Haven Charter Township
Household Sensitivity
Map C.13

- 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

0 — 2 Miles

Data Sources:
U.S. Census Bureau, Block Level Data (2010)
Grand Haven Charter Township
Michigan Geo. Data Library
Ottawa County GIS

N

Prepared August 2015 by:

Resilient GRAND HAVEN!

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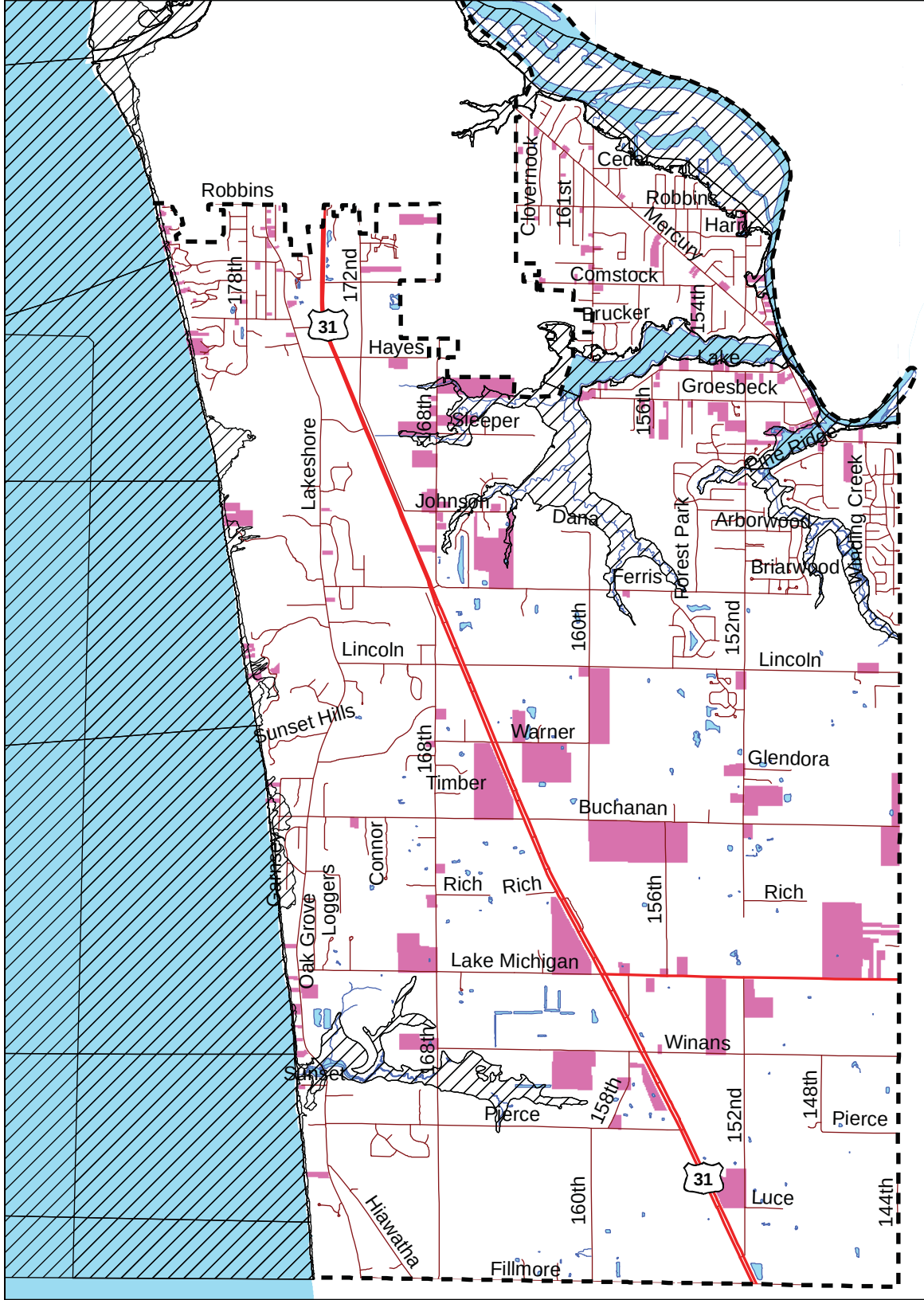

Grand Haven Charter Township
Flooding Sensitive Homes Map
Map C.14

- Home built 1940 & earlier
- FEMA Flood Zones
- Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams

0 2 Miles

Data Sources:
FEMA
Grand Haven Charter Township
Michigan Geo. Data Library
Ottawa County GIS

N

Prepared August 2015 by:

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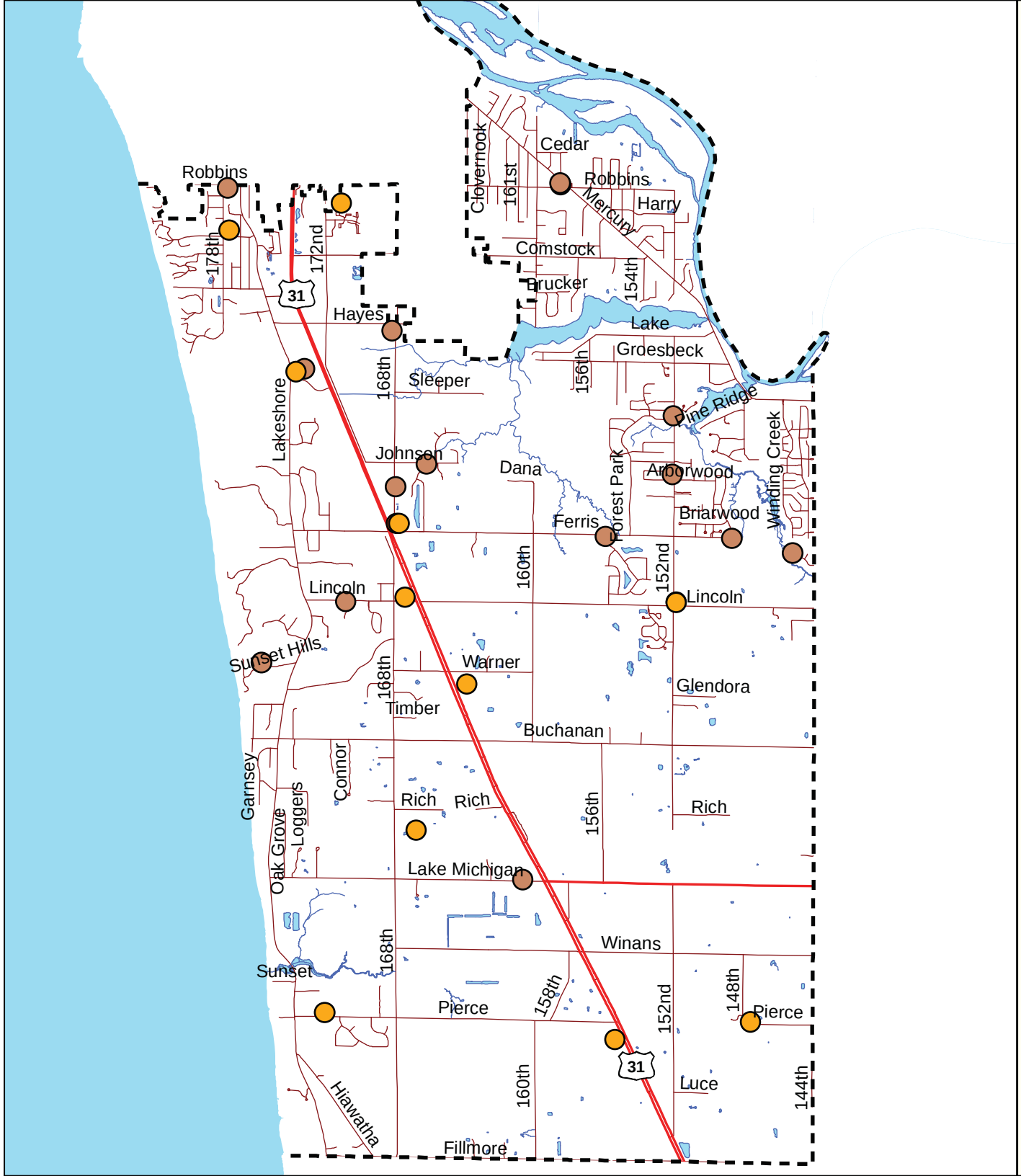
Grand Haven Charter Township
Critical Facilities
Map C.15



- Communication Center
- Fire Station
- Utilities
- Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams

0 2 Miles

N

Data Sources:
Michigan Geo. Data Library
Ottawa County GIS

Prepared August 2015 by:

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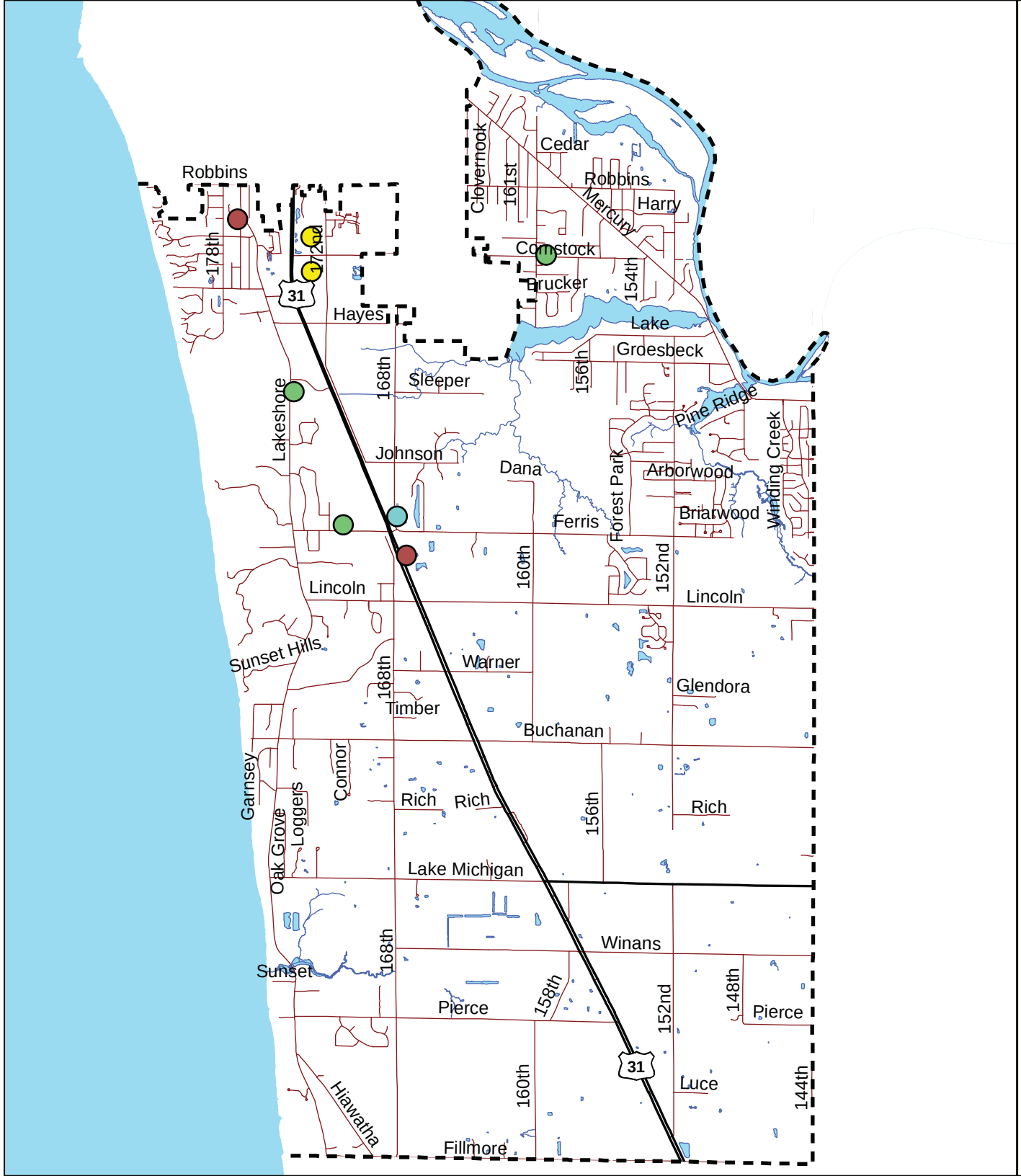
LIAA

Grand Haven Charter Township
Community Services
Map C.16



- Grocery-Full Service
- Place of Worship
- Public Facility
- School
- Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams

Miles
0 2

N

Data Sources:
Michigan Geo. Data Library
Ottawa County GIS

Prepared August 2015 by:

Resilient GRAND HAVEN!

