City of Jacksonville Beach

Agenda

Planning Commission

11 North Third Street
Jacksonville Beach, Florida

Monday, March 9, 2020 | **7:00 PM** | **Council Chambers**

MEMORANDUM TO:

Members of the Planning Commission
City of Jacksonville Beach, Florida

The following Agenda of Business has been prepared for consideration and action at the Regular Meeting of the Planning Commission.

1. **Call to Order**

2. **Roll Call**: Greg Sutton (Chair), Dave Dahl (Vice-Chair), Britton Sanders, Margo Moehring, Jon Scott Walker
   Alternates: Colleen White, Justin Lerman

3. **Approval of Minutes**: January 27, 2020

4. **Correspondence**: None

5. **New Business:**

   (A) **PC#5-20**
   Comprehensive Plan Text Amendment Application proposing a text amendment to the adopted *2030 Comprehensive Plan*, amending the Coastal Management Element to incorporate new objectives and policies that address the "Peril of Flood" statutory requirements of s. 163.3178(2)(f), Florida Statutes.

6. **Planning Department Report:**

   (A) The next meeting is tentatively scheduled for Monday, March 23, 2020.

NOTICE

In accordance with Section 286.0105, Florida Statutes, any person desirous of appealing any decision reached at this meeting may need a record of the proceedings. Such person may need to ensure that a verbatim record of the proceedings is made, which record includes the testimony and evidence upon which the appeal is to be based.
The public is encouraged to speak on issues on this Agenda that concern them. Anyone who wishes to speak should submit the request to the recording secretary prior to the beginning of the meeting. These forms are available at the entrance of the City Council Chambers for your convenience.
In accordance with the Americans with Disabilities Act and Section 286.26, Florida Statutes, persons with disabilities needing special accommodation to participate in this meeting should contact the City Clerk's Office at (904) 247-6299, extension 10, no later than one business day before the meeting.
If you plan on attending or presenting at the hearing then you may use this website www.jacksonvillebeach.org/publichearinginfo for information concerning the hearing process. This information is also available in the City Hall first floor display case.

Minutes of Planning Commission Meeting
held Monday, January 27, 2020, at 7:00 P.M.
in the Council Chambers, 11 North 3rd Street,
Jacksonville Beach, Florida

Call to Order

The meeting was called to order at 7:05 P.M. by Chairman Greg Sutton.

Roll Call

Chairman:	Greg Sutton		
Vice-Chairman:	David Dahl (*absent*)		
Board Members:	Margo Moehring (*absent*)	Britton Sanders	Jon Scott Walker
Alternates:	Justin Lerman	Colleen Murphy White	

Also present was Senior Planner Heather Ireland and Planning and Development Director Bill Mann.

Approval of Minutes

It was moved by Mr. Sanders, seconded by Ms. Murphy White, and passed unanimously to approve the following minutes:

- January 13, 2020

Correspondence

None

New Business

(A) PC#1-20 1304 North 1st Avenue

Owner: JWB Real Estate Capital
7563 Philips Highway Suite 208
Jacksonville, FL 32256

Applicant: Alex Sifakis
JWB Real Estate Capital
7563 Philips Highway Suite 208
Jacksonville, FL 32256

Agent: Curtis Hart
Hart Resources, LLC
8051 Tara Lane
Jacksonville, FL 32216

Concept Plan for Plat Application for a proposed three lot, fee-simple townhouse subdivision located in a *Commercial, general: C-2* zoning district, pursuant to Section 34-503 of the Jacksonville Beach Land Development Code.

Staff Report:
Ms. Ireland read the following report into the record:
The subject property is located on the south side of 1st Avenue North between Penman Road and 11th Street North. The property was historically a single-family residential use, despite being located in a commercial zoning district, which does not permit single-family residential uses. The applicant wishes to redevelop the property with a three-unit fee-simple townhouse project.

The applicant received Conditional Use approval via PC#5-17 on February 27, 2017, for multiple-family residential in a *C-2* zoning district for the proposed three-unit townhouse project. The applicant also received Concept Plan for Plat approval in April of 2017; however, that approval has expired. The applicant's proposed plan shows three townhouse lots that meet the minimum *RM-1* townhouse lot sizes and street frontages, (2,500 square foot exterior lots, and 1,500 square foot interior lots).

Adjacent property uses include single-family to the north across 1st Avenue North, a vacant property to the east, commercial to the west, and commercial to the south along Beach Boulevard. The proposed three-unit townhouse project is consistent with the mixed-use character of the surrounding area, meets the *RM-1* zoning district requirements, and represents a transitional use between the commercial uses on Beach Boulevard and the single-family residential neighborhood to the north.

Agent Curtis Hart, 8051 Tara Lane, Jacksonville, said this was an excellent location for transition zoning between the nearby residential and commercial uses.

Public Hearing:
No one came before the Commission to speak about this case.

Mr.Sutton closed the Public Hearing.

Discussion:
There was no additional discussion by the Commission.

Motion: It was moved by Mr. Walker and seconded by Ms. Murphy White to accept the Concept Plan for Plat Approval.

Roll call vote: Ayes – Britton Sanders, Jon Scott Walker, Colleen Murphy White, Justin Lerman, and Greg Sutton
The application was approved by a 5-0 vote.

(B) **PC#2-20** Land Development Code Text Amendment Application

Applicant: Planning and Development Department
11 North 3rd Street
Jacksonville Beach, FL 32250

Land Development Code Text Amendment Application to amend various text in Article II, Article IV, Article V, Article VI, Article VII, Article VIII, and Article IX of Chapter 34, Land Development Code.

Staff Report:
Ms. Ireland read the following report into the record:
Periodically, the text of the Land Development Code (LDC) must be reviewed and amended to address needed and/or desired updates and improvements. In 2001, the Land Development Code was amended in this manner under Ordinance No. 2001-7810. Changes in that ordinance included text amendments to Articles I, II, IV, VI, VII, VIII, IX, and X, and XII. Since then, minor changes have been made to the LDC over the last 17 years as needed or requested by an applicant. Staff has been assembling the most recent package of required/desired changes over the last several years and has developed a list of amendments for consideration. These proposed amendments are attached to the Land Development Code Text Amendment Application. Changes are proposed to Articles II, IV, V, VI, VII, VIII, and IX of the LDC.

The Planning and Development Director will be present at the January 27th Planning Commission meeting to review and discuss the proposed amendments. A description of the proposed amendments are as follows:

- **Typographical errors** are being corrected in Sections 34-177, 34-179, 34-346(d)(3), and 34-503(5).
- **Section 34-21(e)(1)** – Clarification that appeals of interpretations by the Planning and Development Director may be submitted by an applicant with "standing," per the new definition of "standing," and that appeals are made to the "Circuit Court of Duval County" instead of the "Board of Adjustment," thereby taking an unreasonable burden off of that lay board.
- **Section 34-41** –Definitions are being amended or added for the following terms:
    - Artwork – remove size limitations for murals.
    - Carport – make consistent with Florida Building Code.
    - Driveway – new definition for clarification.
    - Lot of record – new definition for clarification.
    - Shopping Center – change from "two" to "three" separate stores.
    - Walkway – new definition for clarification.
- **Section 34-93(b)** – Change the appointment term for alternates on the Board of Adjustment from "two" years to "four" years, consistent with other boards, and with terms for members.
- **Section 34-155(c)(2)b.** – Change "recommendation" to "report."
- **Section 34-203** – Change Section to reflect that only the Planning Director, Planning Commission, and City Council can initiate changes or amendments to the text of the LDC.
- **Section 34-207** – Change "recommendation" to "report," and adjust the time in which a staff report is to be provided to an applicant. Add that a staff report may contain suggestions for conditions of approval as applicable.

- **Section 34-211(b)** – Change to clarify that the City Council hears the Planning Director's report, and the Planning Commission's recommendation on zoning amendment applications.
- **Section 34-222** – Change "recommendation" to "report."
- **Section 34-283** – Add that a variance may not be requested for relief from maximum building height, residential density, or minimum lot area requirements. (Re-stating current regulations in an appropriate location.)
- **Sections 34-336, 34-337, 34-338, 34-339, and 34-340** – Move "Essential public services," as currently defined in the LDC, from the list of conditional uses to the list of permitted uses in all residential zoning districts.
- **Sections 34-339, 34-340** - Add single-family dwellings, constructed per RS-3 standards, to the list of permitted uses in RM-1 and RM-2 multi-family zoning districts.
- **Section 34-345(b)(19)** – Technical correction for multi-family dwelling developments in *Central Business District: CBD* zoning, correctly referencing the CBD's Site Design and Lot Layout Standards as being applicable to multifamily development in the CBD, in addition to the maximum 40 units per acre density standard.
- **Section 34-373(a)(5) and (a)(6)** – Add a dimensional standard for wheel strips when used for required parking spaces or access to required parking spaces, and add a standard for bicycle parking areas in off-street parking lots containing ten or more spaces.
- **Section 34-373(f)** – Add language to clarify that vehicular access to required parking must also be paved.
- **Section 34-392(a)(1)** – Add a standard that air conditioning compressors can only be located in side yards that are at least seven and a half feet wide, for safety and access reasons.
- **Section 34-392(4)(a)4.** – Change reference to the "Standard Swimming Pool Code" to the "Florida Building Code."
- **Section 34-395** – Change "street lines" to "right-of-way lines" to clarify the definition of corner sight visibility triangles.
- **Section 34-399(e)(5)** – Add "internet websites" and "social media" to the list of prohibited locations where home occupations can advertise their home addresses, reflective of current technologies.
- **Section 34-444(25)** – Add that signs on fences or perimeter walls are prohibited (in addition to signs on trees and other vegetation).
- **Section 34-504** – Change "development order for a development plan" to "application for development plan" for clarification.
- **Section 34-505** – Require five copies of a final plat application to be submitted instead of 10 copies, to reflect actual need.

Ms. Ireland and Mr. Mann read and explained the proposed amendments. Mr. Mann stated the Planning Commission would make a recommendation to the City Council regarding the amendments.

Public Hearing:
No one came before the Commission to speak about this case.

Mr. Sutton closed the Public Hearing.

Discussion:
In response to a question regarding the Comprehensive Plan, Mr. Mann stated staff would determine in 2020 if they must conduct an Evaluation and Appraisal Report (EAR), which would clarify if the City's Comprehensive Plan was concurrent with statutory changes.

Motion: It was moved by Mr. Walker and seconded by Ms. Murphy White to approve.

Roll call vote: Ayes – Justin Lerman, Colleen Murphy White, Jon Scott Walker, Britton Sanders, and Greg Sutton
The application was approved by a 5-0 vote.

(C) PC#3-20 Land Development Code Text Amendment Applicatoin

Applicant: Planning and Development Department
11 North 3rd Street
Jacksonville Beach, FL 32250

Land Development Code Text Amendment Application to amend the text in Section 34-406 to allow six (6) foot tall fences in front yards of properties in residential zoning districts that front S.R. A1A (3rd Street).

Staff Report:
Ms. Ireland read the following report into the record:
This amendment is being proposed by the City Council for consideration, at the request of a homeowner who lives at 3477 South 3rd Street. The homeowner installed a six (6) foot tall wooden fence in the front yard area of the subject property, without obtaining a fence permit, which also extended into the Florida Department of Transportation (FDOT) right-of-way in front of the property. The fence was installed behind an existing hedge planted by a previous owner of the property also in the FDOT right-of-way. The property was cited by Code Enforcement in July 2018 for installing a fence without a permit (Code Enforcement Case #18-219).

The existing six-foot tall fence cannot be permitted by the Planning and Development Department under current zoning regulations due to its location in the required front yard setback of the property and also off of the homeowner's private property in the State Road A-1-A right-of-way. The placing of any structure, including a fence, within the State Road A-1-A (3rd Street) right-of-way, would require approval from the FDOT. Conversely, if the fence were to be relocated into the front yard of the subject property, along the front property line, it could only be permitted to a maximum height of four (4) feet.

There are several reasons why front yard fences are restricted to four (4) feet in height. The primary reason is to allow for passive drive-by surveillance of buildings on developed properties by law enforcement. Another reason is to aid in address location by emergency responders. Finally, the

regulation of front yard fences at any specific height is to promote a general consistency in appearance from property to property that front on any given street or avenue.

Given that the residentially zoned properties fronting on 3rd Street are almost totally developed, an amendment to allow higher front yard fences for properties with front yards facing 3rd Street would benefit only a few properties. The homeowner has presumably modified their existing fence to comply with the Code Enforcement order, and the existing hedge remains in the front of the property.

This is the only the third request for additional fence height in a front yard setback area for a property fronting on 3rd Street in over 20 years. The other two requestors, one of which was from the inquirer's immediate neighbor to the south, were cited for illegal fence installation in the general timeframe in 2018 that the owner of 3477 South 3rd Street was cited. Both of those property owners have since modified their fences to bring them into compliance with the current four (4) foot maximum height for fences in front yards.

Finally, given that the property at 3477 South 3rd Street is 54 feet wide across the front property line of the lot, that the existing driveway from the house out to 3rd Street is approximately 17 feet wide at the front property line, and that the driveway is required to have a 10-foot sight visibility triangle on either side of it with nothing allowed within the triangles above 2.5 feet in height, if a 6-foot tall fence were to be permitted across the front property line, there would still be required to be a 37-foot wide-open gap in the fence to accommodate the driveway and its two sight triangles. That would leave a total of only 17 feet of front property line that could contain the desired 6-foot tall fence.

Public Hearing:
No one came before the Commission to speak about this case.

Mr. Sutton closed the Public Hearing.

Discussion:
Mr. Mann stated the owner had cited noise and privacy as the reasons for installing the six-foot fence. He confirmed the owner had complied with the height restrictions, but the fence was still in the right-of-way.

Mr. Sanders objected because he feared it would set a precedent for properties in other areas, such as Penman Road. He was also very concerned about safety.

Motion: It was moved by Mr. Sanders and seconded by Mr. Lerman to deny.

Roll call vote: Ayes –Jon Scott Walker, Britton Sanders, Colleen Murphy White, Justin Lerman, and Greg Sutton
The application was denied by a 5-0 vote.

(D) **PC#4-20** Land Development Code Text Amendment Application

Applicant: Planning and Development Department
11 North 3rd Street
Jacksonville Beach, FL 32250

Land Development Code Text Amendment Approval amending the text in Section 34-346(b) to add "Mobile Food Vending Vehicles" to the list of Permitted Uses in *Industrial: I-1* zoning districts.

Staff Report:
Ms. Ireland read the following report into the record:
Staff was approached by a representative of the *Veterans of Foreign Wars Post 3270* (VFW) and a food truck operator seeking approval to operate his food truck at the VFW Post located on 9th Street South in an *Industrial: I-1* zoning district. Pursuant to Ordinance 2014-8042, food trucks are currently permitted uses only in *C-1*, *C-2*, *CS*, *CBD,* and in *RD* zoning districts that existed on January 1, 2014, and commercially designated areas of PUDs that existed on January 1, 2014. When Ordinance 2014-8142 was drafted in 2014, it was not contemplated that food truck operators would want to locate in the industrial areas of the city. Two public workshops were held on the subject matter, and the desire to allow food trucks in *I-1* zoning districts was not identified as a priority at that time.

Staff has been directed by City Council to draft an ordinance to add "Mobile Food Vending Vehicles" to the list of Permitted Uses in the *Industrial: I-1* zoning district. If approved, applicants would be required to adhere to the same process as food trucks in all other locations and provide property owner authorization, proof that the food truck meets the criteria established by Ordinance 2014-8041, and a site plan showing the proposed location of the vehicle. Staff has no objections to adding "Mobile Food Vending Vehicles" to the list of permitted uses in the *I-1* zoning district.

Mr. Mann noted this, and the previous ordinances were "sole purpose ordinances" requested by the Council and were therefore separate from the amendment package approved earlier.

Public Hearing:
No one came before the Commission to speak about this case.

Mr. Sutton closed the Public Hearing.

Discussion:
There was no additional discussion.

Motion: It was moved by Mr. Walker and seconded by Ms. Murphy White to approve.

Roll call vote: Ayes – Britton Sanders, Jon Scott Walker, Colleen Murphy White, Justin Lerman, and Greg Sutton
The application was approved by a 5-0 vote.

Planning & Development Director's Report

Ms. Ireland announced there were no meetings scheduled for February, so the next meeting would be March 9, 2020.

Adjournment

There being no further business coming before the board, Mr. Sutton adjourned the meeting at 7:59 P.M.

Submitted by: Jodilynn Byrd
Administrative Assistant

Approval:

_____
Chairman

_____
Date

MEMORANDUM

TO: Planning Commission Members

FROM: Heather Ireland, Senior Planner

DATE: March 2, 2020

RE: March 9, 2020 - Planning Commission Staff Report

The following information is provided for your consideration regarding the following agenda item for the upcoming **Monday, March 9, 2020** Planning Commission meeting.

NEW BUSINESS:

PC#5-20 **Comprehensive Plan Text Amendment Application**

Applicant: Planning and Development Department
11 North 3rd Street
Jacksonville Beach, FL 32250

Request: **Comprehensive Plan Text Amendment Application** proposing a text amendment to the adopted 2030 Comprehensive Plan, amending the Coastal Management Element to incorporate new objectives and policies that address Peril of Flood Statutory Requirements of s. 163.3178(2)(f), Florida Statutes.

Comments: In September of 2019, the City of Jacksonville Beach was awarded a grant from the Florida Department of Environmental Protection (FDEP) to analyze the City's vulnerability to sea level rise, spring tides, and storm surge. The City contracted with a consultant to carry out the grant requirements of conducting the technical analysis, summarizing the results, and identifying potential policy implications.

The grant project was split into two phases. Phase I involved gathering data from different sources and modeling the impacts over time of sea level rise, spring tide, storm surge, and collective events, such as sea level rise combined with storm surge. The modeling results were joined with parcel data, future land use, structure values, habitats, and major infrastructure to identify potential future vulnerability. The first public workshop was held on December 19, 2019 to present the findings and obtain public input. The results of Phase I were documented in the *Phase One Summary Report* (provided in your agenda packets).

Phase II involved evaluating potential options to mitigate or reduce the impacts from sea level rise and prepare comprehensive plan amendments to address the "peril of flood" requirement of Florida Statutes 163.3178(2)(f). New objectives and policies are proposed for addition under Goal CM. 3 of Coastal Management Element of the 2030 Comprehensive Plan. A second public workshop was held on February 24, 2020 to discuss the proposed amendments and obtain additional public input.

Florida Statutes 163.3178(2)(f) states that the Coastal Management Element of a Comprehensive Plan must contain a redevelopment component that outlines principles that must be used to address and eliminate inappropriate and unsafe development in the coastal areas when opportunities arise.

Land use strategies identified state-wide for potential policy options include the following:

- Retreat (not feasible)
- Density / Intensity Reduction (limited opportunities)
- Elevate / Vertical Mitigation (primary option)
- Increase open space / reduce impervious surfaces
- Increase retention capacity
- Limited shoreline hardening / revetment

The City's consultant for the grant will be providing additional details on the grant project and presenting the proposed Comprehensive Plan Amendments that are provided in your agenda packets. Following the Planning Commission meeting/Public Hearing, the proposed amendments will be presented to City Council on March 16, 2020. The proposed amendments will then be transmitted to State agencies for review and comment. Once approved, the proposed amendments will be again presented to the City Council for consideration and final adoption into the 2030 Comprehensive Plan.

COMPREHENSIVE PLAN AMENDMENT APPLICATION

PC NO. 5-20

HEARING DATE 3/9/20 AS/400# 20-100030

This form is intended for use in submitting a Site Specific Comprehensive Plan Amendment. A Site Comprehensive Plan Amendment is a request submitted by a property owner or group of property owners requesting a change in the boundaries of the Future Land Use Map of the Future Land Use Element of City of Jacksonville Beach 2010 Comprehensive Plan Elements. It is not intended to relieve particular hardships, nor to confer special privileges or rights on any person, but only to make necessary adjustments in light of changing conditions. Seven (7) copies of all materials are required. All applications shall include a $1,000.00 filing fee, as required by City Ordinance. A separate fee for advertising costs will be assessed accordingly.

APPLICANT INFORMATION

Land Owner's Name: N/A
Mailing Address: _____
_____
Telephone: _____
Fax: _____
E-Mail: _____

Applicant Name: Planning and Development Department
Mailing Address: 11 North 3rd Street
Jacksonville Beach, FL 32250
Telephone: (904) 247-6231
Fax: _____
E-Mail: planning@jaxbchfl.net

NOTE: Written authorization from the land owner is required if the applicant is not the owner.

Agent Name: _____
Mailing Address: _____
_____
Telephone: _____
Fax: _____
E-Mail: _____

Please provide the name, address and telephone number for any other land use, environmental, engineering, architectural, economic, or other professional consultants assisting with the application on a separate sheet of paper.

COMPREHENSIVE PLAN AMENDMENT DATA

Street Address of Property: N/A - Text amendment Real Estate Number: _____
Legal Description (Attach Copy of Deed): _____
Current Future Land Use Map Designation: _____ Proposed Future Land Use Map Designation: _____
Current Zoning Classification: _____

In reviewing an application for a site specific comprehensive plan amendment, the Planning Commission and City Council are required to consider the following items, in addition to the relationship to and consistency of the proposed change with the intent of the comprehensive plan. Attach a narrative statement outlining the relationship of the proposed amendment to the applicable factors:

1. Changed projections in the Comprehensive Plan that affect the boundaries of the Future Land Use Map;
2. Changed assumptions, including but not limited to the fact that growth in the area, in terms of the development of vacant land, new development, and the availability of public services has altered the character such that the amendment is now reasonable and consistent with the land use characteristics;
3. Data errors, including errors in mapping, vegetative types and natural forms in the Comprehensive Plan.
4. New issues that have arisen since the adoption of the Comprehensive Plan;
5. Recognition of a need for additional detail or comprehensiveness in the Comprehensive Plan; and
6. Data updates.

REQUIRED EXHIBITS *Provide the following exhibits as attachments, when applicable, with this form and required narrative statement:*	Attached? Yes	Attached? No
1. A copy of the appropriate Duval County Property Assessment Map, showing the exact location of the land proposed for the amendment, with the boundaries clearly marked;		✓
2. An 8 1/2 "x11" vicinity map locating the land proposed for amendment;		✓
3. An aerial photograph, less than twelve (12) months old, of the land proposed for amendment, with the boundaries clearly marked;		✓
4. A description of the proposed amendment and an explanation of how it relates to and is consistent with the Comprehensive Plan.	✓	
5. A traffic impact study shall be prepared by the city, at the applicant's sole expense, pursuant to LDC Section 34-160.		✓

Applicant Signature: _____ Date: 2/24/20

Draft City of Jacksonville Comprehensive Plan Amendment Responding to Peril of Flood Statutory Requirements (s. 163.3178(2)(f), Florida Statutes)

Goal CM.3 (existing)
The vulnerability of the people and property of Jacksonville Beach to coastal hazards such as hurricane damage and coastal flooding shall be minimized.

Objective CM 3.4 (proposed)

The City shall adopt and implement policies, regulatory standards, administrative procedures, incentives or other strategies to reduce vulnerability to sea level rise, high-tide events, storm surge, stormwater runoff and flash floods.

Policy CM3.4.1 (proposed)
The City shall consider in all decision-making processes whether the action or decision will increase, reduce or mitigate flood potential from sea level rise, high tide and storm surge, including:

1. Comprehensive Plan and Land Development Code amendments. The City shall evaluate its policies and regulations on a periodic basis to consider amendments to reduce and/or mitigate flooding impacts and shall ensure amendments do not increase the extent and depth of flood potential.

2. Land use and zoning amendment decisions. Density offsets in the Coastal High Hazard Area shall not result in an increase in density or intensity within areas forecasted to flood due to sea level rise or high tide events forecasted through 2060 based on high risk scenario.

3. Subdivision, Planned Unit Development and Site Plan reviews. The City shall ensure all applicable policies and regulations are enforced during development review procedures and shall evaluate opportunities for offering incentives for exceeding minimum standards.

4. Budgetary Process, Strategic Plans and Departments. The City shall consider opportunities to reduce and/or mitigate flood impacts in preparing its budget, evaluating public projects and determining priorities by Department.

5. Infrastructure Improvements. The City shall give high priority to infrastructure improvements and other engineering solutions that will increase public health and safety by improving flood resiliency.

Policy CM3.4.2 (proposed)
The City shall implement the following redevelopment and development principles, strategies and engineering solutions to reduce the extent of real property and structures located in designated flood zones:

1. The City shall evaluate land acquisition opportunities based on the following guiding principles:

    a. Identify and prioritize sites that are determined most susceptible to flooding based on modeling and/or recorded repetitive structural damage.
    b. Prioritize sites that maximize public benefits, including shoreline access, recreation, conservation and other objectives of the Comprehensive Plan.
    c. Reduce acquisition costs by seeking out willing sellers through voluntary land acquisition.
    d. Coordinate with regional, state and federal agencies and non-profit programs on funding acquisition priorities.
    e. Pursue options to aggregate acquisition lands to maximize effectiveness and reduce infrastructure demands.

f. Identify properties with higher vulnerability populations such as elderly and low income.

2. The City shall identify opportunities to reduce density/intensity of development in flood zones:

    a. Prioritize potential sites appropriate for less than fee simple purchase of partial development rights following the same principles as for fee simple acquisition.
    b. Prioritize sites that are suitable for conversion to less susceptible and or lower value land uses (i.e., commercial to light industrial) in conjunction with fee simple purchase of partial development rights.
    c. Evaluate opportunities for public/private partnerships to implement drainage improvements, selective seawall construction or other engineering solutions in conjunction with reduction of density/intensity.

3. The City shall amend its floodplain regulations to require the elevation of new structures and substantially repaired/improved structures located in flood zones to a minimum of 1.5 feet above applicable base flood elevation standards.

4. The City shall amend its floodplain regulations to require a cumulative calculation of improvement costs over a two-year period in determining whether improvements result in a substantial improvement to a nonconforming structure below required base floor elevation.

5. The City shall limit public expenditures that would facilitate development within areas susceptible to projected flooding from sea level rise through 2060 and high tides, and shall encourage local governments, agencies and service providers to implement the same strategy.

6. The City shall ensure that drainage swales, ditches, stormwater retention areas and urban conveyance systems are maintained to achieve maximum design capacity and flow. The City shall conduct periodic inspections of private drainage systems under its regulatory jurisdiction to ensure enforcement of permitting conditions relating to operation and maintenance of drainage systems, and shall encourage the St. Johns Water Management District to conduct inspections for systems under its jurisdiction.

7. The City shall coordinate with the Florida Department of Transportation, Duval County, the Duval County School District and other government agencies that own development sites, control right-of-way or provide services in order to evaluate opportunities for partnering on drainage improvements and to encourage designs that minimize and mitigate flood impacts.

Policy CM3.4.3 (proposed)
The City shall evaluate and adopt regulations to require or incentivize the following site development techniques and best management practices to reduce losses due to flooding and resulting insurance claims:

a. Evaluate the feasibility of adopting more stringent drainage level-of-service standards as related to duration, frequency and recovery design criteria.

b. Evaluate the feasibility of revising regulations to reduce the extent of required impervious surfaces, including minimum and maximum off-street parking ratios, options for compact parking spaces, bicycle storage parking credits, specific shared parking ratios for uses with different peak periods, and use of pervious materials for driveways, parking and sidewalks.

c. Require shared access points and cross-connections between developments where feasible and where result would reduce impervious surfaces.

d. Reduce minimum pavement width requirements for curb and gutter roads to 22' plus 1.5' curb and gutter for collector and local roads.

e. Support regulatory and financial incentives for elevating the first floor of structures on pilings in A-zones to allow for parking beneath the structure. Implement the same strategy for elevating the first floor structures above minimum regulatory requirements in V-zones as necessary to locate parking below structures.

f. The City shall coordinate with the UF/IFAS Extension office to seek assistance in amending the City's development standards and landscaping standards to increase flood attenuation.

g. The City shall continue to provide public education on flood protection, best management practices and the National Flood Insurance Program via its website, pamphlets workshops, and other outreach methods.