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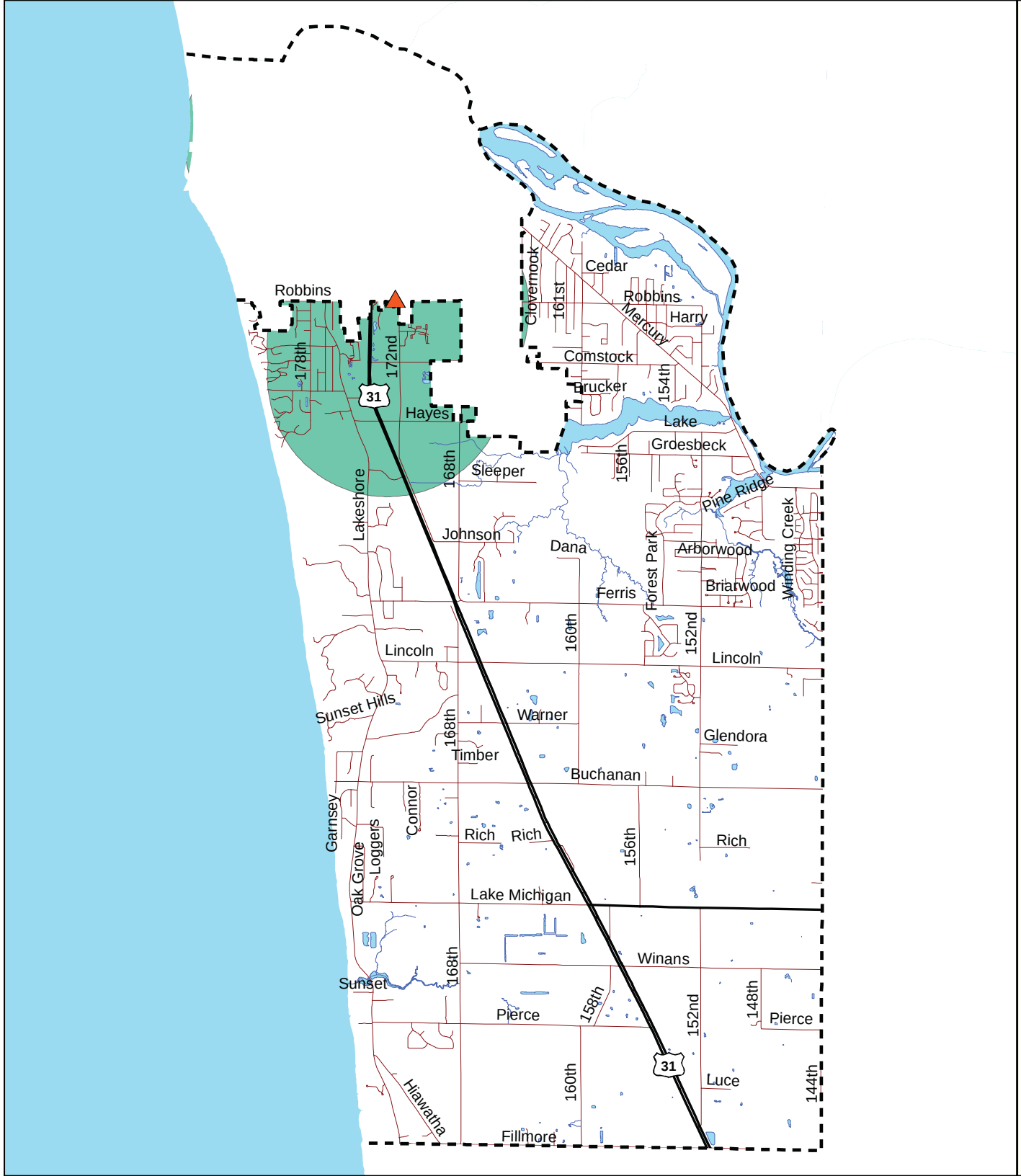
Grand Haven Charter Township
Food Availability
Map C.17



- Grocery-Full Service (1 mile radius)
- Grocery-Convenience
- Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams

0 2 Miles

Data Sources:
Grand Haven Charter Township
Michigan Geo. Data Library
Ottawa County GIS

N

Prepared August 2015 by:

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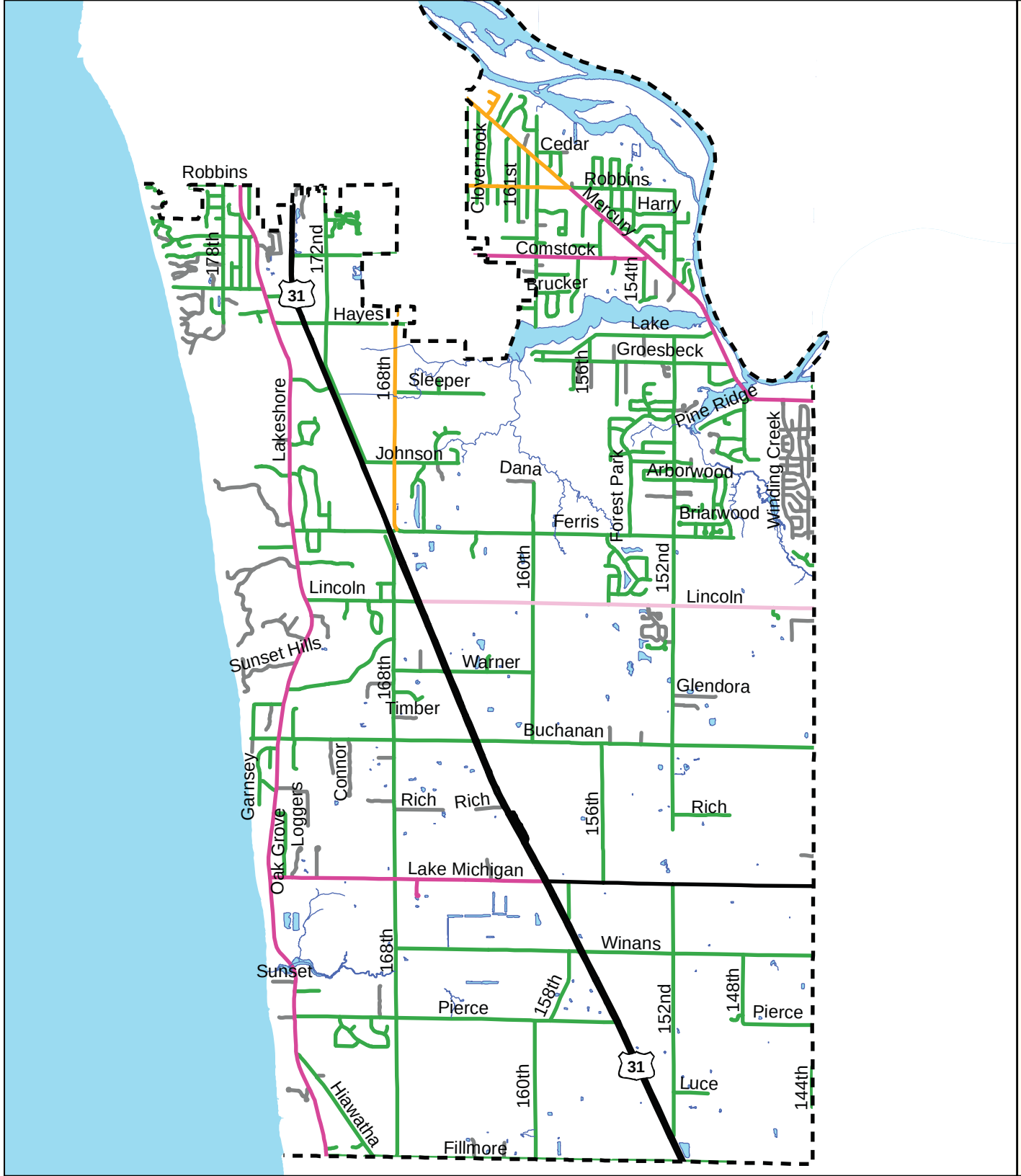
APPENDIX D. MAPS

MAP LIST



Grand Haven Charter Township
Road Classifications
Map 4.1

- Other Principal Arterials
- Minor Arterials
- Major Collector
- Minor Collector
- Local
- Not a certified public road
- Jurisdiction Boundary
- Lakes
- Streams

Miles
0
2

N

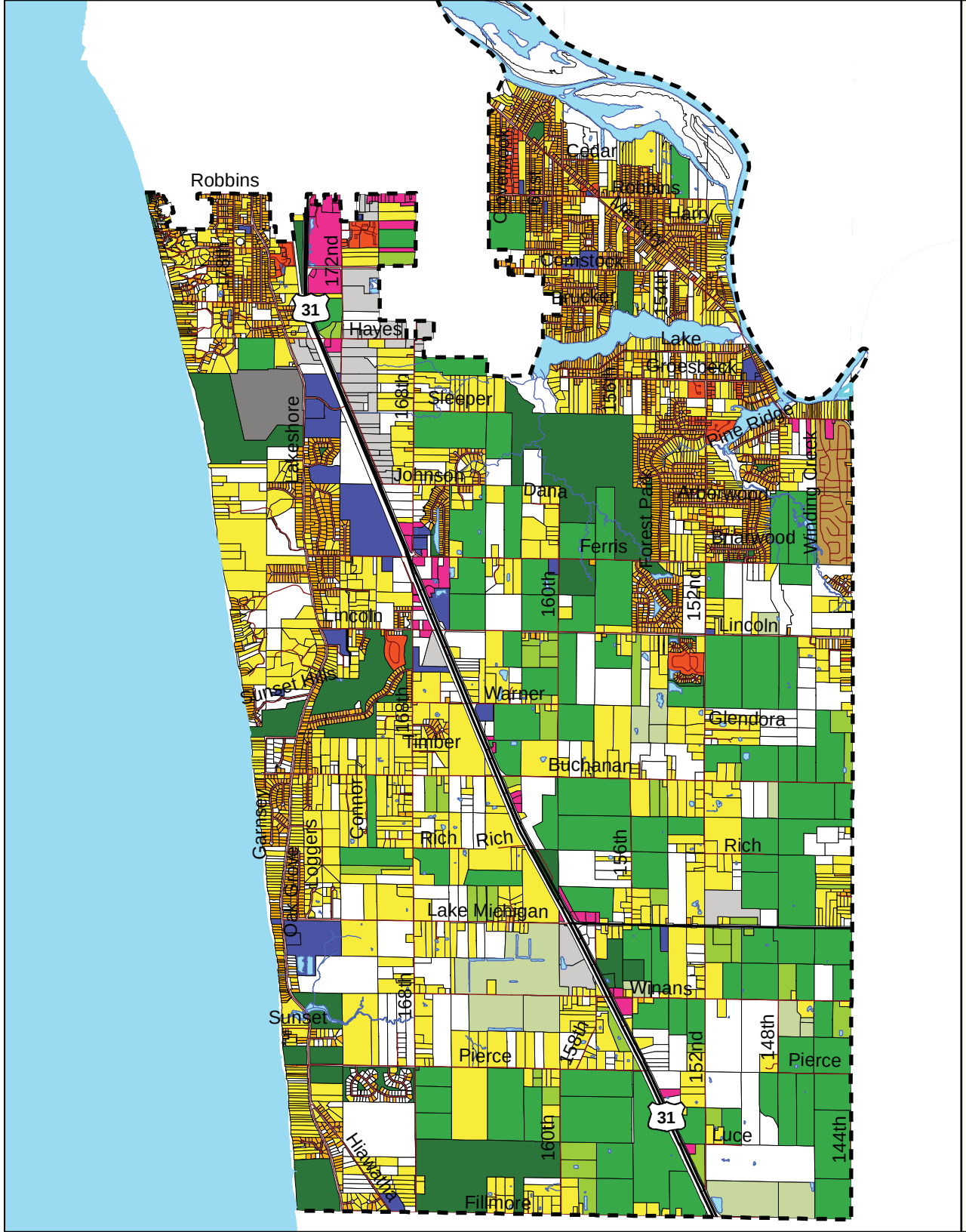
Data Sources:
Michigan Geo. Data Library
Ottawa County GIS

Prepared August 2015 by:

Resilient GRAND HAVEN!