Policy CM3.4.4 (proposed)
The City shall maintain flood-resistant construction requirements that are consistent with, or more stringent, than the Florida Building Code and applicable flood plain management regulations set forth in 44 C.F.R., Part 60.

Policy CM3.4.5 (proposed)
Construction activities seaward of the coastal construction control lines established pursuant to s. 161.053 shall be consistent with Chapter 161, Florida Statutes.

Policy CM3.4.6 (proposed)
The City shall continue to participate in the National Flood Insurance Program Community Rating System and shall periodically evaluate program options for improving its rating to maximum insurance premium discounts.

TASK #7
PHASE ONE SUMMARY REPORT
Flood Vulnerability Analysis for City of Jacksonville Beach, Florida and Preliminary Evaluation of Policy Implications

Prepared For: City of Jacksonville Beach, Florida Pursuant to Contract Agreement R-1912 between City of Jacksonville Beach and Florida Department of Environmental Protection

December 26, 2019

Prepared by:

Kenneth B. Metcalf, AICP

Kenneth B. Metcalf, AICP
Planning Director
Stearns Weaver Miller Weissler
Alhadeff & Sitterson, P.A.

Acknowledgments

This Report has been funded through a Coastal Resiliency grant provided by the Florida Department of Environmental Protection and the National Oceanic and Atmospheric Administration to the City of Jacksonville Beach pursuant to Contract R-1912. The City of Jacksonville Beach and Stearns Weaver Miller gratefully acknowledge the continued assistance provided by Ms. Angel Baratta and Ms. Whitney Gray in working with the City.

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1.0 Introduction

The Florida Department of Environmental Protection approved a Coastal Resiliency Grant ("Grant") for the City of Jacksonville Beach, Florida for FY 2019-2020. The Scope of Work for the approved Grant includes two major phases of work:

> Phase I - a risk assessment to spatially model and quantify the City's vulnerability to flooding from sea level rise (SLR), spring tides, storm surge and other events, the presentation of the results in a public workshop, and the preparation of this Phase I Report;
>
> Phase II - an evaluation of policies, regulations and other strategies to reduce the City's potential vulnerability and increase its resiliency to withstand and recover from the impacts of flooding, culminating with public hearings to adopt amendments to the City of Jacksonville Beach Comprehensive Plan to address the requirements set forth in s. 163.3178(2)(f), Florida Statutes, known as the "Peril of Flood" amendments.

Phase I included extensive modeling, spatial analysis and mapping utilizing Geographic Information System (GIS) methodologies to build a comprehensive parcel-based data set and related series of maps to spatially depict the extent of flooding forecast to occur in 2040 and 2060 under various scenarios. The maps are designed to provide a user-friendly graphic depiction of flood risk so that the City Commission, City Departments, and the public can visually ascertain and easily understand the areas of the City most vulnerable to flooding and the potential water depths forecasted to occur within those areas. The GIS analysis joined the flood modeling data layers to the Future Land Use Map and the Duval County Property Appraiser parcel data set to allow for the quantification of flood impacts cross-tabulated by different variables, such as acreage, number of buildings, assessed building value, age of buildings, existing land use and future land use, which form the basis for the vulnerability assessment. The Technical Appendix includes the resulting map series (CD) and summary charts and tables.

1.1 Inundation Scenarios

SLR represents the forecasted increase in the mean sea level due to global warming, taking into account elevation changes (erosion and accretion) occurring in the region where the tide gauge is located. Several climate models have been developed for the purpose of forecasting SLR, including models by the Army Corps of Engineers (ACOE) in 2013 and the National Oceanic Atmospheric Administration (NOAA) in 2012. These two models utilize the following risk or probability levels in forecasting SLR:

C1 = ACOE Low/NOAA Low
C2 = ACOE Intermediate/NOAA Intermediate Low
C3 = NOAA Intermediate High
C4 = ACOE High
C5 = NOAA High

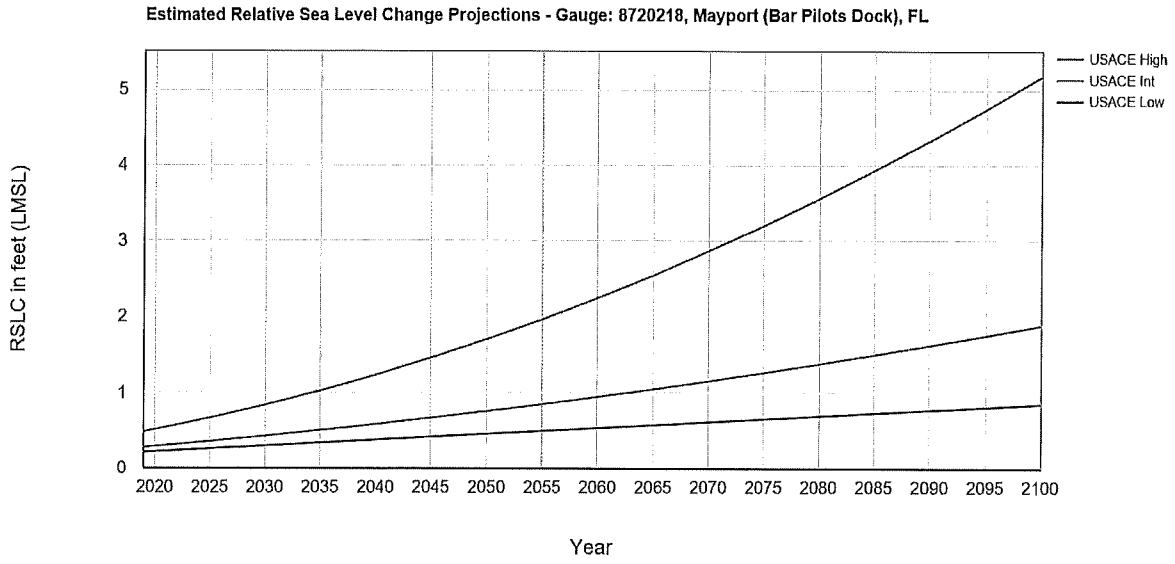
This evaluation utilized the ACOE C2 and C4 scenarios, which result in the following forecasts for SLR (relative to NAVD 88) based on the nearest NOAA Tidal gauge at the Mayport (8720218) (Bar Pilots Dock) located roughly six miles north of the City at the mouth of the St. Johns River:

Table 1.1.1. SLR Increase at Mayport

Scenario	SLR 2040 (feet)	SLR 2060 (feet)
ACOE C2	.6	1.2
ACOE C4	.9	2.2

The following graph compares the ACOE scenarios. As evident from the graph, the low projection is linear, and the intermediate and high projection curves account for a change in the rate of change, resulting in non-linear curves with the high projection curve reflecting a greater rate of change as compared to the intermediate curve.

Figure 1.1.1 (ACOE Sea Level Rise Calculator)



As previously noted, the "Peril of Flood" statutory provisions require local governments to evaluate the potential impacts of flooding from SLR as well as spring tides and Category 1 storm surge. The SRL water depth modeling forms the foundation for evaluating those additional scenarios. Based on the Scope of Work, the following scenarios were developed, analyzed and spatially mapped to determine the extent and depth of inundation:

- Spring tide water depths in 2019;
- Category 1 storm surge in 2019;
- SLR C2 and C4 in 2040 and 2060;
- SLR C2 and C4 combined with spring tides in 2040 and 2060; and
- SLR C2 and C4 combined with Category 1 storm surge.

These inundation layers were joined with other GIS data layers to allow for an evaluation of how the forecasted inundation would potentially impact Jacksonville Beach. These additional layers include:

- Future Land Use Map categories from the adopted Jacksonville Beach Comprehensive Plan;
- Duval County Property Appraiser parcel data set;
- Infrastructure layers including roads, stormwater, potable water and sanitary sewer.

The GIS analysis resulted in a customized, comprehensive database integrating all of the data sets to allow for spatial analysis and cross-tabulation analysis to produce maps, summary tables and charts documenting:

- the extent and depth of flooding within the future land use categories;
- existing land uses impacted by flooding;
- the number, age and assessed value of the impacted buildings;
- the location and types of infrastructure impacted; and
- the soil and habitat types impacted.

These outputs were generated for the current and future scenarios referenced above and provide the basis for the vulnerability assessment presented in this Phase I report.

1.2 Methodology

This section briefly summarizes the modeling approach, data sources and limitations inherent in forecasting water depths and in conducting the spatial analysis at the parcel level.

1.2.1 Bathtub Model

For the purpose of evaluating the potential flooding impact on local communities, the Digital Elevation Model (DEM) was utilized in conjunction with the SLR data to determine the extent and depth of inundation. Commonly referred to as the "bathtub model," the model fills ground elevations that are below the sea level as though it were filling a bathtub. Water depths are calculated as between the sea level and the ground elevation. If the ground elevation is lower, then flooding occurs and fills the low spots to the elevation of the water level. The DEM is based on highly accurate topographic elevations derived from Light Detection and Ranging (LIDAR) technology. However, it is a raster form of data, which means that the data is presented in grid cells or pixels, which for this model is a 3m x 3m grid resolution, with each cell providing a single, average elevation for the cell. The DEM for Jacksonville Beach includes over 2.2 million pixels, of which under 12,000 are located within the impacted area. The modeling process determined water depth for each cell based on the ground elevation relative to the sea level. This process resulted in forecasted water depths in one-inch increments that were converted to one-foot increments in the GIS analysis to allow the data to be analyzed and mapped in a format that is more easily comprehended.

1.2.2 SLOSH Model

The Category 1 storm surge data were obtained from the *Sea Lake and Overland Surges from Hurricanes (SLOSH)* model. SLOSH is a complex model that runs thousands of scenarios, accounting for the direction and forward speed of a hurricane, tide conditions, topographic elevations and other factors to map the geographic area that would be flooded by storm surge from a Category 1 hurricane. SLOSH produces a conservative or worst-case scenario by utilizing a concept known as the Maximums of Maximums, whereby the model iterations account for the maximum values for each variable in the model. In order to determine the combined effect of SLR and storm surge, the spatial extent of the Category 1 storm surge reach was analyzed to determine the corresponding elevation contour. This method allowed for the Category 1 storm surge to be added to the SLR contour to provide a combined spatial extent, which was then utilized to run the bathtub water depth calculations in the same manner as for SLR as described above.

1.2.3 Spring Tides

Spring tides, also referred to as king tides, occur twice each month all year, regardless of season. Spring refers to the "springing" forth of the tide and not the season, which is a common misperception. To estimate the spring tide increment to be added to the SLR increment, the highest spring tide elevations were obtained for each month as recorded at the Mayport tide gauge from 2001-2019. The average spring tide was calculated for this time period after removing statistical outliers, resulting in a spring tide elevation of 3.02' relative to the NAVD 88 datum. To put this into perspective, the Mean Higher-High Water (MHHW) elevation at Mayport is 2.01'. Thus, the spring tides increase the typical MHHW elevation by about one foot.

The accepted convention for modeling and mapping SLR has been to show the results for a MHHW tide, which is the higher of the MHW tide elevations at locations experiencing two high tides each day (i.e., diurnal tides). MHHW has been selected since it represents the highest daily tide experienced by the community. Therefore, in mapping the spring tide elevation, the spring tide increment effectively adds one foot to the SLR water depth, which is depicted at MHHW.

1.2.4 Duval County Property Appraiser Parcel Data Set

The Duval County Property Appraiser parcel data set provides parcel level information, including existing land use codified by the property appraiser, as well as the number of buildings on each parcel, assessed building value and the effective year built of each building. The effective year built was utilized in this analysis, as it reflects the year that a building underwent structural improvements. Assessed value is generally considered to be 80-85% of actual market value. Therefore, the assessed values presented in this report are expressed in 2019 dollars and should be increased by about 20% to obtain market value. However, the assessed and market values in the target years of 2040 and 2060 would be substantially higher as a result of inflation.

1.2.5 Limitations

Models attempt to simulate complex real world conditions. As such, all models include certain inherent limitations and are not perfect representations of complex conditions. Similarly, the GIS

methodology also has certain limitations as do the data sets, such as just described for the parcel data set. The following limitations are acknowledged in regard to the Phase I modeling and evaluation:

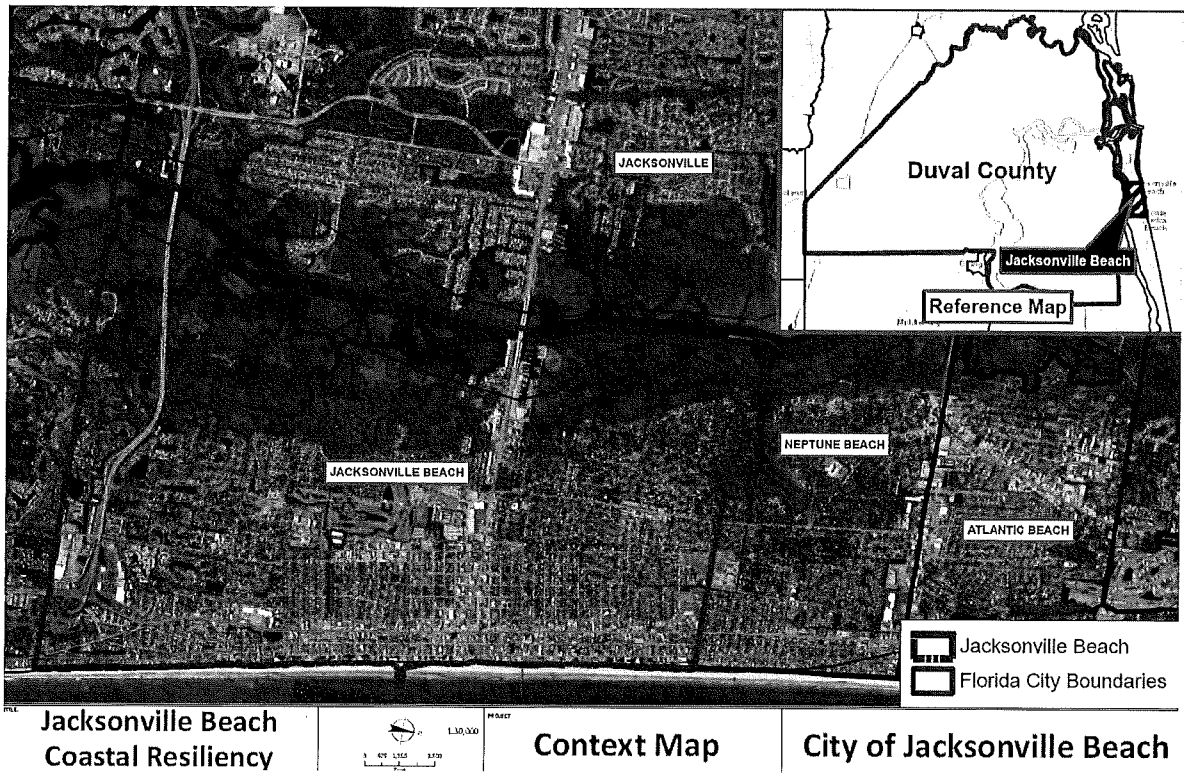
1) The SLR forecast is based on the datum from the Mayport tide gauge, which is the nearest station to Jacksonville Beach. The sea level conditions at Mayport will differ marginally from the City of Jacksonville Beach.
2) The model grid resolution (3m x 3m) results in a uniform elevation for each cell and does not account for all topographic conditions within the cell.
3) The 2001-2018 spring tide data were averaged as previously described. This time period was selected in order to provide more recent data rather than utilizing the 1983-2001 epoch.
4) The parcel data set provides existing land use, assessed values and effective age of structures. However, some parcel records are missing one or more of the three variables. As a result, the total building count affected by inundation for a given scenario may differ somewhat from the breakdown by land use, age and assessed value. However, those data set omissions do not impact the overall trends as summarized in the table and charts, which are aggregated.
5) The 2040 and 2060 scenarios combining SLR and Category 1 required the conversion of the impacted geographic area to provide a uniform controlling elevation (46") in order to add the SLR increment. Aerials were examined to ensure that the 46" contour captured impacted parcels in the developed portions of subdivisions, while excluding parcels where flooding was marginal or insignificant.
6) Stormwater management will significantly impact potential flood conditions in the City. As part of this Phase I work, the City's stormwater system components, such as outfalls and manholes, have been identified and mapped in relation to the flood scenarios. While a general vulnerability assessment has been conducted in accordance with the Scope of Work, detailed engineering studies are beyond the scope of this effort. However, Phase II will include recommendations regarding the future need for more detailed engineering analysis and potential engineering solutions.

These limitations do not impact the validity of the analysis or overall results. Please note that **the maps produced for this exercise are not intended, and should not be relied upon, to determine the potential flooding that may occur on any given parcel or even within individual neighborhoods.** Rather, the purpose of the analysis is to provide an overall "community" level vulnerability assessment, which can be utilized to guide strategies to reduce flood risk and increase the resiliency of Jacksonville Beach to recover from such events. Phase II of this effort will evaluate and develop potential intervention strategies for consideration by the City of Jacksonville.

1.3 Context of Jacksonville Beach

The City of Jacksonville Beach is located on the Atlantic Ocean between the City of Neptune Beach to the north and Duval/St. Johns County to south. The Intracoastal Waterway (ICW) runs along the west side of the City and functions as more of a natural tributary at this location, which is less channelized than the ICW farther to the south of the City. As shown by the context map below, the ICW at this location includes many tributary creeks that extend eastward toward the City. The City benefits from significant marshlands that provide a buffer ranging from one-quarter

mile to almost a mile at some locations between the ICW and developed lands. These marshlands or "lowlands" attenuate flooding to some degree, but may transition over time to support different benthic communities as water depth increases due to SLR.



The City encompasses over 5,000 acres and is essentially built out. The western-most areas of the City abutting the marshlands and the ICW tributaries primarily consist of low density, single-family residential neighborhoods. Existing multi-family, commercial and industrial development will also be impacted, but to a lesser degree as further discussed in the land use evaluation, which provides summary statistics regarding impacts on future land use categories. The parcel data base also provides existing land uses for each parcel and closely tracks the future land use categories. Therefore, the land use analysis presented is based on the City's adopted Future Land Use Map, as it also reflects existing land use conditions.

The following general findings are presented in more detail in the following sections of this report:

- Flooding occurs from the intracoastal waterway in all scenarios and not from the Atlantic Ocean;
- 2060 storm surge results in the greatest inundation, impacting over one-third of the City (excluding right-of-way);
- Impacts occur primarily within the Conservation and Recreation future land use categories followed by impacts to the Low Density Residential and Medium Density Residential neighborhoods west of the City's historic ridge;

- Non-residential impacts occur at limited locations along the western-most frontages of Beach Boulevard and Butler Boulevard.
- More than 90% of impacted structures in the worst-case 2060 scenarios are inundated by less than three feet of water.
- More than 75% of impacted structures were built prior to the adoption of more stringent Florida Building Code standards following Hurricane Andrew;
- 2060 storm surge results in the most significant risk in terms of the assessed value of impacted structures at over $155 million (2019 dollars);
- Consistent with the land use finding, residential accounts for most of the assessed value at risk in all of the scenarios;
- Stormwater and road impacts pose the most significant infrastructure concerns;
- Flooding impacts on roadways are similar in extent and in water depth to the impacts within the neighborhoods;
- Stormwater management will be impacted due to the inability to achieve positive outfall discharge and as a result of saturated soils reducing percolation rates;
- Water and sewer treatment plants are not impacted, but the collection/distribution system and related system components will be impacted, which will increase utility maintenance costs; and
- The extent of benthic communities, salt marsh, estuaries and freshwater wetlands will be marginally affected due to changes in water depth.

2.0 Vulnerability Analysis

The purpose of the Vulnerability Analysis is to identify the relative vulnerability of existing and future development to inundation due to the existing spring tide and Category 1 storm surge and the forecasted SLR, SLR+Spring Tide, SLR+Category 1 scenarios through 2040 and 2060. The risk analysis forms the basis for evaluating policy options to reduce the vulnerability of property, structures and infrastructure to SLR flooding. The following analysis examines future land uses within the forecasted inundation areas as well as the age and value of affected structures. The analysis quantifies the potential impact in terms of the extent of affected acreage and number of buildings, and presents summary findings in regard to the land use and structural analysis as well as the type and extent of affected infrastructure.

2.1 Overall Impact on Jacksonville Beach

The City encompasses over 5,000 gross acres. However, for the purpose of calculating summary statistics and comparing the impact of the inundation scenarios, all calculations are based on the net acreage of the City excluding rights-of-way based on the parcel data base. Table 2.1.1 confirms that SLR impacts a relatively low percentage of the City compared to all other scenarios, while the 2060 C4 scenario for spring tide and Category 1 storm surge confirm the greatest impact, inundating over one-third of the City.

Table 2.1.1 Acres/Percent[1] of City Inundated By Sea Level Rise

	2040 C2	2040 C4	2060 C2	2060 C4
Acreage	60.81	173.97	126.80	719.48
Percent	1.54%	4.42%	3.22%	18.26%

Table 2.1.2 Acres/Percent[1] of City Inundated by Current Spring Tide and Cat. 1 Storm Surge

	Spring Tide	Cat. 1 Storm Surge
Acreage	1,020.87	1,121.80
Percent	25.91%	28.47%

Table 2.1.3 Acres/Percent[1] of City Inundated By Sea Level Rise/Spring Tide

	2040 C2	2040 C4	2060 C2	2060 C4
Acreage	1,137.92	1,232.64	1,190.05	1,377.37
Percent	28.88%	31.29%	30.21%	34.96%

Table 2.1.4 Acres/Percent[1] of City Inundated By Sea Level Rise/Category 1 Storm Surge

	2040 C2	2040 C4	2060 C2	2060 C4
Acreage	1,188.23	1,307.56	1,259.29	1,438.37
Percent	30.16%	33.19%	31.96%	36.51%

1. **Excludes rights-of-way**

The Category 1 storm surge scenarios' impacts are marginally higher than the spring tide scenarios for each year (2019, 2040 and 2060). The spatial patterns are also similar as confirmed in comparing the Category 1 and Spring Tide Maps in the Appendix, Task I subfolder. At its most-eastern reach south of Beach Boulevard, Category 1 Storm Surge (2060 C4) impacts occur west of S. 15th, well west of Fairway Lane and approach America Avenue only at a few locations. North of Beach Boulevard, impacts do not extend as far east and are generally confined to the first couple of blocks from the current shoreline, except for a significant inland area occurring south of Seagate Avenue between Tanglewood Road and Oakwood Road/Lakeside Drive where drainage ditches overflow in the neighborhood.

2.2 Future Land Use

Chapter 163, Part II, Florida Statutes, requires all local governments to adopt a comprehensive plan, which must include a future land use map (FLUM) showing the location of all planned future land use categories. The City of Jacksonville Beach Comprehensive Plan designates the following future land use categories on the FLUM:

- Conservation (CON)
- Recreation and Open Space (ROS)
- Low Density Residential (LDR)
- Medium Density Residential (MDR)
- High Density Residential (HDR)

- Commercial (C)
- Industrial (I)
- Mixed Use (MU)

As previously noted, impacts occur primarily within the Conservation and Recreation land use categories, which together account for 90% of the impacted acreage for the 2019 Category 1 storm surge, followed by the Low Density Residential category as indicated by ***Figure 2.1.1***:

Figure 2.2.1 2019 Category 1 Storm Surge

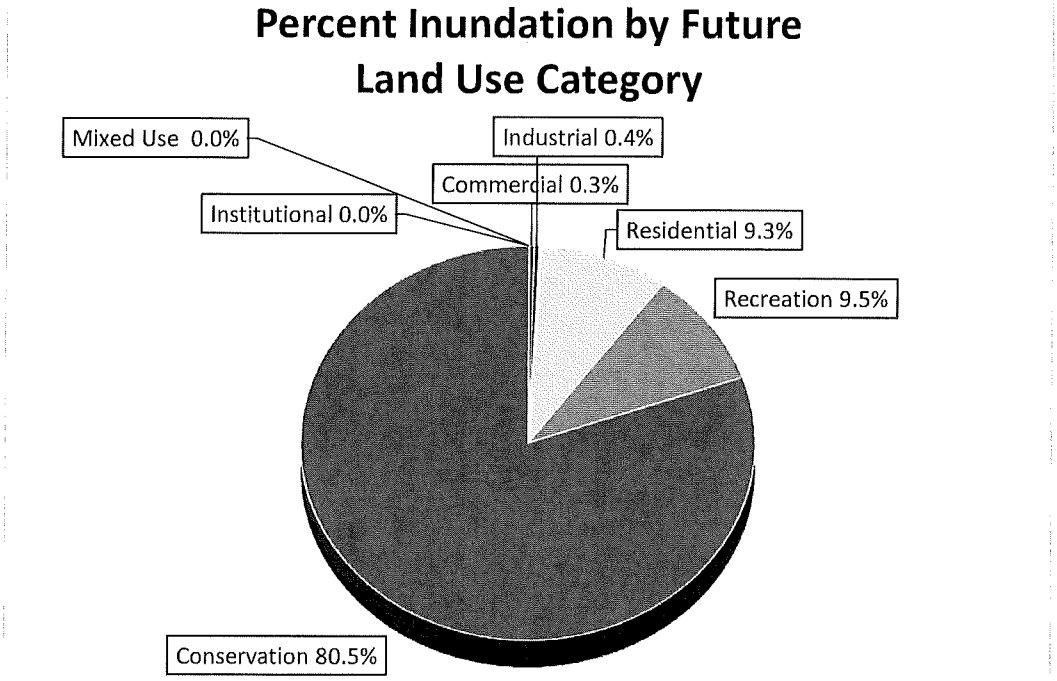
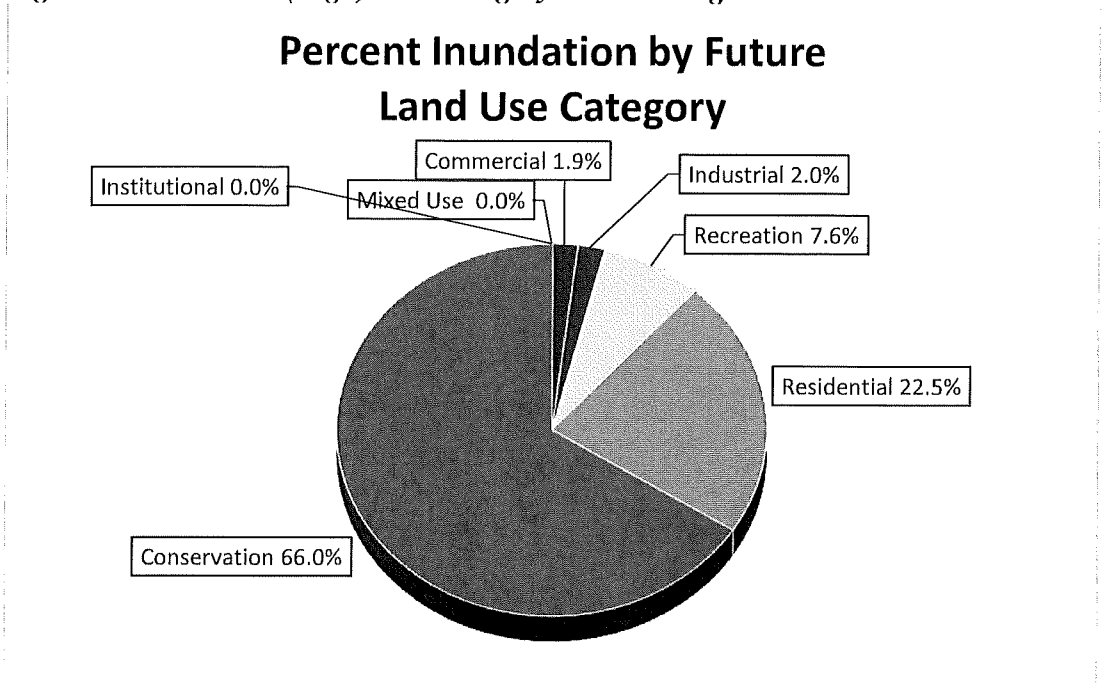


Figure 2.2.2 confirms that Category 1 storm surge impacts to developable future land use categories (i.e., residential, commercial and industrial) increases to 34% by 2060 due to the SLR increment. The same relative increase occurs in comparing the impacts for 2019 spring tide and 2060 spring tide accounting for SLR. The technical appendix provides the complete series of pie charts confirming how the percentages change in 2040 and 2060 for the C2 (intermediate) and C4 (high).