LIAA

Grand Haven Charter Township
Existing Land Use
Map 4.2



- 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

0 — 2 Miles

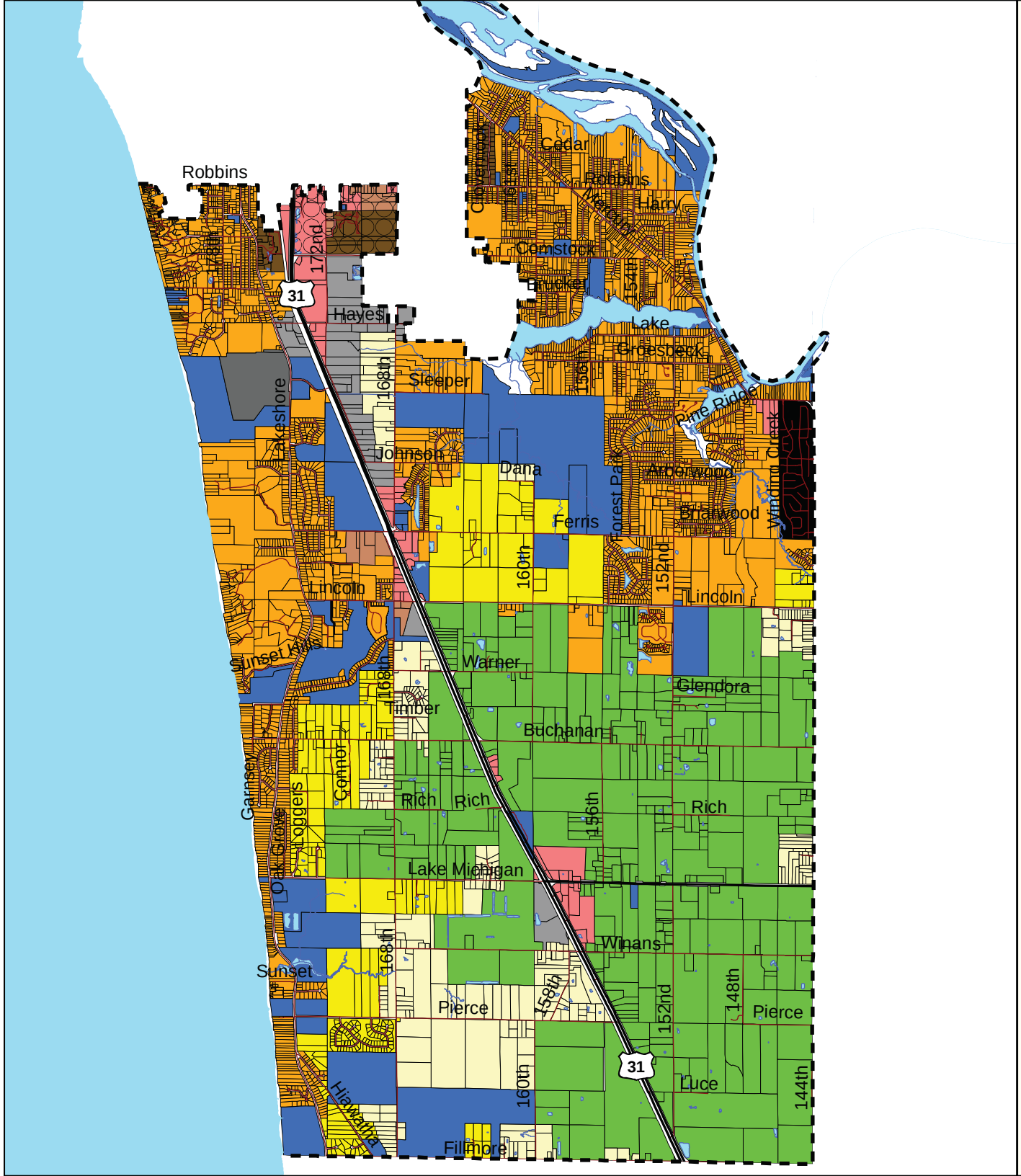
N

Data Sources:
Michigan Geo. Data Library
Grand Haven Charter Township
Ottawa County GIS

Prepared August 2015 by:

Resilient GRAND HAVEN!

LIAA



Grand Haven Charter Township
Future Land Use
Map 4.3

- 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

0 — 2 Miles

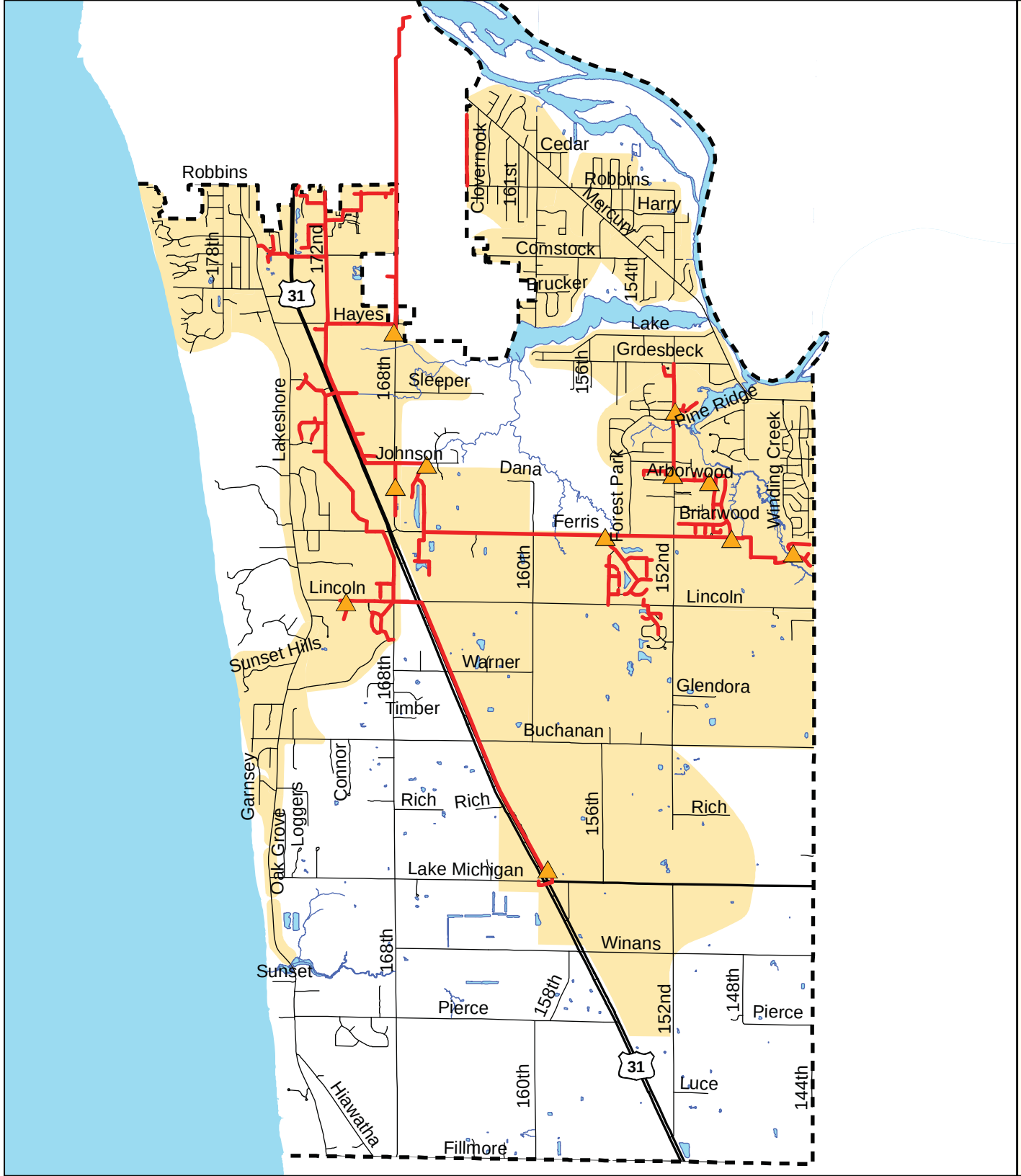
N

Data Sources:
Michigan Geo. Data Library
Grand Haven Charter Township
Ottawa County GIS

Prepared August 2015 by:

Resilient GRAND HAVEN!

LIAA



Grand Haven Charter Township
Existing Sanitary Sewer System
Map 4.4

- Sanitary Sewer Service area
- Lift Stations
- Existing Sanitary Sewer Mains
- Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams

Miles
0 2

Data Sources:
USDA-NRCS Geospatial Data Gateway
Michigan Geo. Data Library
Ottawa County GIS

N

Prepared August 2015 by:

Resilient GRAND HAVEN!

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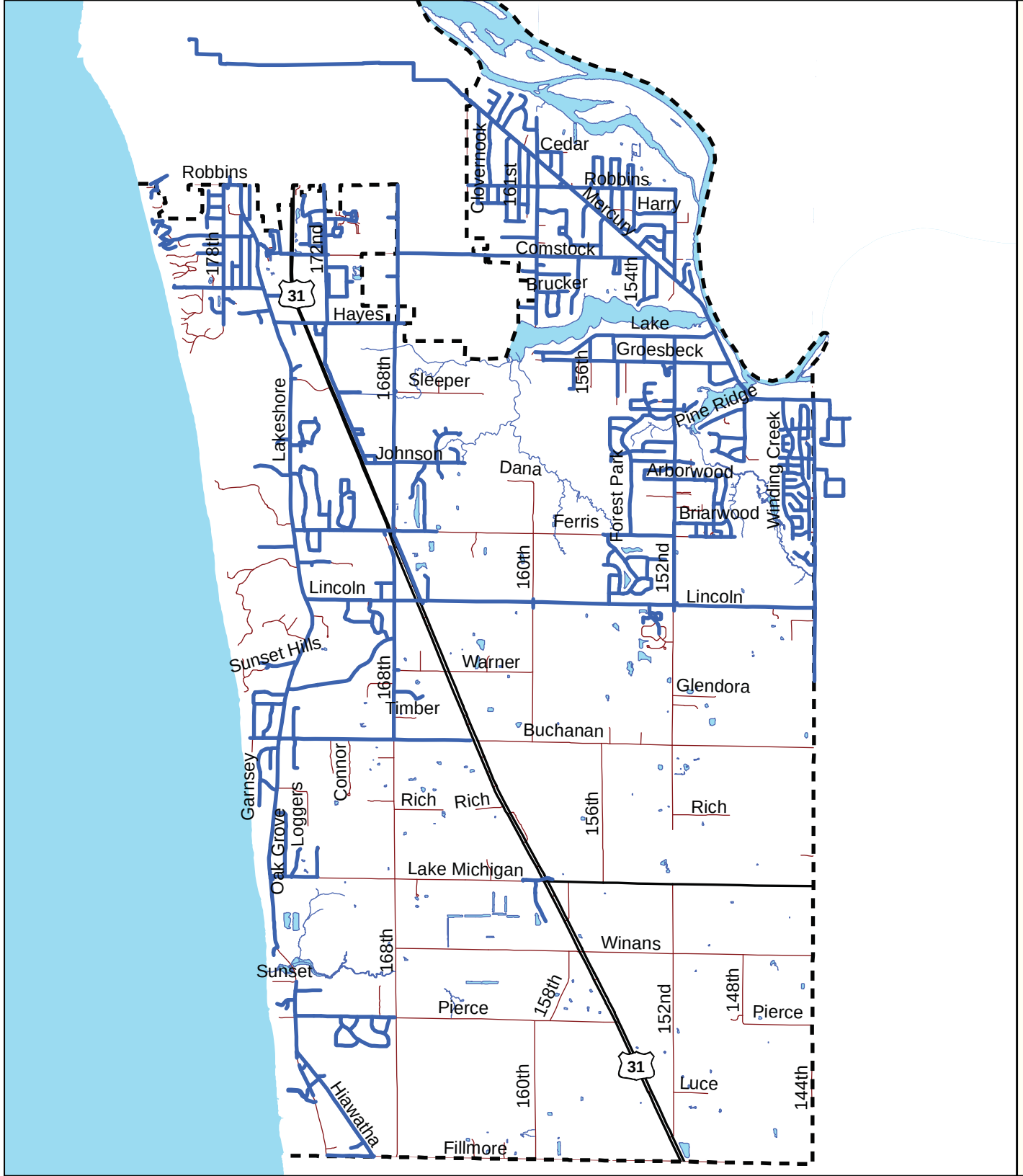

Grand Haven Charter Township
Water Distribution
Map 4.5

- Existing Water Mains
- Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams

Miles
0 2

Data Sources:
USDA-NRCS Geospatial Data Gateway
Michigan Geo. Data Library
Ottawa County GIS

N

Prepared August 2015 by:

Resilient GRAND HAVEN!