Figure 2.2.2 2060 C4 (High) SLR/Category 1 Storm Surge



The future land use categories were also evaluated to determine the extent of flooding within each land use category as indicated by the following bar chart comparison of the 2019 Storm Surge and 2060 Storm Surge. As expected, the extent of flooding within each land use category increases over time due to the additional impact of SLR. Significant increases in the percentage of impact occur in all of the developed future land use categories, except for Institutional and Mixed Use, which are not impacted by any scenarios through 2060.

Figure 2.2.3 2019 Category 1 Storm Surge

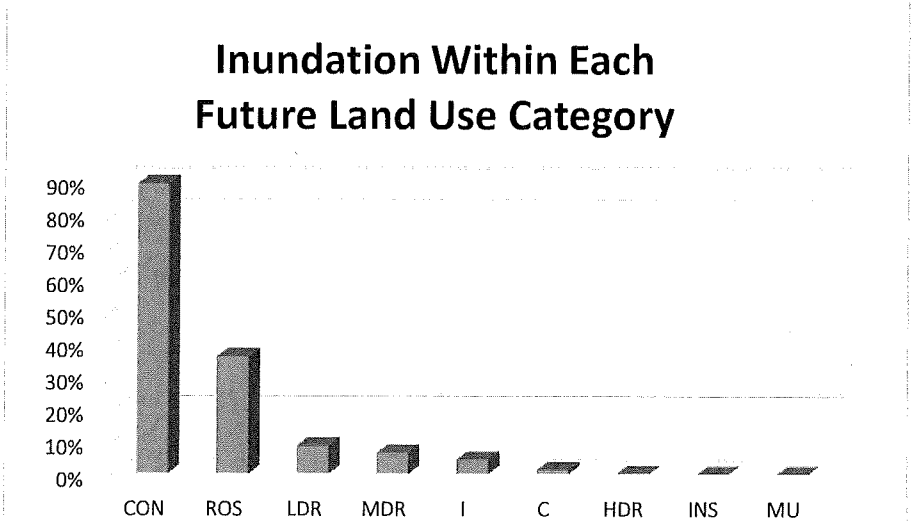
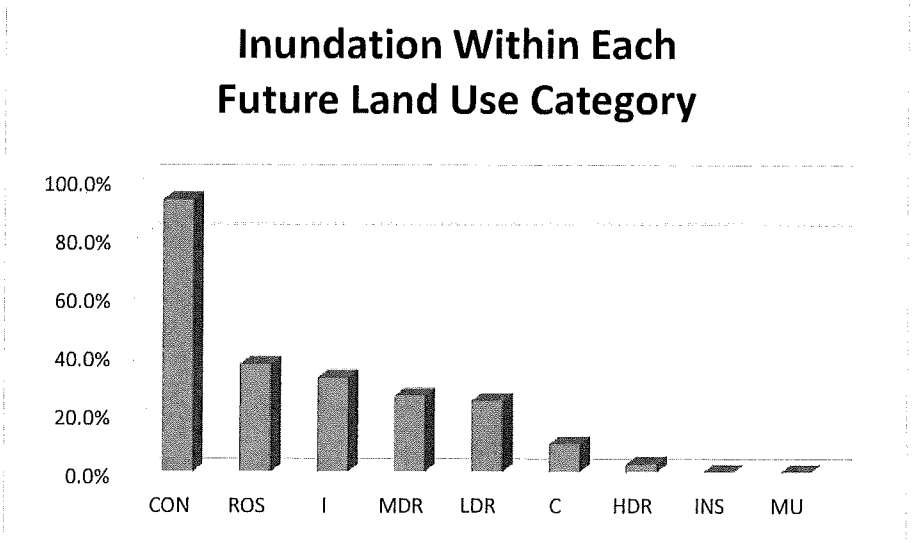


Figure 2.2.4 2060 C4 (High) SLR/Category 1 Storm Surge



As would be expected, the same pattern occurs in comparing 2019 Spring Tide to 2060 Spring Tide impacts due to SLR. The Technical Appendix provides the full series of bar charts to allow for a comparison of the incremental change over time for the intermediate and high scenarios.

The spatial patterns are consistent across all scenarios. The map series confirms:

- Most inundation occurs within the Conservation/Recreation future land use categories followed by the Low Density Residential and Medium Density Residential categories (i.e., single-family neighborhoods);

- Low density residential neighborhoods account for 70-76% of residential impacts, depending on the scenario;
- Medium density accounts for the balance, except for one impacted high density site (Pablo Hamlet elderly housing complex) south of Beach Boulevard on Shetter Avenue;
- Impacts to commercial and industrial land use occur along Beach Boulevard, which is mostly comprised of one-story buildings;
- Industrial land use is shown on the FLUM south of Butler Boulevard, but this area is actually developed with commercial uses along the frontage and also includes Marsh Landing residential to the rear of the commercial uses. This appears to be the only impacted area where the uses are nonconforming to the land use category.

2.3 Impacts Forecasted by Water Depth

The next step in the vulnerability analysis forecasts and evaluates the severity of flooding by cross-tabulating acreage by water depth in one-foot increments. In interpreting the tables below, higher water depths are typically located nearer to the shoreline, although exceptions occur where creeks and drainage ditches extend landward. The lowest water depths would occur at higher elevations and at greater distances from the source of water (i.e., ICW, creeks/drainage districts and retention areas) where the inundation disperses until the topographic elevation equals the water elevation.

Table 2.3.1 compares the current spring tide and Category 1 storm surge inundation and confirms the total impacted area and water depths are marginally greater for the storm surge scenario. Table 2.3.2 confirms that SLR has limited overall impacts in terms of acreage as compared to the current spring tides and storm surge. This is consistent with the comparative increases whereby spring tide is 3.01' (NAVD-88), while 2060 SLR (high scenario) is only 1.72' (NAVD-88).

Table 2.3.1 Inundated Acreage by Water Depth (Current)

Scenario	**> 0' to 1'**	**> 1' to 2'**	**> 2' to 3'**	**> 3' to 4'**	**Total**
Spring Tide	456.81	436.40	127.66	0.00	1020.87
Percent	45%	43%	13%	0%	100%
Category 1 Storm Surge	104.55	454.29	435.05	127.87	1121.76
Percent	9%	40%	39%	11%	100%

Table 2.3.2 Inundated Acreage by Water Depth (SLR)

Scenario	> 0' to 1'	> 1' to 2'	> 2' to 3'	Total
2060 C4 Acreage	141.27	443.97	134.24	719.48
2060 C4 Percent	20%	62%	19%	100%
2060 C2 Acreage	126.80	0.00	0.00	126.80
2060 C2 Percent	100%	0%	0%	100%
2040 C4 Acreage	141.27	32.70	0.00	173.97
2040 C4 Percent	81%	19%	0%	100%
2040 C2 Acreage	60.80	0.00	0.00	60.80
2040 C2 Percent	100%	0%	0%	100%

Tables 2.3.3 and 2.3.4 provide the forecasted inundated acreage for the 2040 and 2060 SLR/Spring Tide and SLR/Category 1 Storm Surge scenarios, respectively. The tables confirm the SLR/Category 1 Storm Surge results in a marginally higher percentage of acreage in the higher water depths overall results are fairly comparable between the tables for all of the scenarios. Both 2060 scenarios confirm that water depths will

Table 2.3.3 Inundated Acreage by Water Depth (SLR/Spring Tide)

Scenario	> 0' to 1'	> 1' to 2'	> 2' to 3'	> 3' to 4'	> 4' to 5'	> 5' to 6'	Total
2060 C4 Acreage	38.58	137.88	142.43	472.71	443.90	141.27	1376.76
2060 C4 Percent	3%	10%	10%	34%	32%	10%	100%
2060 C2 Acreage	132.05	472.76	443.97	141.27	0	0	1190.05
2060 C2 Percent	11%	40%	37%	12%	0%	0%	100%
2040 C4 Acreage	32.11	142.46	472.73	443.96	141.27	0	1232.54
2040 C4 Percent	3%	12%	38%	36%	11%	0%	100%
2040 C2 Acreage	79.93	472.76	443.97	141.26	0	0	1137.92
2040 C2 Percent	7%	42%	39%	12%	0%	0%	100%

Table 2.3.4 Inundated Acreage by Water Depth (SLR/Category 1 Storm Surge)

Scenario	> 0' to 1'	> 1' to 2'	> 2' to 3'	> 3' to 4'	> 4' to 5'	> 5' to 6'	Total
2060 C4 Acreage	124.33	128.98	138.90	464.48	440.87	140.72	1438.29
2060 C4 Percent	9%	9%	10%	32%	31%	10%	100%
2060 C2 Acreage	83.50	137.09	462.05	439.76	136.85	0	1259.247
2060 C2 Percent	7%	11%	37%	35%	11%	0%	100%
2040 C4 Acreage	127.35	138.35	464.15	440.25	137.38	0	1307.48
2040 C4 Percent	10%	11%	35%	34%	11%	0%	100%
2040 C2 Acreage	35.75	130.07	455.56	436.19	130.62	0	1188.19
2040 C2 Percent	3%	11%	38%	37%	11%	0%	100%

The GIS analysis also identified the location of structures within affected parcels to forecast water depths at the primary structure. Table 2.3.5 confirms that SLR has a limited impact. However, when combined with spring tide and Category 1 storm surge, the 2060 worst case scenario impacts up to 516 and 647 structures by 2060 as shown by Tables 2.3.6 and 2.3.7, respectively.

Table 2.3.5 Number of Buildings Impacted by Water Depth (SLR)

Scenario	> 0' to 1'	> 1' to 2'	> 2' to 3'	Total
2060 C4 Buildings	0	5	10	15
2060 C4 Percent	0%	33%	67%	100%
2060 C2 Buildings	3	0	0	3
2060 C2 Percent	100%	0%	0%	100%
2040 C4 Buildings	1	3	0	4
2040 C4 Percent	25%	75%	0%	100%
2040 C2 Buildings	3	0	0	3
2040 C2 Percent	100%	0%	0%	100%

Table 2.3.6 Number of Buildings Impacted by Water Depth (SLR/Spring Tide)

Scenario	> 0' to 1'	> 1' to 2'	> 2' to 3'	> 3' to 4'	> 4' to 5'	> 5' to 6'	Total
2060 C4 Buildings	66	286	120	31	9	4	516
2060 C4 Percent	13%	55%	23%	6%	2%	1%	100%
2060 C2 Buildings	105	31	9	4	0	0	149
2060 C2 Percent	70%	21%	6%	3%	0%	0%	100%
2040 C4 Buildings	51	120	31	9	4	0	215
2040 C4 Percent	24%	56%	14%	4%	2%	0%	100%
2040 C2 Buildings	51	31	9	4	0	0	95
2040 C2 Percent	54%	33%	9%	4%	0%	0%	100%

Table 2.3.7 Number of Buildings Impacted by Water Depth (SLR/Category 1 Storm Surge)[1]

Scenario	> 0' to 1'	> 1' to 2'	> 2' to 3'	> 3' to 4'	> 4' to 5'	>8 to 9'	Total
2060 C4 Buildings	205	270	114	27	8	3	627
2060 C4 Percent	33%	43%	18%	4%	1%	0%	100%
2060 C2 Buildings	157	113	27	8	3	0	308
2060 C2 Percent	51%	37%	9%	3%	1%	0%	100%
2040 C4 Buildings	263	113	27	8	3	0	414
2040 C4 Percent	64%	27%	7%	2%	1%	0%	100%
2040 C2 Buildings	0	4	178	8	3	0	193
2040 C2 Percent	0%	2%	92%	4%	2%	0%	100%

1. No buildings are located in 6' to 8' depth in 2060 C4 scenario.

The tables confirm over 90% of impacted buildings will experience water depths of less than 3' in all 2040 and 2060 scenarios. By 2060, spring tides occurring once per month will cause water depths of 2-3 feet impacting 120 buildings or nearly one-quarter of all affected buildings. These would typically include homes located on the first block from the current shoreline or immediately adjacent to creeks. At the lowest scenario (2040 C2), spring tides impact fewer than 100 buildings with more than half at one foot or lower, while storm surge impacts 193 structures with nearly all occurring between 2-3' of water depth. The 2040 SLR scenario adds approximately one foot. Therefore, current spring tides and storm surge impacted buildings are roughly estimated by shifting the number of buildings one column to the left as compared to the 2040 C4 scenarios (e.g., > 2' to 3' would shift to > 1' to 2'). For example, the current storm surge would impact approximately 113 buildings with water depths of one foot or less.

2.4 Age of Structures

The analysis classifies the age of structures into three categories. Structures built prior to 1977 pre-dated the City's participation in the NFIP program and would typically mean that the structures are located below base flood elevation. Structures built between 1970 and 2001 were built pursuant to the City's floodplain ordinance requirements, but pre-date the amendments to the Florida Building Code in 2001 following the post storm assessment from Hurricane Andrew. Structures built in 2002 or later would typically incorporate the code improvements. Tables 2.4.1 and 2.4.2 confirm that over three-fourths of the impacted buildings were constructed or substantially improved under the NFIP program, but pre-dated the FBC improvements. Few impacted buildings show an effective age pre-dating the NFIP.

Table 2.4.1 Age of Buildings Impacted (SLR/Spring Tide)

Scenario	Pre-NIFP	1977-2001	2002-Present	Total
2060 C4 Buildings	13	415	88	516
2060 C4 Percent	2.5%	80.4%	17.1%	100%
2060 C2 Buildings	2	116	34	152
2060 C2 Percent	1.3%	76.3%	22.4%	100.0%
2040 C4 Buildings	2	170	42	214
2040 C4 Percent	0.9%	79.4%	19.6%	100%
2040 C2 Buildings	0	75	20	95
2040 C2 Percent	0%	79%	21%	100%

Table 2.4.2 Age of Buildings Impacted (Sea Level Rise/Category 1 Storm Surge)

Scenario	Pre-NIFP	1977-2001	2002-Present	Total
2060 C4 Buildings	22	509	96	627
2060 C4 Percent	3.5%	81.2%	15.3%	100%
2060 C2 Buildings	4	259	45	308
2060 C2 Percent	1%	84%	15%	100%
2040 C4 Buildings	8	341	65	414
2040 C4 Percent	1.9%	82.4%	15.7%	100%
2040 C2 Buildings	3	161	29	193
2040 C2 Percent	2%	83%	15%	100%

2.5 Value of Structures

The parcel database was also analyzed to document the assessed value of impacted buildings by existing land use (i.e., residential, commercial and industrial) for the C-2 and C-4 scenarios in 2040 and 2060. The worst case scenario (2060 Category 1 storm surge) confirms 647 buildings at risk with an aggregate assessed building value of over $155 million dollars, while the 2060 spring tide scenario generates an aggregate assessed building value roughly 10% lower.

Residential buildings account for the vast majority of impacted buildings and total assessed value in all scenarios. The Pablo Hamlet elderly facility accounts for the maximum residential assessed value, while the median residential value is more indicative of single family residential assessed building values. The 2040 scenarios, which do not include the elderly facility, show a maximum value ranging from $988K to $1.2MM, with median values that are similar to the 2060 scenarios, confirming that the median value is driven by the value of single family homes.

Commercial and industrial buildings are higher valued as compared to residential buildings overall. For example, even though commercial buildings account for only 2.9% of the total number of impacted buildings in the 2060 Category 1 storm surge scenario, they account for 13.4% of the aggregate at risk assessed value for that scenario. These patterns are consistent across all scenarios.

Table 2.5.1 Impacted Buildings by Use by Assessed Value (2060 SLR/Spring Tide)

Scenario	Existing Land Use	Buildings	Minimum	Maximum	Median Value	Total Building Value
2060 C4	Residential	481	$62,036	$3,923,339	$184,043	$113,754,169
	Commercial	14	$141,115	$6,539,398	$976,143	$19,749,815
	Industrial	12	$58,300	$1,132,354	$385,246	$5,981,843
Total		**507**				**$139,485,827**
2060 C2	Residential	138	$85,658	$1,201,113	$193,564	$37,539,228
	Commercial	6	$266,584	$3,140,458	$1,784,745	$9,319,662
	Industrial	2	$833,729	$941,841	$887,785	$1,775,570
Total		**146**				**$48,634,460**

Table 2.5.2 Impacted Buildings by Use by Assessed Value (2040 SLR/Spring Tide)

Scenario	Land Use	Buildings	Minimum	Maximum	Median Value	Total Building Value
2040 C4	Residential	199	$73,282	$1,201,113	$188,958	$50,659,551
	Commercial	6	$266,584	$3,140,458	$1,784,745	$9,319,662
	Industrial	5	$790,675	$1,132,354	$941,841	$4,693,048
Total		**210**				**$64,672,261**
2040 C2	Residential	90	$104,875	$1,201,113	$191,663	$24,307,130
	Commercial	3	$266,584	$3,140,458	$1,818,437	$5,225,479
	Industrial	0				
Total		**93**				**$29,532,609**

Table 2.5.3 Impacted Buildings by Use by Assessed Value (2060 SLR/Category 1 Storm Surge)

Scenario	Land Use	Buildings	Minimum	Maximum	Median Value	Total Building Value
2060 C4	Residential	590	$36,342	$3,923,339	$180,031	$128,320,053
	Commercial	18	$68,746	$6,539,398	$536,973	$20,843,985
	Industrial	12	$58,300	$1,132,354	$385,246	$6,065,519
Total		**620**				**$155,229,557**
2060 C2	Residential	286	$73,282	$987,931	$186,489	$67,559,202
	Commercial	6	$243,166	$3,140,458	$1,131,368	$7,731,381
	Industrial	11	$58,300	$1,132,354	$369,856	$5,664,883
Total		**303**				**$80,955,466**

Table 2.5.4 Impacted Buildings by Use by Assessed Value (2040 SLR/Category 1 Storm Surge)

Scenario	Land Use	Buildings	Minimum	Maximum	Median Value	Total Building Value
2040 C4	Residential	385	$73,282	$987,931	$185,808	$88,133,904
	Commercial	11	$243,166	$3,140,458	$971,703	$12,694,379
	Industrial	12	$58,300	$1,132,354	$385,246	$6,065,519
Total		**408**				**$106,893,802**
2040 C2	Residential	187	$104,875	$987,931	$188,131	$46,562,094
	Commercial	1	$3,140,458	$3,140,458	$3,140,458	$3,140,458
	Industrial	0				$0
Total		**188**				**$49,702,552**

2.6 Infrastructure

The four major components of the City's infrastructure are roads, stormwater, wastewater and potable water.

A. Roads

Local road inundation generally tracks the extent and water depths indicated within the neighborhoods served. Table 2.6.1 provides road acreage by water depth and resulting percent distribution. Consistent with the land use findings, the current Category 1 storm surge results in slightly greater inundation and water depths as compared to spring tides with water depths primarily occurring in 0-1' for spring tides and 1-2' for storm surge.

Table 2.6.1 Local Road Inundation (Current Spring Tide and Category 1 Storm Surge)

	> 0' to 1')	*> 1' to 2')*	*> 2' to 3')*	*> 3' to 4')*	*Total*
Spring Tide Acres	*5.3*	*1.2*	*0.4*	*0.0*	*6.9*
Percent	*76.1%*	*17.5%*	*6.4%*	*0.0%*	*100.0%*
Category 1 Acres	*1.3*	*4.8*	*1.2*	*0.4*	*7.7*
Percent	*16.5%*	*62.2%*	*15.6%*	*5.8%*	*100.0%*

Tables 2.6.2 and 2.6.3 provide forecasted road inundation for spring tides and Category 1 storm surge, respectively, for 2040 and 2060. These tables also show the same relative pattern with storm surge resulting in greater inundation. By 2060, both C4 scenarios indicate significant flooding in 2-3' and 3-4' of water depths spring and both reaching 5'-6' in limited areas.

Table 2.6.2 Local Road Inundation (SLR/Spring Tide)

SLR/ Spring Tide	**> 0' to 1'**	**> 1' to 2'**	**> 2' to 3'**	**> 3' to 4'**	**> 4' to 5'**	**> 5' to 6'**	**Total**
2040 C2 Acres	1.0	4.8	1.2	0.4	0.0	0.0	7.5
Percent	13.3%	64.6%	16.2%	6.0%	0.0%	0.0%	100.0%
2040 C4 Acres	1.6	4.2	4.8	1.2	0.5	0.0	12.3
Percent	13.4%	33.9%	39.2%	9.8%	3.7%	0.0%	100.0%
2060 C2 Acres	3.7	4.8	1.2	0.5	0.0	0.0	10.2
Percent	36.1%	47.5%	11.9%	4.5%	0.0%	0.0%	100.0%
2060 C4 Acres	1.6	6.8	4.2	4.8	1.2	0.5	19.1
Percent	8.6%	35.6%	21.9%	25.3%	6.3%	2.4%	100.0%

Table 2.6.3 Local Road Inundation (SLR/Category 1 Storm Surge)

SLR/Category 1	**> 0' to 1'**	**> 1' to 2'**	**> 2' to 3'**	**> 3' to 4'**	**> 4' to 5'**	**> 5' to 6'**	**Total**
2040 C2 Acres	1.6	3.7	4.8	1.2	0.4	0.0	11.8
Percent	13.4%	31.7%	40.9%	10.2%	3.8%	0.0%	100.0%
2040 C4 Acres	6.6	4.2	4.8	1.2	0.4	0.0	17.2
Percent	38.2%	24.3%	28.0%	7.0%	2.6%	0.0%	100.0%
2060 C2 Acres	3.7	4.0	4.8	1.2	0.4	0.0	14.2
Percent	26.0%	28.4%	33.9%	8.5%	3.1%	0.0%	100.0%
2060 C4 Acres	5.3	6.8	4.2	4.8	1.2	0.4	22.8
Percent	23.5%	29.8%	18.4%	21.1%	5.3%	2.0%	100.0%

B. Stormwater

The Stormwater Management Element of the Comprehensive Plan confirms that the historic, north south ridge runs roughly along 10th Street at an elevation of 20'. Three drainage basins exist on the east side of the City, but extend west of the ridge. The Stormwater Management Element makes several findings that should be considered in evaluating the risk of future inundation scenarios:

- The basins generally experience greater flooding issues than the area west of the basins;
- The central and south basins experience greater flooding issues than the north basin;
- The basins primarily discharge to the ICW through drainage ditches and culverts;
- The older parts of the stormwater system were designed for only a three-year, one-hour rainfall event and the City has undertaken improvements to improve the level of service to receive runoff from a 5-year, 24-hour event; and
- The City has required private stormwater systems to comply with a 25-year, 24-hour storm event.

The City's stormwater system consists of transmission pipes, manholes, catch basins/drains and outfalls. Table 2.6. confirms the linear feet of the stormwater transmission network within the forecasted inundation areas for the 2060 C4 scenarios.

Table 2.6.4 Linear Feet of Pipes within Inundation Areas (2060 C4)

	Stormwater
SRL/Spring Tide	**19,691**
SLR/Category 1 Storm Surge	**25,569**

The Appendix includes a map series showing the location of all components within the forecasted inundation area for the higher intensity (C4) 2040 and 2060 scenarios. Engineering studies will be required to evaluate options for maintenance where manholes are submerged. Submerged outfall locations pose the most significant concern to the extent that positive discharge may not be feasible, which may cause stormwater runoff to back into retention areas and drainage ditches. This condition would be worse still where the water table elevation increases and permanently saturates soils beneath retention areas, which could potentially reduce percolation rates, resulting in a compounding effect over time due to SLR. Phase II of the work program will further evaluate options that can be considered to reduce or mitigate these problems.

C. Sanitary Sewer and Potable Water Systems

The City's sanitary sewer and potable water treatment plants/wells are located outside of the forecasted inundation areas. However, transmission lines and other system components are located within the forecasted inundation areas. Table 2.6.4 summarizes the linear feet of the transmission networks within the 2060 C4 forecasted inundation area:

Table 2.6.5 Linear Feet of Transmission Network within Inundation Areas (2060 C4)

	Sanitary Sewer	**Potable Water**
SRL/Spring Tide	**58,713**	**52,668**
SLR/Category 1	**75,100**	**68,143**

The water system includes the following additional components, which are located in the forecasted inundation areas: hydrants, meter boxes and valves. These components are located

along the transmission network as shown on the potable water map series, which depict the network for the 2040 and 2060 C4 scenarios.

The sanitary sewer system includes the following additional components, which are located in the forecasted inundation areas: clean outs, lift stations and manholes. These components are located along the transmission network as shown on the sanitary sewer map series, which depicts the network for the 2040 and 2060 C4 scenarios.

These systems will remain necessary as they serve existing neighborhoods. While the transmission network can operate in a submerged condition, engineering studies will be required in order to evaluate options for providing service where manholes are submerged and cannot otherwise be floodproofed. Similarly, engineering options must be evaluated in regard to hydrants to ensure proper operation. Lift stations utilize submersible pumps, which would not be significantly impacted, but engineering analysis should be undertaken to determine the extent of improvements that may be required from an operational perspective.

Please refer to Appendix for infrastructure maps and tables.

2.7 Flash Floods

The National Weather Service describes flash floods as:

> Flooding that begins within 6 hours, or often 3 hours of the heavy rainfall...Flash floods can be caused by a number of things, but is most often due to extremely heavy rainfall from thunderstorms... The intensity of the rainfall, the location and distribution of the rainfall, the land use and topography, vegetation types and growth/density, soil type, and soil water-content all determine just how quickly the flash flooding may occur, and influence where it may occur.
>
> Urban Areas are also prone to flooding in short time-spans and, sometimes, rainfall (from the same storm) over an urban area will cause flooding faster and more-severe than in the suburbs or countryside. The impervious surfaces in the urban areas do not allow water to infiltrate the ground, and the water runs off to the low spots very quickly.

The NWS does not maintain a database of flash floods due in part to the difficulty in precisely defining the event. However, Jacksonville Beach, like much of Florida, is prone to flash floods due to the intensity of the thunderstorms, extent of impervious surfaces and the limitations of the City's stormwater management system. As previously noted, an analysis of engineering options is beyond the scope of this evaluation; however, it is clear that stormwater improvements should be considered a high priority and will be addressed in conjunction with recommendations addressing intervention strategies for responding to SLR, spring tides and Category 1 storm surge events.

2.8 Habitat Succession and Soil Conditions

SLR will also impact habitat and soil conditions within and near the forecasted inundated areas. The Appendix includes a Cooperative Land Cover map which provides the breakdown of habitat conditions within the City. The teal color primarily represents salt marsh and estuary habitats, which can be further distinguished based on the assigned codes. These habitats would be expected to potentially expand as sea level rise submerges additional acreage landward of these habitats. As previously noted, SLR is forecast to increase by 2.2' by 2060 in the worst case, high projection scenario, while the 2040 C4 and 2060 C2 scenarios are forecast to increase by closer to one foot. Each of these scenarios would be expected to reduce the size of islands within the ICW as the submerged area expands. As referenced on the map, the islands are comprised of various wetlands depicted in dark green, which are primarily comprised of wet flatwoods and mixed wetland hardwoods. These wetlands also occur as a buffer between the marine/estuary and many developed subdivisions. The size of these buffers would also be expected to diminish as the submerged area increases. Finally, the lime green color on the map represents mesic flatwoods, mixed hardwood/coniferous and shrub/brushland. These habitats occur on ICW islands and as buffers along the edge of subdivisions and would be expected to diminish in size as well as the submerged area increases.