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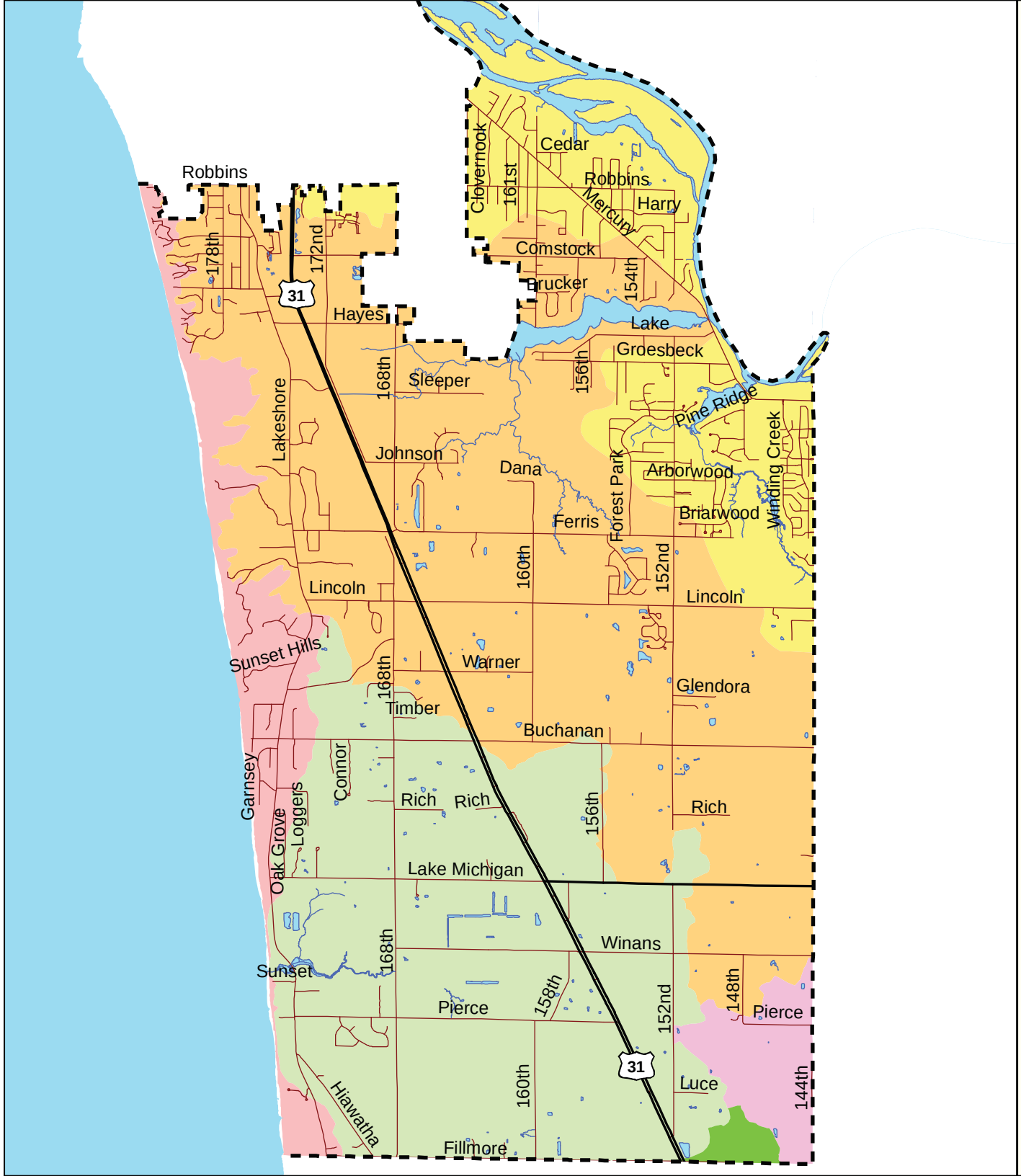


Grand Haven Charter Township
Watersheds
Map 5.1

- Bass River
- Grand River
- Lake Drainage
- Little Pigeon Creek
- Pigeon River
- Pottawattomie Bayou
- Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams

0 — 2 Miles

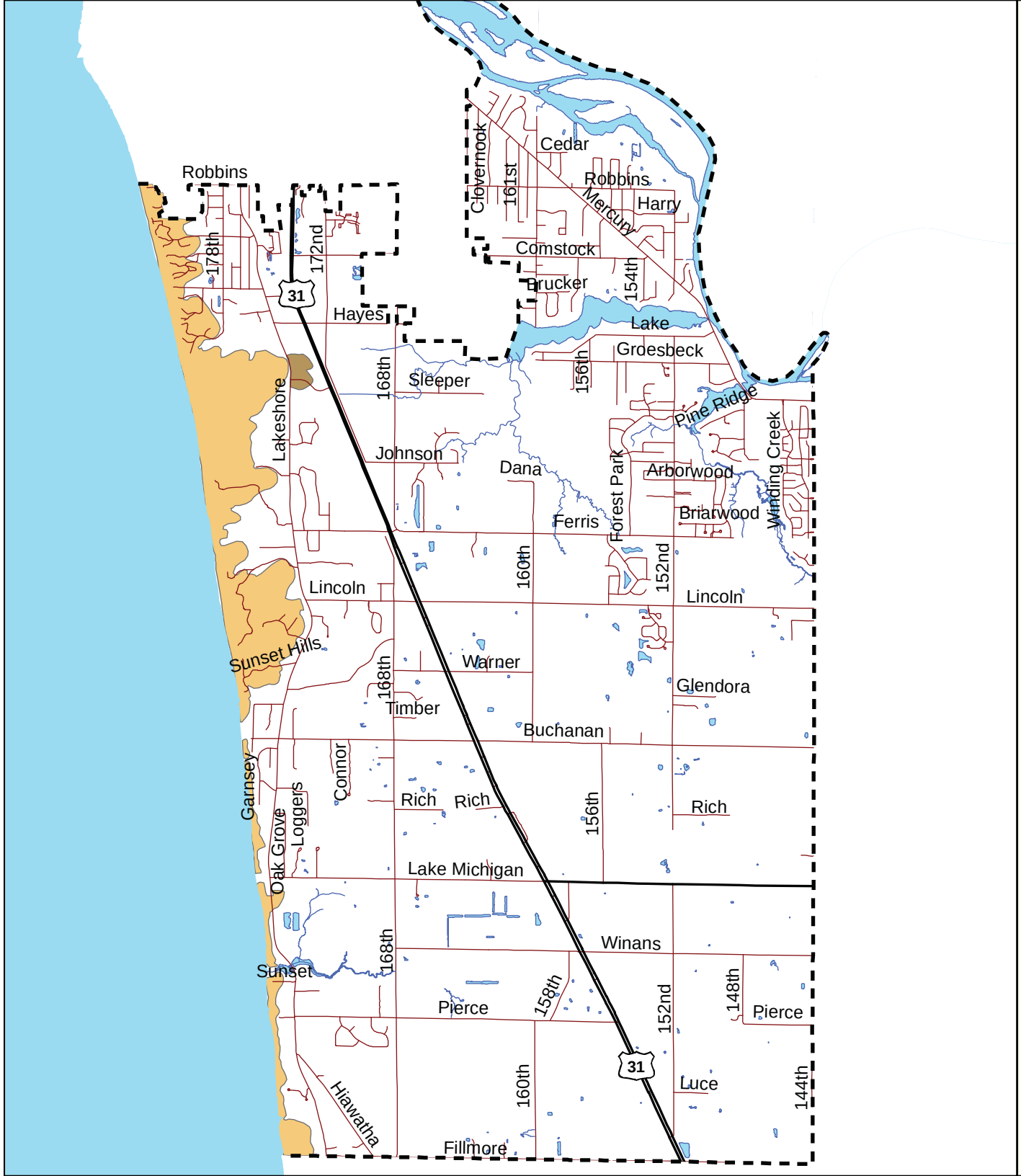
N

Data Sources:
Michigan Geo. Data Library
Ottawa County GIS

Prepared August 2015 by:

Resilient GRAND HAVEN!

LIAA



Grand Haven Charter Township
Critical Dunes
Map 5.2

- Barrier dunes
- Exemplary dune associated plant community
- Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams

0 2 Miles

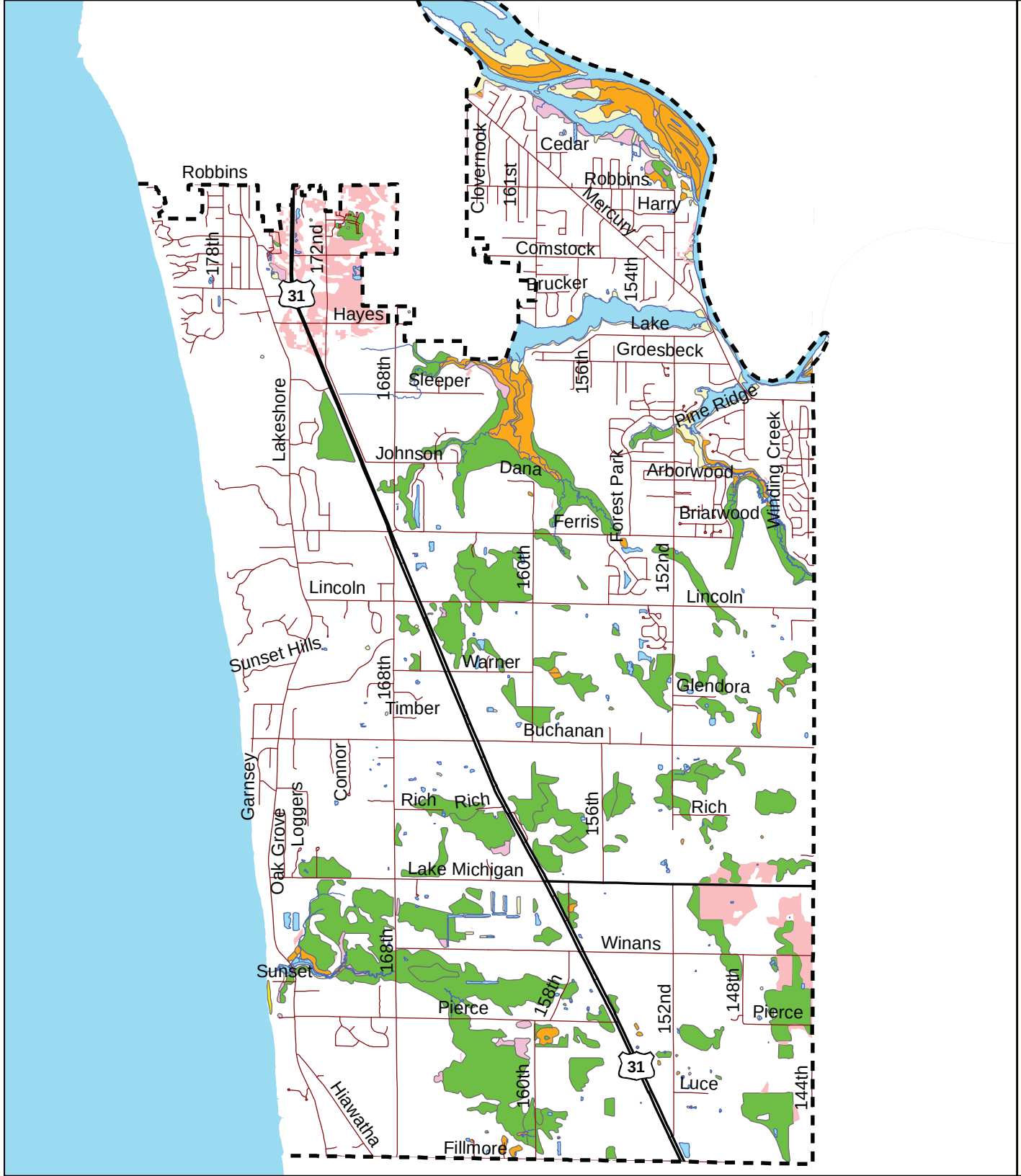
N

Data Sources:
Michigan Geo. Data Library
Ottawa County GIS

Prepared August 2015 by:

Resilient GRAND HAVEN!