The soil map aggregates soil types into very poorly drained (red), poorly drained (orange) and somewhat poorly drained (yellow), which generally correspond with the habitat classification. The very poorly drained soils are characterized by mucky peat conditions and correspond with the salt marsh/estuarine areas. Orange areas are comprised of fine sandy soils (#14 and #32) which occur on some of the islands. The balance of the orange areas are urban soils occurring with developed subdivisions, particularly subdivisions abutting shorelines in the south part of the City. The yellow areas comprise the balance of the subdivisions within the forecasted inundation areas near the shoreline, particularly north of Beach Boulevard. These are also urban soils, which drain somewhat better than the orange areas.

Subdivision lots would be expected to develop salt tolerant vegetation where the slope is relatively flat. Where the elevation increases more significantly where urban fill occurs, subdivision would be impacted to a lesser degree. As previously noted, the SLR acreages are relatively modest, except for the significant increase forecasted for the 2060 C4 scenario.

3.0 Policy Implications

The Vulnerability Analysis set forth above indicates the need for a multi-prong strategy. Due to the built out conditions of Jacksonville Beach, the most feasible options include:

- **Incentives or regulations to:**
  - elevate structures (i.e., vertical mitigation) as redevelopment occurs;
  - reduce the maximum impervious area permitted;
  - increase drainage retention capacity on private lands.

- **Select engineering solutions, which may include:**
  - limited fill/bulkheads/seawalls;
  - increasing the conveyance capacity of the City's stormwater management system;
  - elevating local roads in conjunction with stormwater improvements;
  - floodproofing infrastructure components where feasible.

These strategies will be evaluating in greater detail in Phase II of this effort.

Land use strategies should also be considered, even though they are inherently difficult to effectively implement in built out communities. Land use strategies would seek to reduce the extent of existing development within the forecasted inundation areas and would be prioritized based on those areas most susceptible to flooding, which are generally located within the first few blocks from the shoreline. Vertical mitigation will not likely provide an adequate solution for the most susceptible neighborhoods. While the structures could be elevated during reconstruction in these areas, it may not be possible to solve the stormwater management challenge to achieve a relatively safe and healthy condition. Locations that are forecasted to flood from sea level rise alone would be first priority since those areas would experience sustained flood conditions.

Land use strategies would potentially incorporate a combination of land acquisition and incentives/regulations to transfer development rights to locations outside of the forecasted flood areas. Ideally, a cost-benefit analysis should be performed to compare the cost and effectiveness of maintaining existing subdivisions within the most flood prone neighborhoods versus the cost and effectiveness of implementing land use strategies. Even where vertical mitigation is feasible, it may not be cost effective to maintain infrastructure within the most flood prone areas, and it may not be feasible or desirable to implement engineering solutions, such as seawalls, along the ICW. Selective land acquisition may be feasible for limited areas, but would typically not provide sufficient funding for acquiring lots within established subdivisions. Given the demand and pressure on acquisition programs, a transferable development rights (TDR) program may provide the best land use option. However, for a TDR program to work effectively, market conditions must create demand for the purchase of transferable densities/development rights. Therefore, a TDR program would require significant increases in density at potential receiver sites. Phase II will further evaluate the feasibility of TDR strategies, including whether sufficient receiver sites could be designated and whether such higher-density receiver sites would be compatible with the City's objectives regarding community character.

Phase II will provide a more comprehensive evaluation of all potential options, culminating in a public workshop to obtain public input on recommended strategies to reduce and mitigate the impacts of flooding. This will be followed by drafting proposed amendments to the City's Comprehensive Plan to address the "peril of flood" planning requirements set forth in s 163.3178(2), Florida Statutes.

APPENDIX

IMPACTED ACREAGE BY FUTURE LAND USE CATEGORY

Figure A-1, Category 1 Storm Surge (Current)

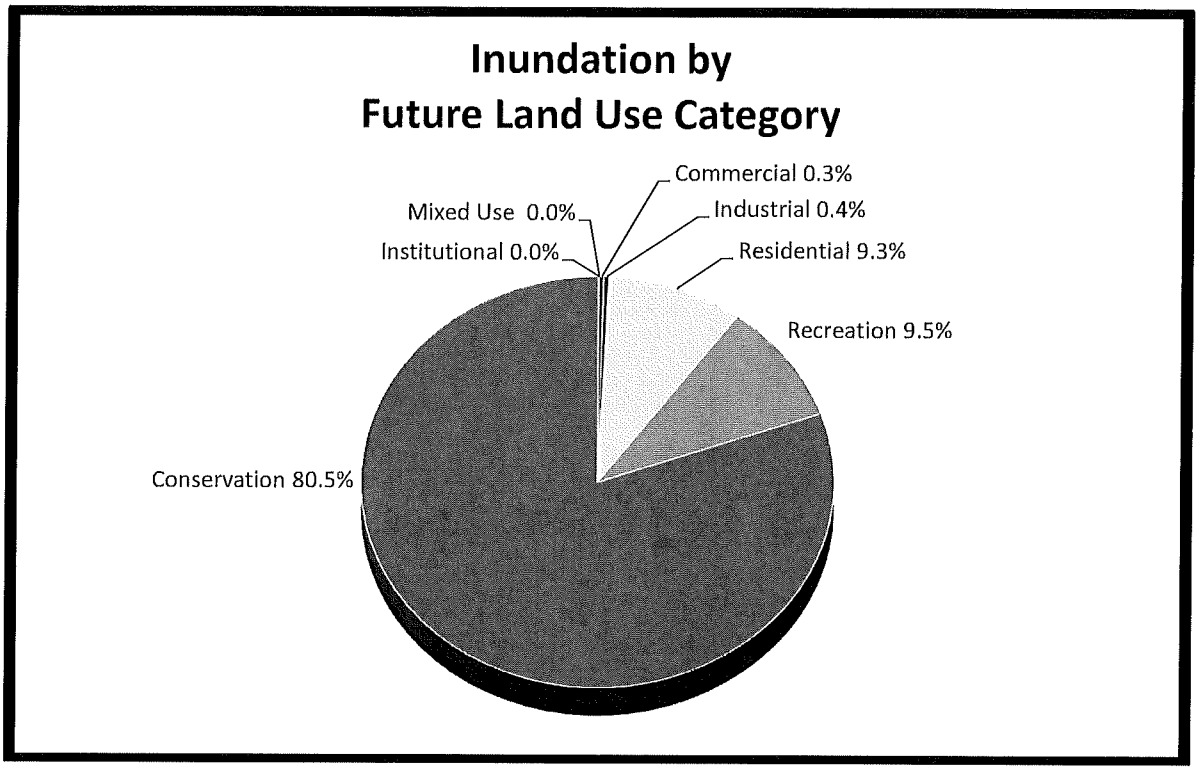


Figure A-2, Category 1 Storm Surge (2040 C2)

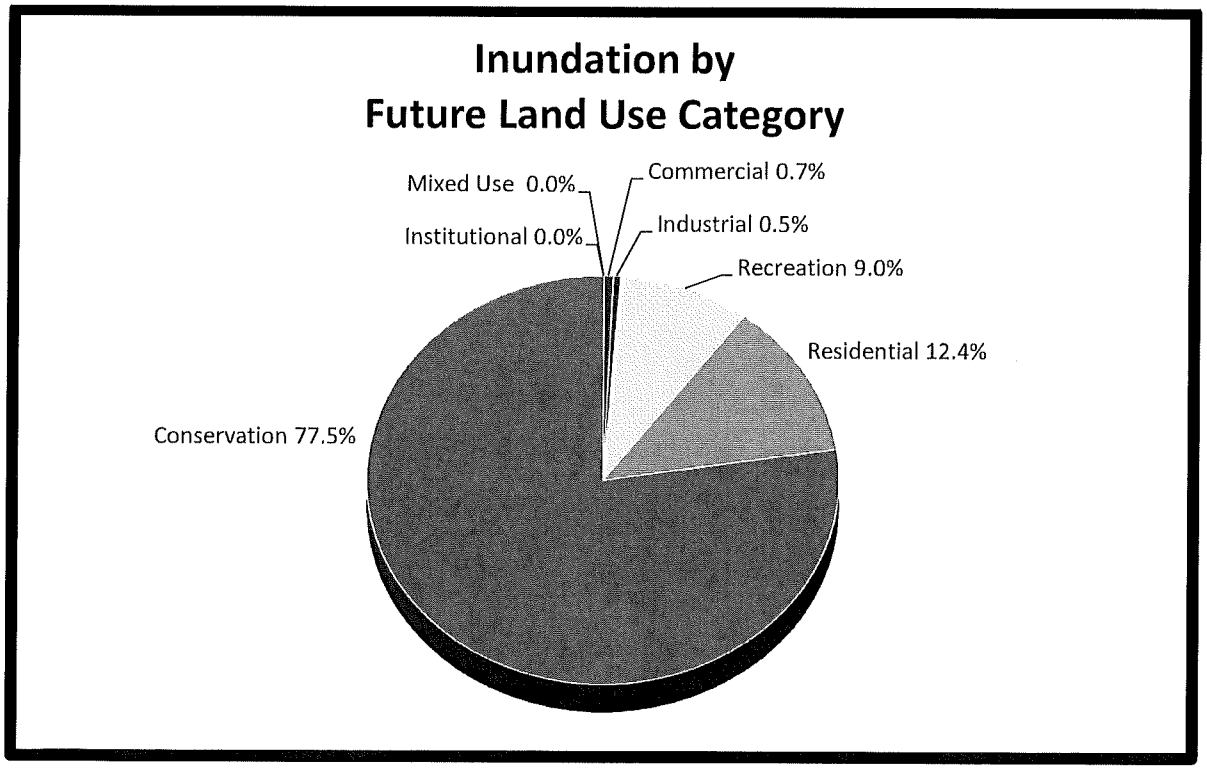


Figure A-3, Category 1 Storm Surge (2040 C4)

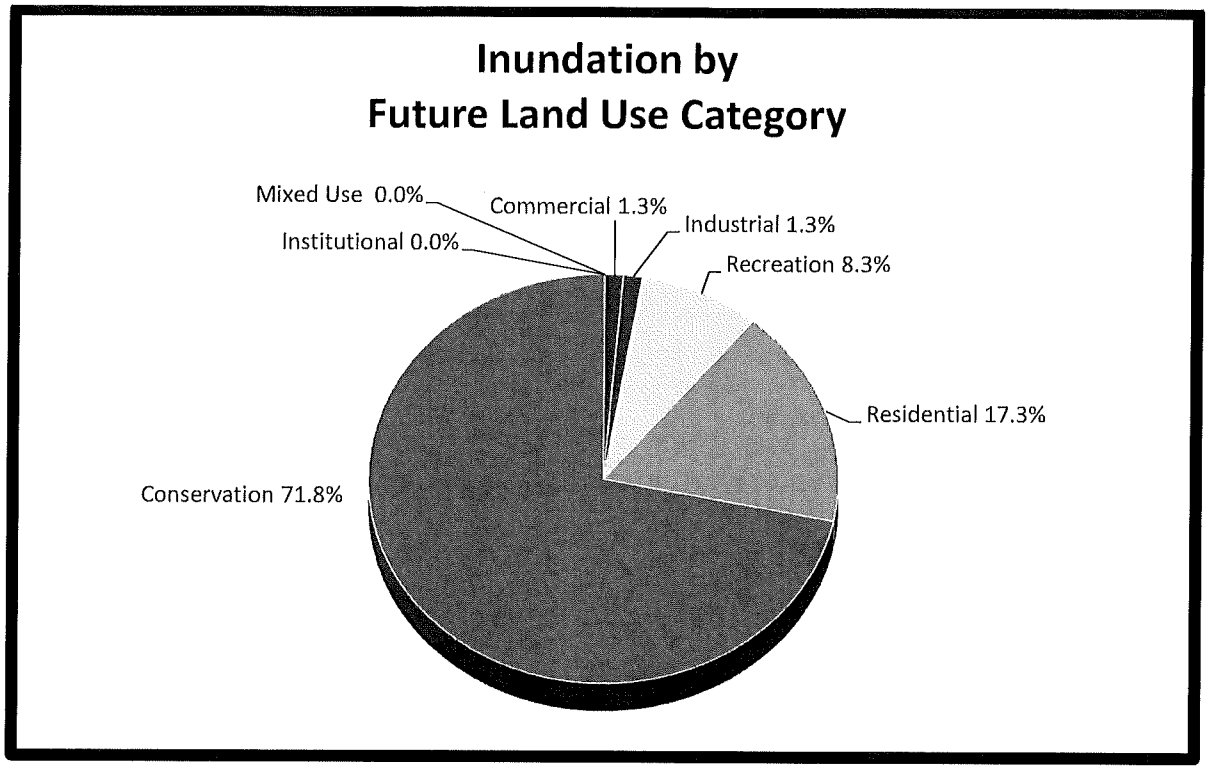


Figure A-4, Category 1 Storm Surge (2060 C2)