LIAA



Grand Haven Charter Township
Wetlands & Potential Wetlands
Map 5.3

- Emergent Wetland
- Forested Wetland
- Scrub-Shrub Wetland
- Unconsolidated Bottom Wetland
- Unconsolidated Shore Wetland
- Potential Wetlands Restoration Area
- Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams

0 2 Miles

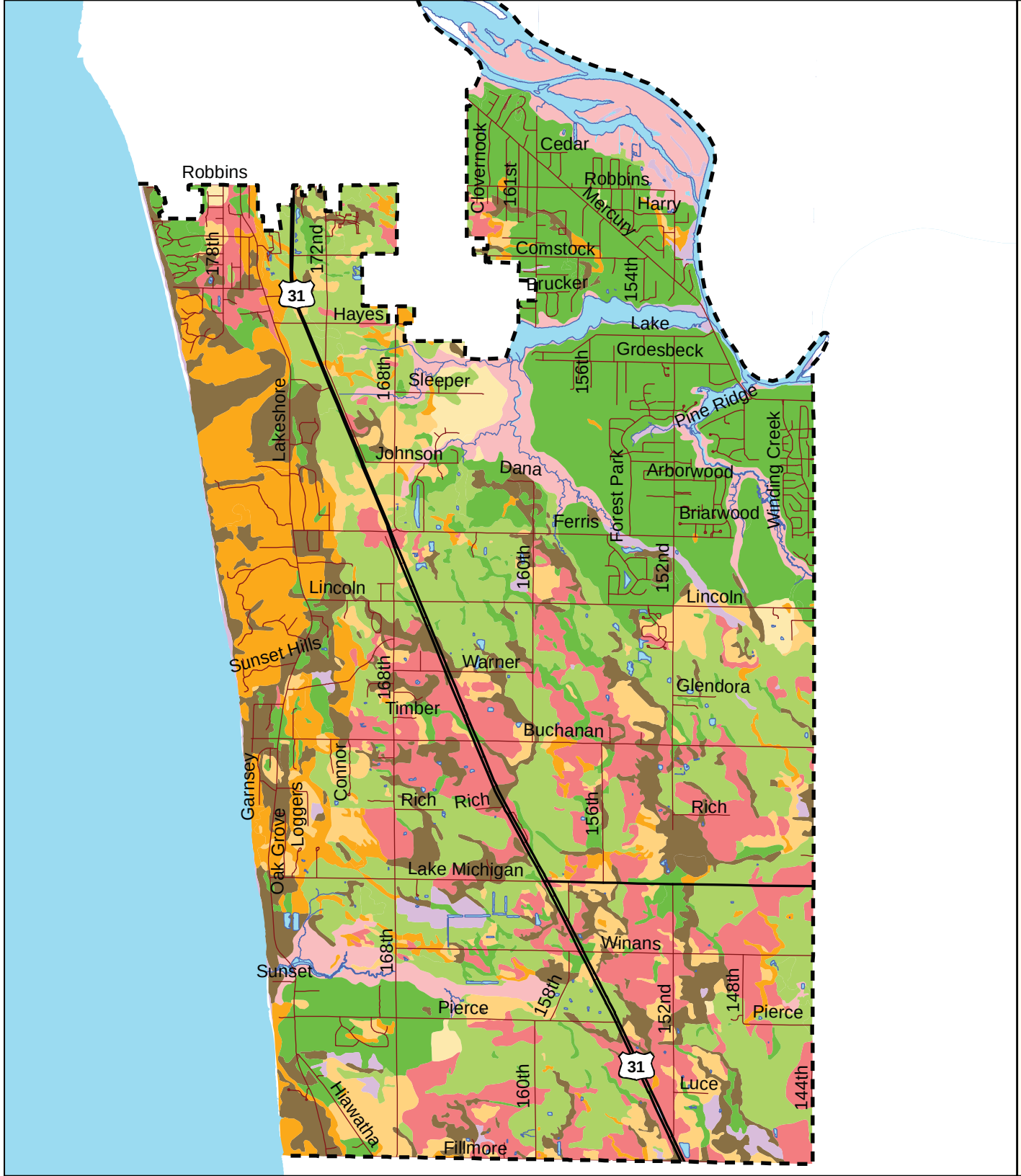
Data Sources:
Michigan Geo. Data Library
City of Grand Haven
Ottawa County GIS

N

Prepared August 2015 by:

Resilient GRAND HAVEN!

LIAA



Grand Haven Charter Township
Soil Classification
Map 5.4

- 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

Miles
0 2

Data Sources:
Michigan Geo. Data Library
Ottawa County GIS

N

Prepared August 2015 by:

Resilient GRAND HAVEN!

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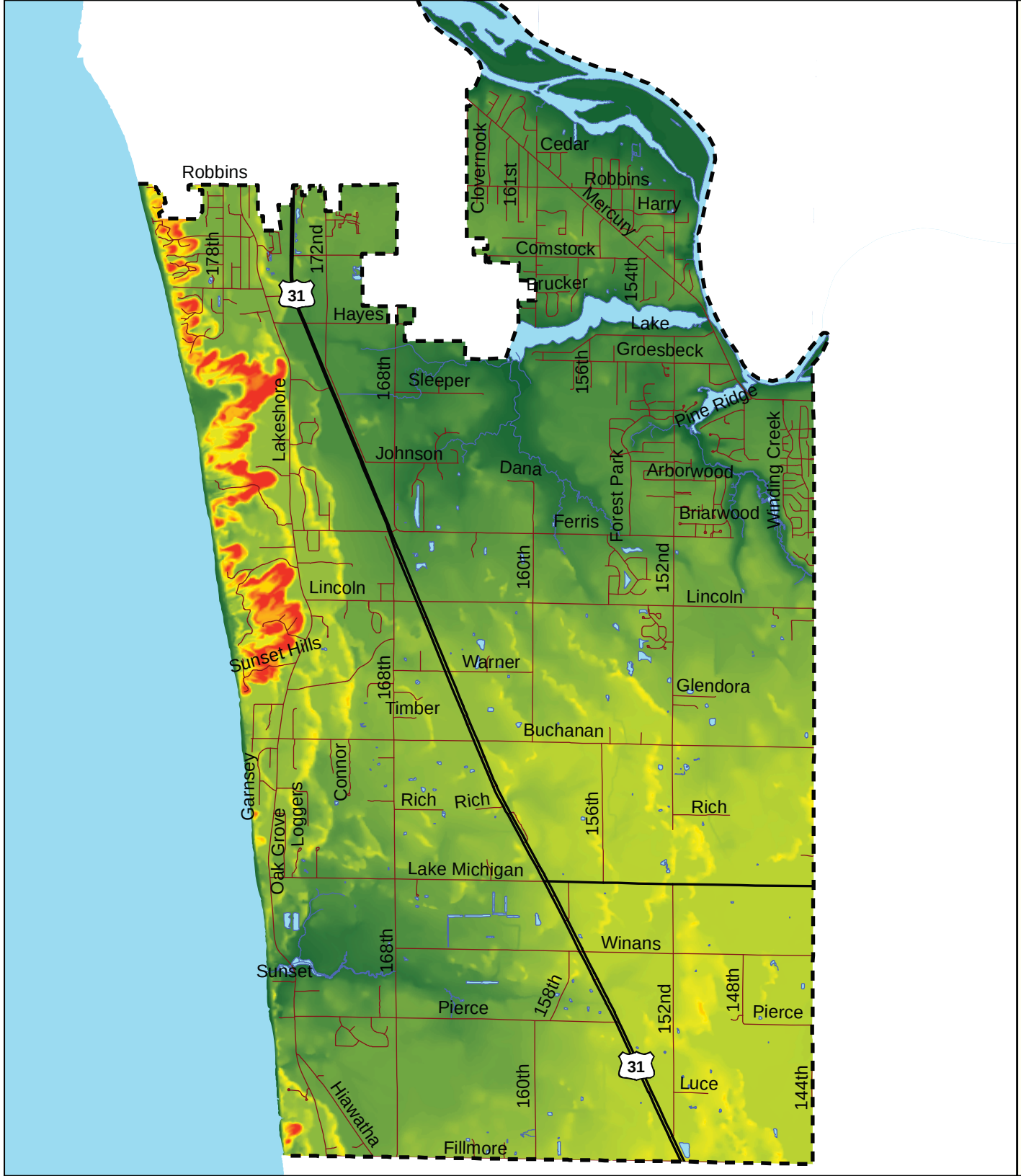


Grand Haven Charter Township
Digital Elevation Model
Map 5.5

High : 829.7 ft

Low : 578.4 ft

Jurisdiction Boundary

Highways

Roads

Lakes

Streams

Miles

0 2

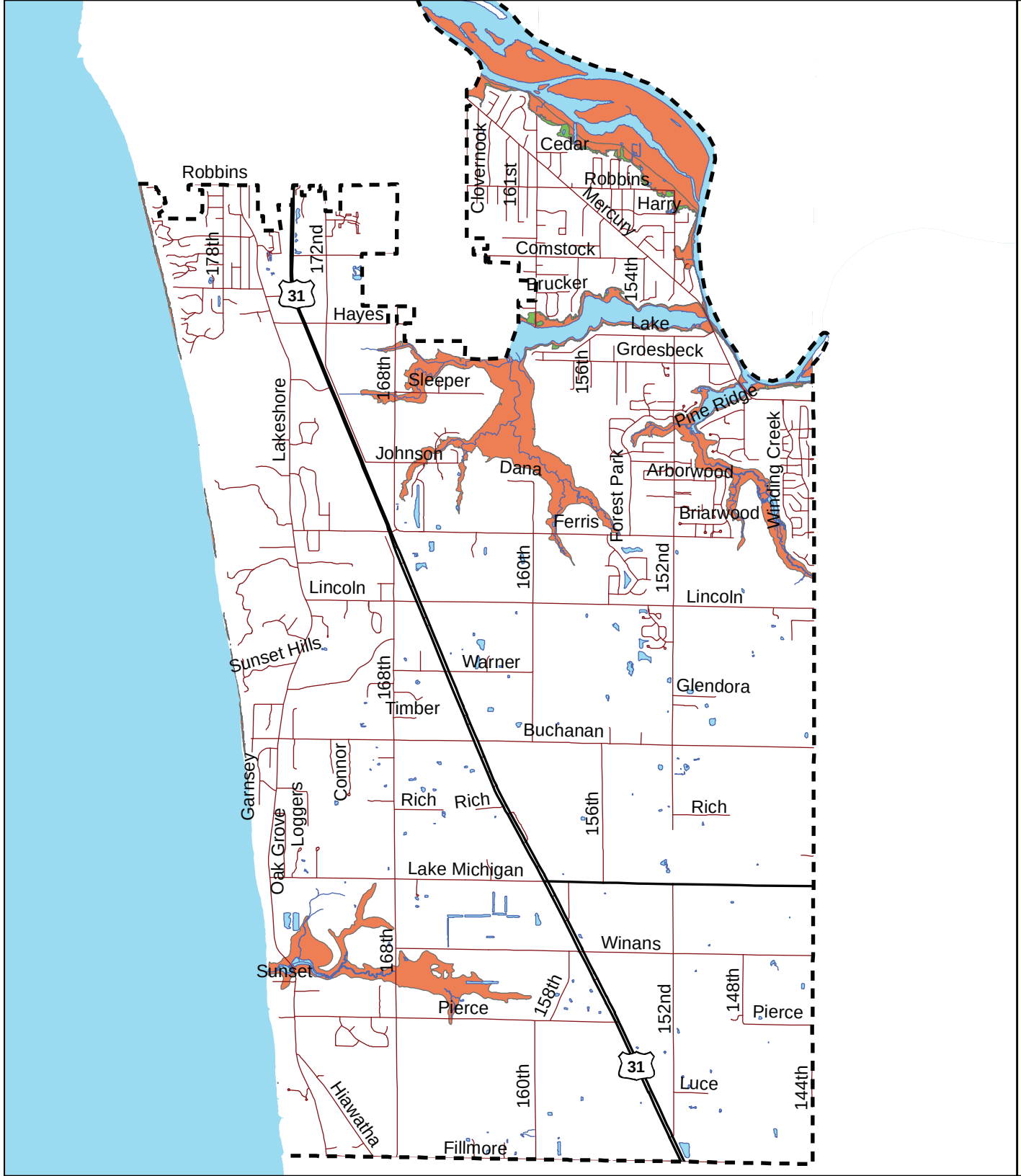
Data Sources:
USDA-NRCS Geospatial Data Gateway
Michigan Geo. Data Library
Ottawa County GIS

N

Prepared August 2015 by:

Resilient GRAND HAVEN!

LIAA



Grand Haven Charter Township
FEMA - 100 & 500 Year Flood Zones
Map 5.6

- 500 year Flood Zone
- 100 year Flood Zone
- Jurisdiction Boundary
- Highways
- Roads
- Lakes
- Streams

0 2 Miles

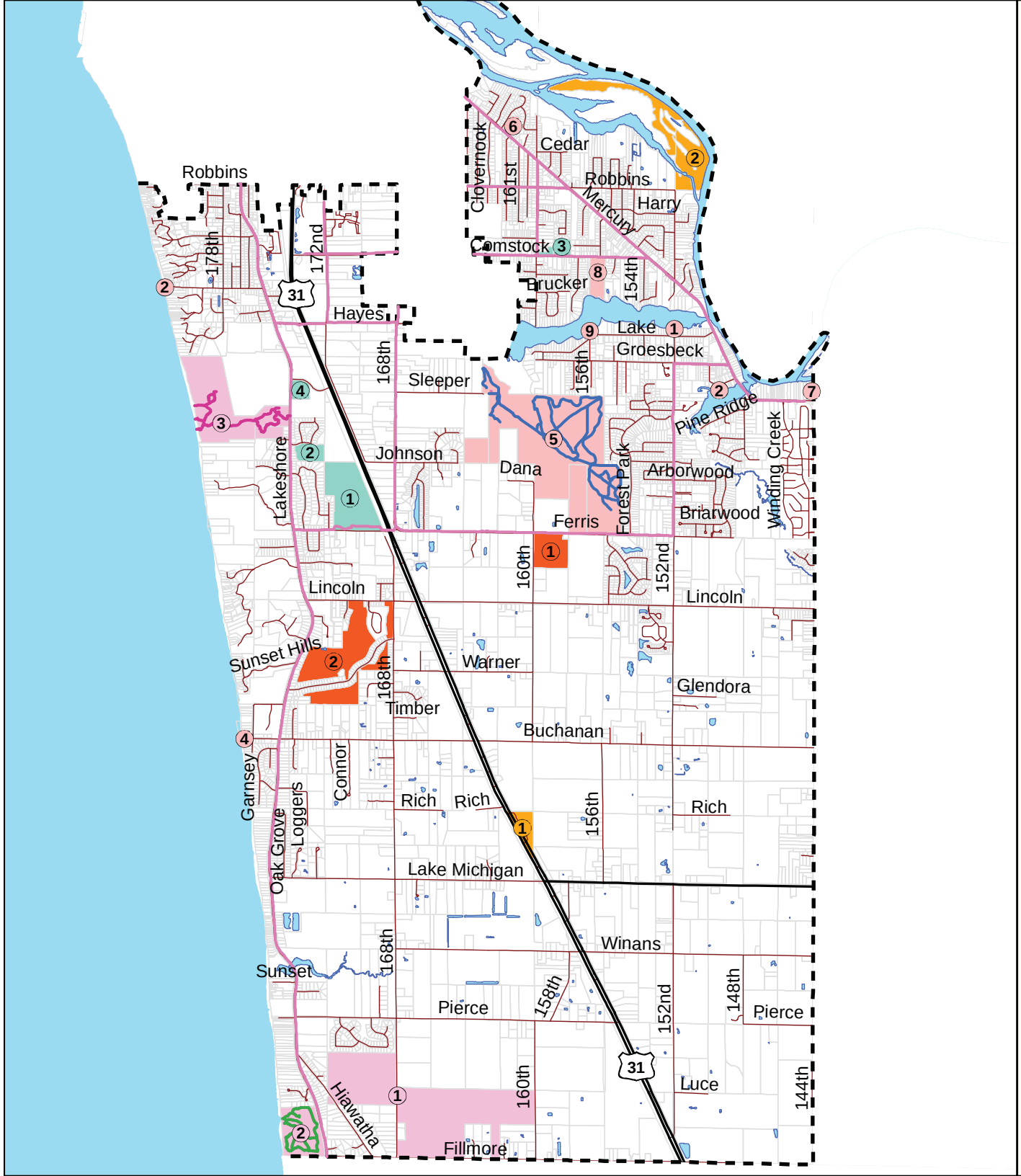
Data Sources:
FEMA
Michigan Geo. Data Library
City of Grand Haven
Ottawa County GIS

N

Prepared August 2015 by:

Resilient GRAND HAVEN!

LIAA



Grand Haven Charter Township
Parks and Trails
Map 5.7

- 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

Miles
0 2

Data Sources:
Grand Haven Charter Township
Michigan Geo. Data Library
Ottawa County GIS

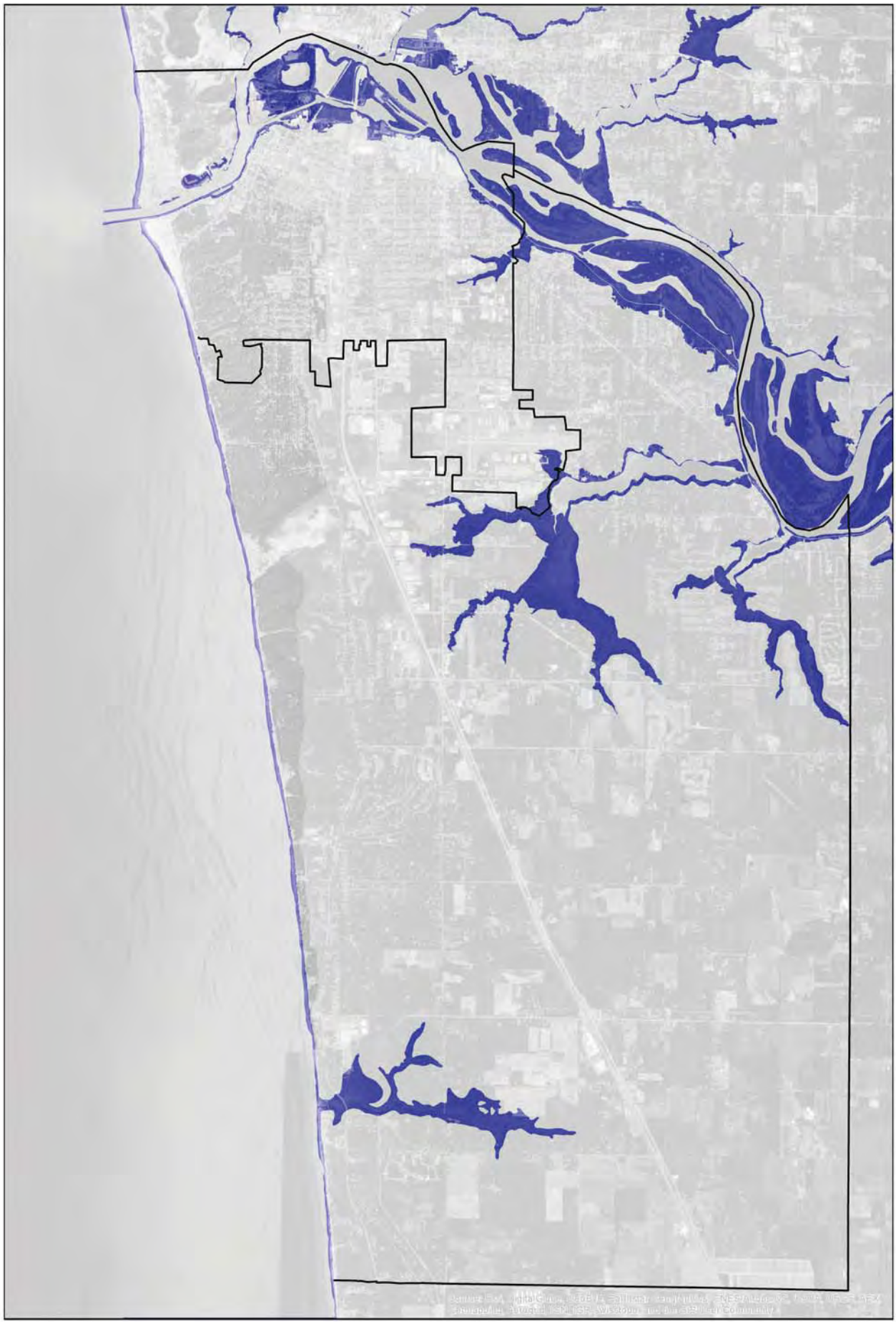
N

Prepared August 2015 by:

Resilient GRAND HAVEN!

LIAA

Map 11.1 "Lucky" Climate Future



"Lucky" Flood Scenario

1:42,000 0 0.25 0.5 1 1.5 2 Miles

11.2 “Expected” Climate Future

“Expected” Flood Scenario

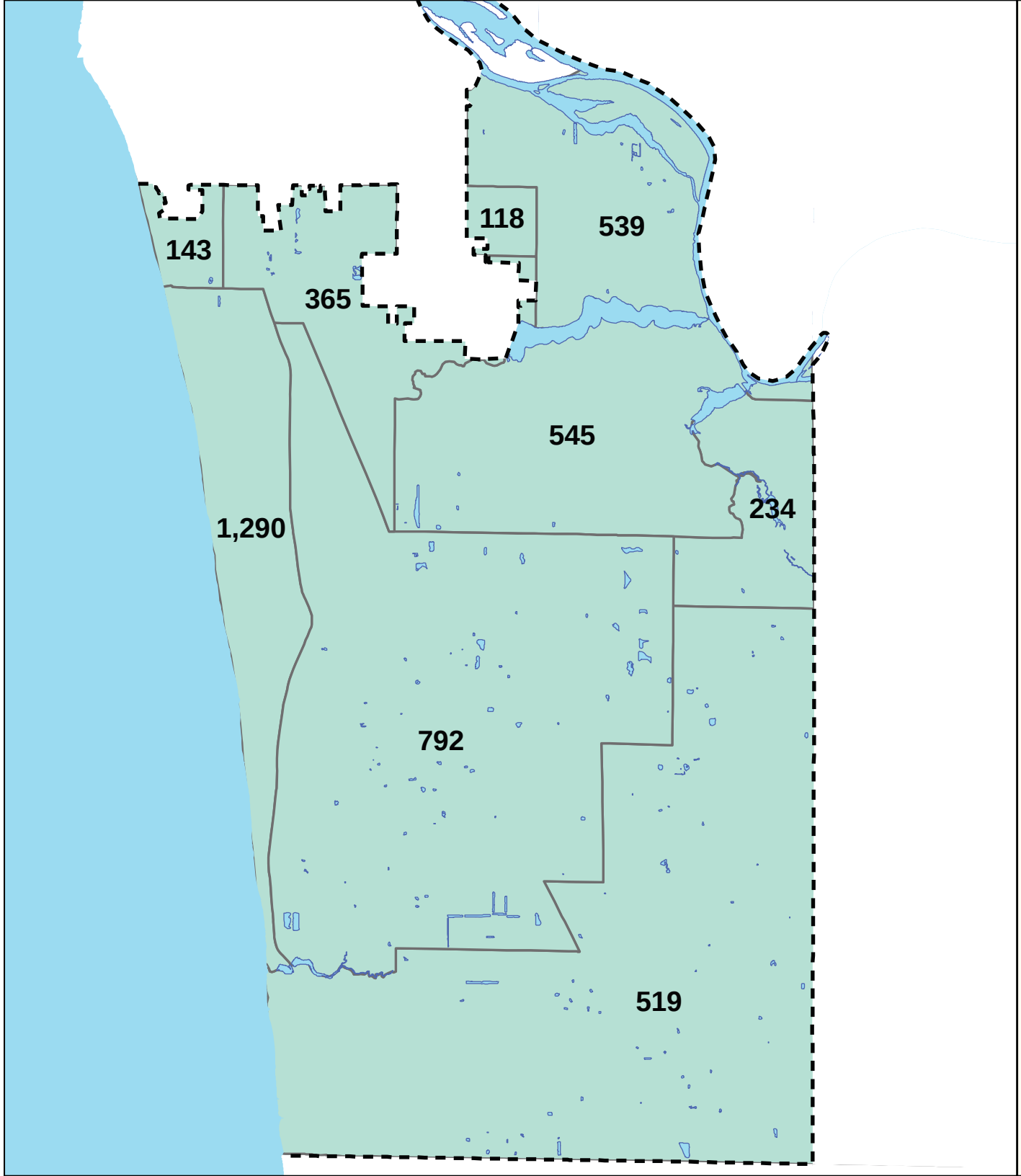
1:42,000 0 0.25 0.5 1 1.5 2 Miles

11.3 “Perfect Storm” Climate Future

“Perfect Storm” Flood Scenario

1:42,000 0 0.25 0.5 1 1.5 2 Miles

Grand Haven Charter Township
Buildout Analysis
Map 11.4



Sections, based on Block Groups*
Jurisdiction Boundary
Lakes

* The number in each section summarizes additional residential unit growth possible under current zoning

Miles
0
2

N

Data Sources:
U.S. Census Bureau,
Block Group Level Data (2010)
Michigan Geo. Data Library
Ottawa County GIS

Prepared August 2015 by:

Resilient GRAND HAVEN!

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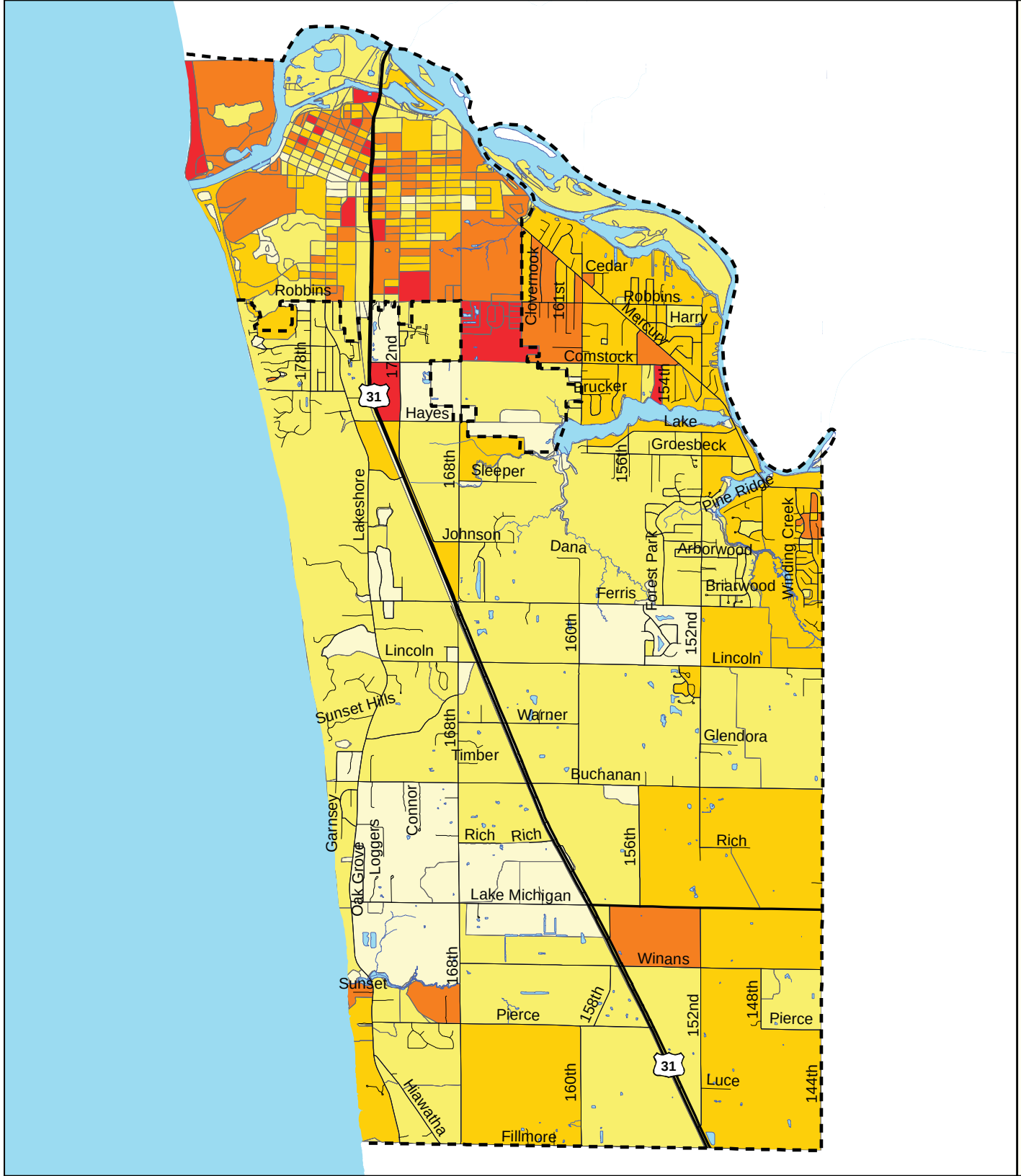

Grand Haven Charter Township
Relative Sensitivity of Populations to Extreme Heat Events
Map 12.1

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

0 2 Miles

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

N

Prepared August 2015 by:

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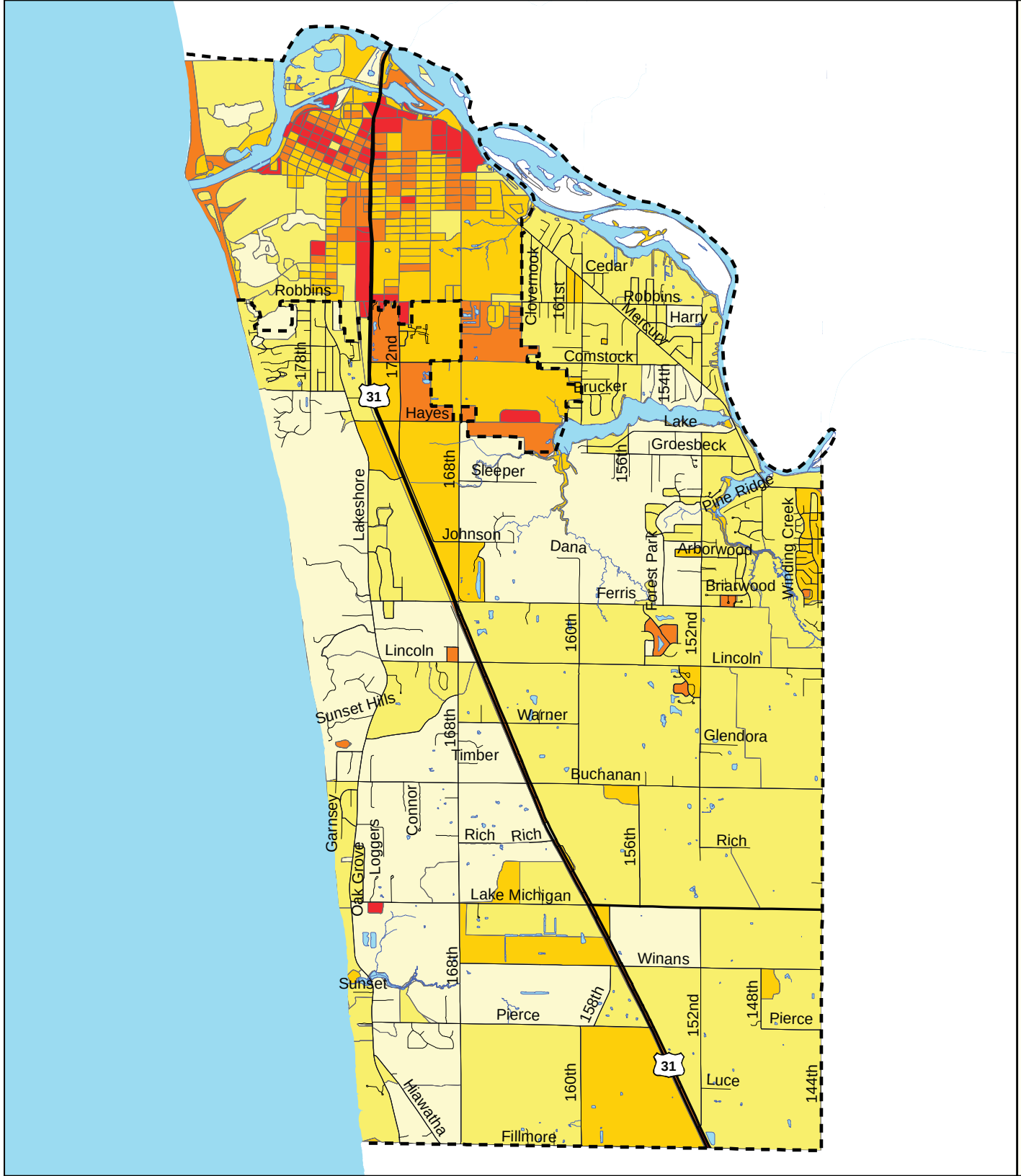

Grand Haven Charter Township
Relative Exposure of Populations to Extreme Heat Events
Map 12.2

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

0 2 Miles

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

N

Prepared August 2015 by:

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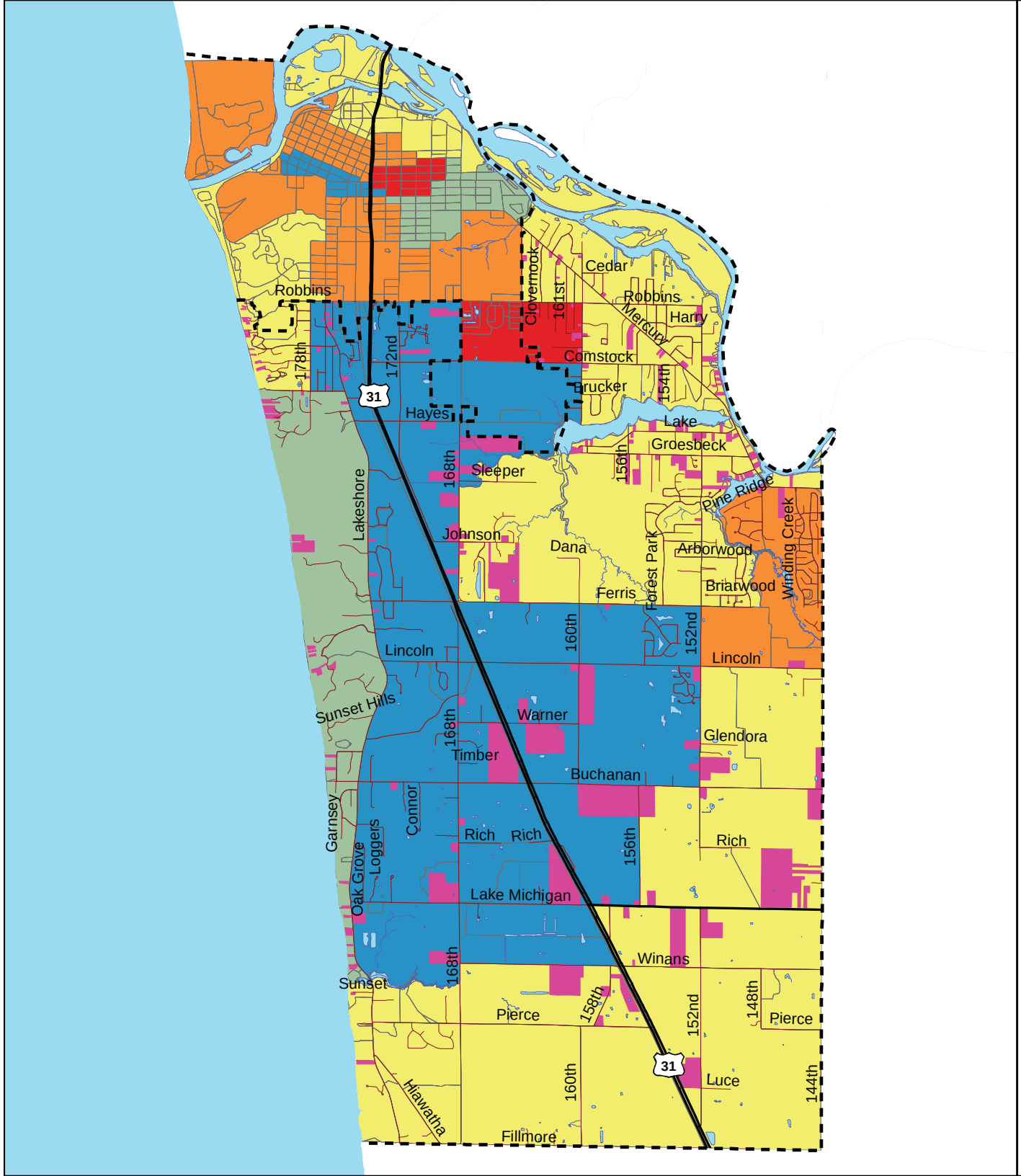


Grand Haven Charter Township
Household Sensitivity
Map 12.3

- 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

0 2 Miles

Data Sources:
U.S. Census Bureau, Block Level Data (2010)
Grand Haven Charter Township
Michigan Geo. Data Library
Ottawa County GIS

N

Prepared August 2015 by:

Resilient GRAND HAVEN!

LIAA

GRAND HAVEN CHARTER TOWNSHIP

Community Development Memo

DATE: December 30, 2015

TO: Planning Commission

FROM: Stacey Fedewa, Planning & Zoning Official

RE: Proposed Zoning Text Amendment Ordinance (Draft)

BACKGROUND

During the last 18 months the Planning Commission has been working to update the Master Plan. The Resilient Master Plan has a focus on protecting the valuable undeveloped land that remains in the Township.

One way to accomplish this goal is to adopt text amendments to the zoning ordinance that allow a developer to build vertically rather than horizontally. In doing so, less undeveloped land is disturbed. Furthermore, by strategically allowing increased building heights within the "urbanized" areas, the Township is able to limit the costs of infrastructure extensions.

Extending infrastructure to undeveloped areas inherently promotes the development of such land. Additionally, although the developer is responsible for installation—the Township is financially responsible for long-term maintenance of the new infrastructure.

Moreover, the Township is experiencing a more diverse development pressure than it was in 1999, when the current zoning ordinance was adopted. In order to remain proactive in managing the growth of the Township it is imperative that ordinance regulations are tailored accordingly.

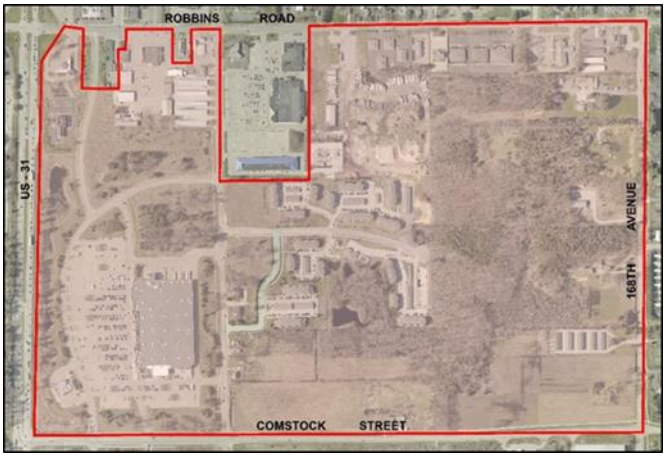
As such, the Planning Commission has directed staff to begin drafting text amendments to address the current development trends.

PROPOSED TEXT AMENDMENT

Per the direction of the Planning Commission staff has drafted five text amendments to the Planned Unit Development (PUD) Chapter of the Zoning Ordinance. As previously discussed, the logical and strategic location to "test" increased building heights—to address sprawl—is within the Robbins

Road Sub-Area (*see below*). This is the "urbanized" area of the Township that is on the cusp of rapid redevelopment. Furthermore, this amendment will support the goals and objectives of the Robbins Road Sub-Area Plan and Resilient Master Plan.

The proposed text amendments address three items:



1. The **regulatory flexibility** language that grants authority to approve departures from the zoning ordinance has been addressed more explicitly. The proposed amendment provides clearer direction to the Planning Commission and Township Board for making decisions on departure requests.
2. There is a lack of cohesion between the **land uses permitted by the PUD Chapter** in the Zoning Ordinance, and those described in the Master Plan. In an effort to ensure the two documents are cohesive staff has simplified the uses permitted by right, and those permitted as a special land use.
3. To allow an **increased building height for Commercial PUD's** within the boundaries of the Robbins Road Sub-Area. Staff recommends a maximum building height of 4 stories, or 55 feet, whichever is lower.
    - Fifty-five feet, is a common building height that allows for a multitude of use groups by the Michigan Building Code.
    - The MBC, coupled with the GHT Fire/Rescue equipment that can reach a height of 75 feet, forms the basis for why the proposed combination of height and stories was selected.

NEXT STEPS

Staff has scheduled the public hearing for the proposed amendments for January 19th. If the Planning Commission would like revisions to the proposed amendment please direct staff to make those modifications prior to the public hearing.

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

ORDINANCE NO. ____

ZONING TEXT AMENDMENT ORDINANCE

AN ORDINANCE TO AMEND THE ZONING ORDINANCE OF GRAND HAVEN CHARTER TOWNSHIP, OTTAWA COUNTY, MICHIGAN, BY ADDRESSING REGULATORY FLEXIBILITY, BASE REGULATIONS, COMMERCIAL PLANNED UNIT DEVELOPMENT LAND USES, STRUCTURE HEIGHT; AND BY PROVIDING FOR AN EFFECTIVE DATE.

GRAND HAVEN CHARTER TOWNSHIP, COUNTY OF OTTAWA, AND STATE OF MICHIGAN, ORDAINS:

Section 1. Planned Unit Development District – Regulatory Flexibility. Section 17.01.5 of the Grand Haven Charter Township Zoning Ordinance shall be restated in its entirety as follows.

Regulatory Flexibility. The provisions of this Chapter are not intended as a device for ignoring this Ordinance, or the planning upon which it has been based. However, to encourage flexibility and creativity consistent with the PUD concept, departures from the regulations may be permitted subject to review and approval by the Township Board after the recommendation of the Planning Commission. For example, such departures may include but are not limited to modifications in lot dimensional standards; floor area standards; setback requirements; height requirements; parking, loading, and landscaping requirements; and similar requirements. Such modifications may be permitted only if they will result in a higher quality development than would be possible without the modifications. The provisions of this Chapter are intended to result in the land use development that is substantially consistent with the goals and objectives of the Township Master Plan, this Ordinance, and consistent with sound planning principles.

Section 2. Permitted Planned Unit Developments – Base Regulations. Section 17.06 of the Grand Haven Charter Township Zoning Ordinance shall be restated in its entirety as follows.

1. A Planned Unit Development may be approved as any of the following:

    A. Residential PUD (Section 17.07)
    B. Commercial PUD (Section 17.08)
    C. Industrial PUD (Section 17.09)
    D. Mixed-Use PUD (Section 17.10)

2. Applicable Base Regulations. Unless waived or modified in accordance with Section 17.01.5, the yard and lot coverage, parking, loading, landscaping, lighting, and other standards for the underlying zoning shall be applicable for uses proposed as part of a PUD. The underlying zoning

shall be the current zoning map designation of the property in the proposed PUD, or the Future Land Use Map designation of the property. Mixed-uses shall comply with the regulations applicable for each individual use, except that if regulations are inconsistent with each other, the regulations applicable to the most dominant use shall apply. The site standards for all individual land uses and facilities as provided in this Ordinance (such as special land uses) must be observed unless waived by the Township Board after the recommendation of the Planning Commission for any, or all, of the specific uses and facilities.

Section 3. Commercial PUD – Permitted Uses. Section 17.08.2 of the Grand Haven Charter Township Zoning Ordinance shall be restated in its entirety as follows.

2. Except as provided in Section 17.08.3 below, in a Commercial PUD District, no building or land shall be used and no building or structure shall be erected, except for the following uses:

   A. C-1 Commercial District Permitted Uses described in Section 15.02.

   B. SP Service/Professional District Permitted Uses described in Section 14.02.

Section 4. Commercial PUD – Special Land Uses. Section 17.08.3 of the Grand Haven Charter Township Zoning Ordinance shall be restated in its entirety as follows.

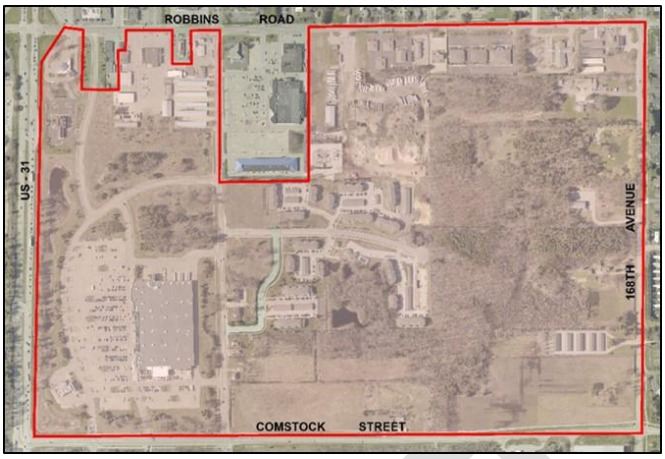
3. The following uses are permitted in the Commercial PUD District when the PUD approval includes a consideration of the standards and the relevant specific requirements imposed by Chapter 19 (Special Land Uses):

   A. C-1 Commercial District Special Land Uses described in Section 15.03.

   B. SP Service/Professional District Special Land Uses described in Section 14.03.

Section 5. Commercial PUD – Structure Height. Section 17.08.5 of the Grand Haven Charter Township Zoning Ordinance shall be added to state in its entirety as follows.

5. All buildings within the Robbins Road Sub-Area, as illustrated below, shall have a maximum structure height of four (4) stories, or fifty-five (55) feet, whichever is lower. This Section should not be interpreted as a prohibition of granting reasonable height departures outside of the Sub-Area.



Section 6. Effective Date. This amendment to the Grand Haven Charter Township Zoning Ordinance was approved and adopted by the Township Board of Grand Haven Charter Township, Ottawa County, Michigan on _____, 2016, after a public hearing as required pursuant to Michigan Act 110 of 2006, as amended; after introduction and a first reading on _____, 2016, and after posting and publication following such first reading as required by Michigan Act 359 of 1947, as amended. This Ordinance shall be effective on _____, 2016, which date is the eighth day after publication of a Notice of Adoption and Posting of the Zoning Text Amendment Ordinance in the *Grand Haven Tribune*, as required by Section 401 of Act 110, as amended. However, this effective date shall be extended as necessary to comply with the requirements of Section 402 of Act 110, as amended.

_____	_____
Karl French, Township Supervisor	Laurie Larsen, Township Clerk

CERTIFICATE

I, Laurie Larsen, the Clerk for the Charter Township of Grand Haven, Ottawa County, Michigan, certify that the foregoing Grand Haven Charter Township Zoning Text Amendment Ordinance was adopted at a regular meeting of the Township Board held on _____, 2016. The following members of the Township Board were present at that meeting: _____ _____. The following members of the Township Board were absent: _____. The Ordinance was adopted by the Township Board with members of the Board _____ _____ _____ voting in favor and members of the Board _____ voting in opposition. Notice of Adoption of the Ordinance was published in the *Grand Haven Tribune* on _____, 2016.

_____
Laurie Larsen,
Township Clerk

GRAND HAVEN CHARTER TOWNSHIP
PLANNING COMMISSION
2016 MEETING DATES

Monday, January 4, 2016
Tuesday, January 19, 2016
Monday, February 1, 2016
Monday, February 15, 2016
Monday, March 7, 2016
Monday, March 21, 2016
Monday, April 18, 2016
Monday, May 2, 2016
Monday, May 16, 2016
Monday, June 6, 2016
Monday, June 20, 2016

Tuesday, July 5, 2016
Monday, July 18, 2016
Monday, August 1, 2016
Monday, August 15, 2016
Tuesday, September 6, 2016
Monday, September 19, 2016
Monday, October 3, 2016
Monday, October 17, 2016
Monday, November 7, 2016
Monday, November 21, 2016
Monday, December 5, 2016

All meetings will be held at the Township Hall, 13300 168th Avenue, Grand Haven, and will begin at 7:30 p.m.

The Charter Township of Grand Haven will provide necessary reasonable auxiliary aids and services, such as signers for the hearing impaired and audiotapes of printed materials being considered at the meeting, to individuals with disabilities at the meeting/hearing upon seven (7) business days notice to the Charter Township of Grand Haven. Individuals with disabilities requiring auxiliary aids or services should contact the Charter Township of Grand Haven by writing or calling the following:

Director of Administrative Services
13300 168th Avenue
Grand Haven, MI 49417
(616) 842-5988