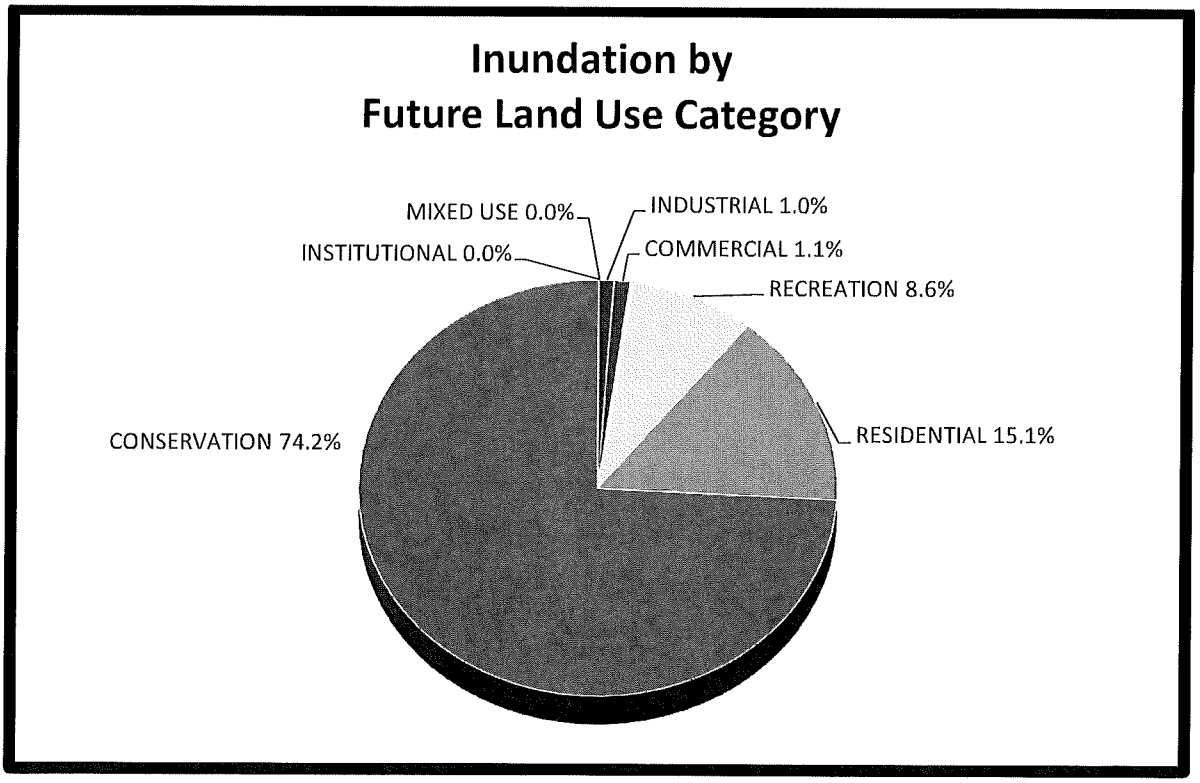


Figure A-5, Category 1 Storm Surge (2060 C4)

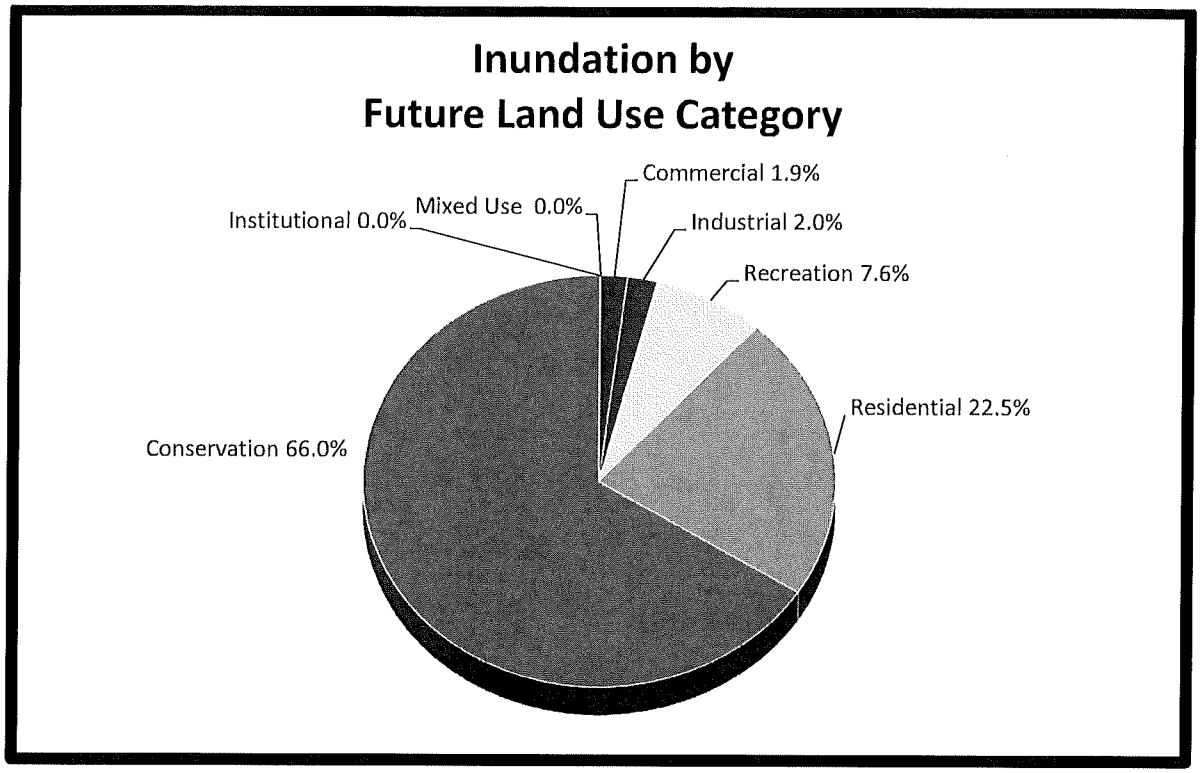


Figure A-6, Spring Tide (Current)

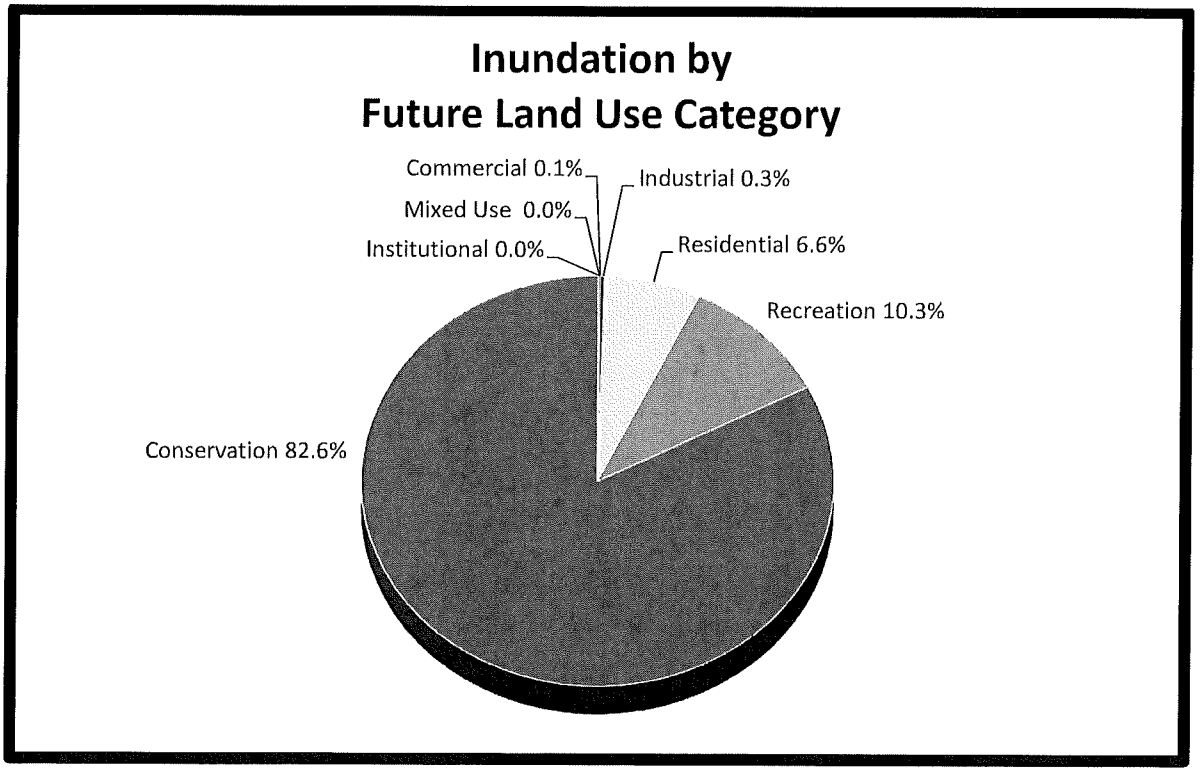


Figure A-7, Spring Tide (2040 C2)

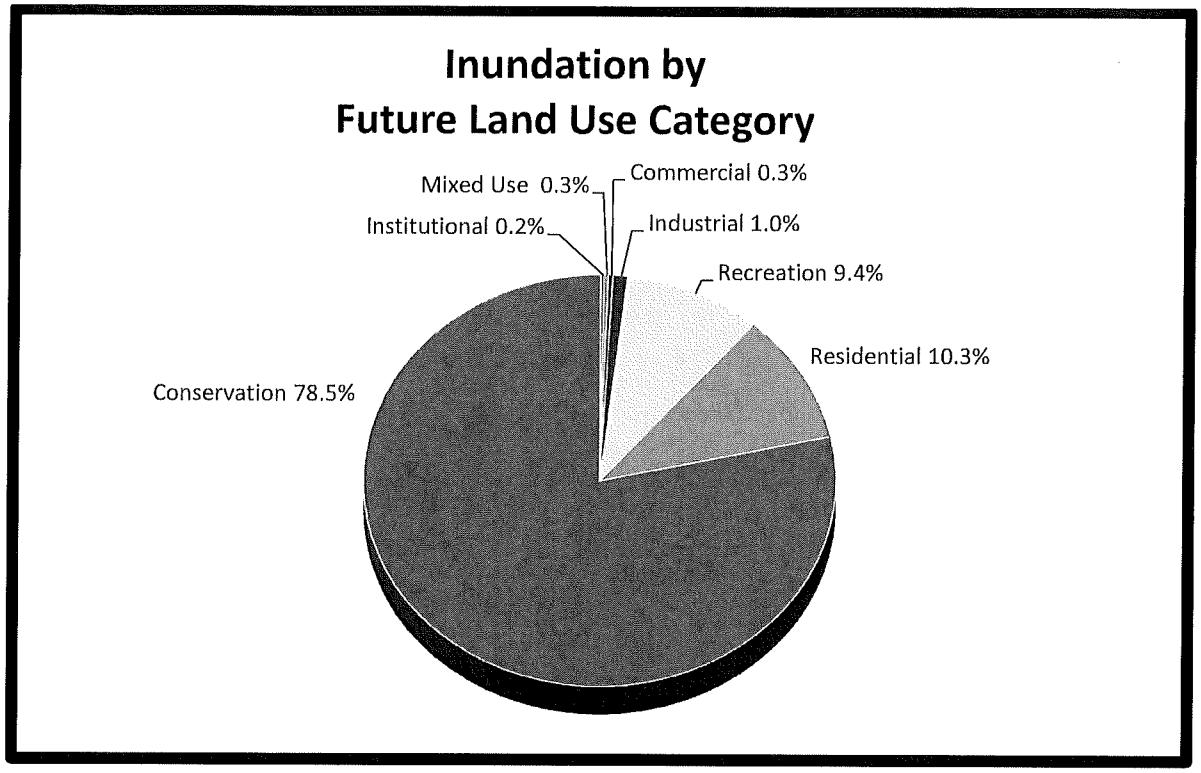


Figure A-8, Spring Tide (2040 C4)

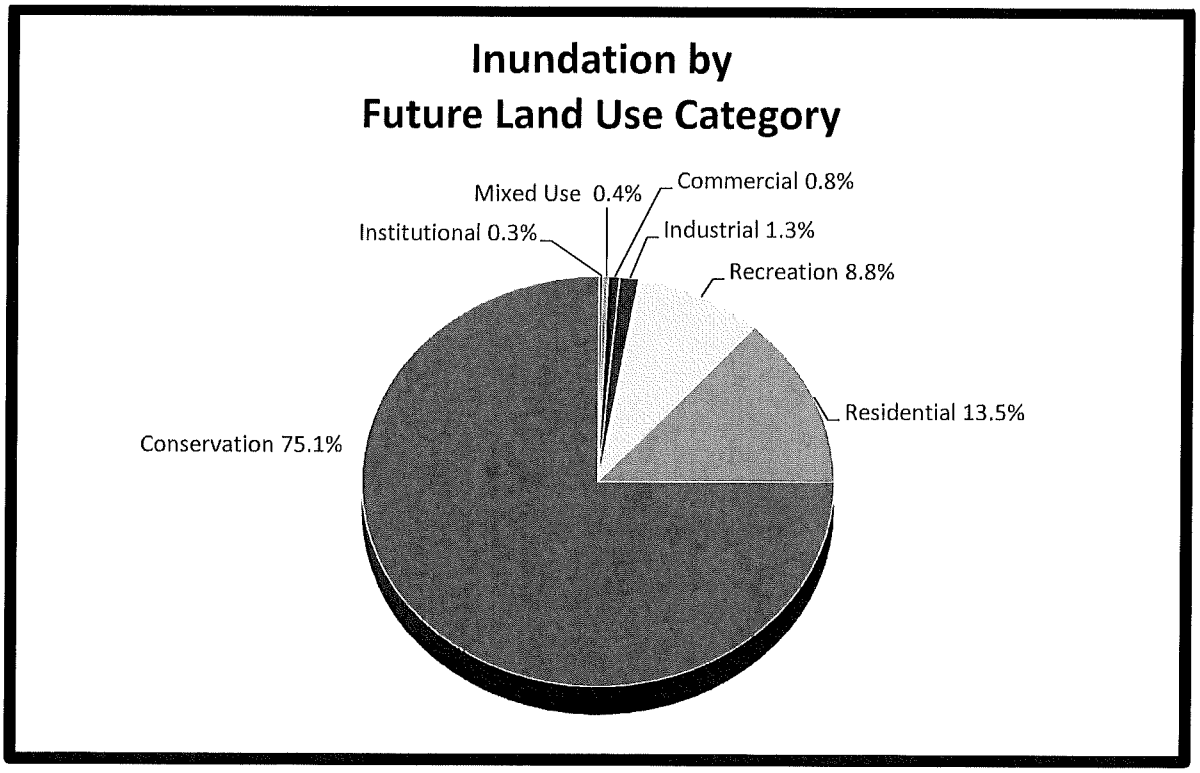


Figure A-9, Spring Tide (2060 C2)

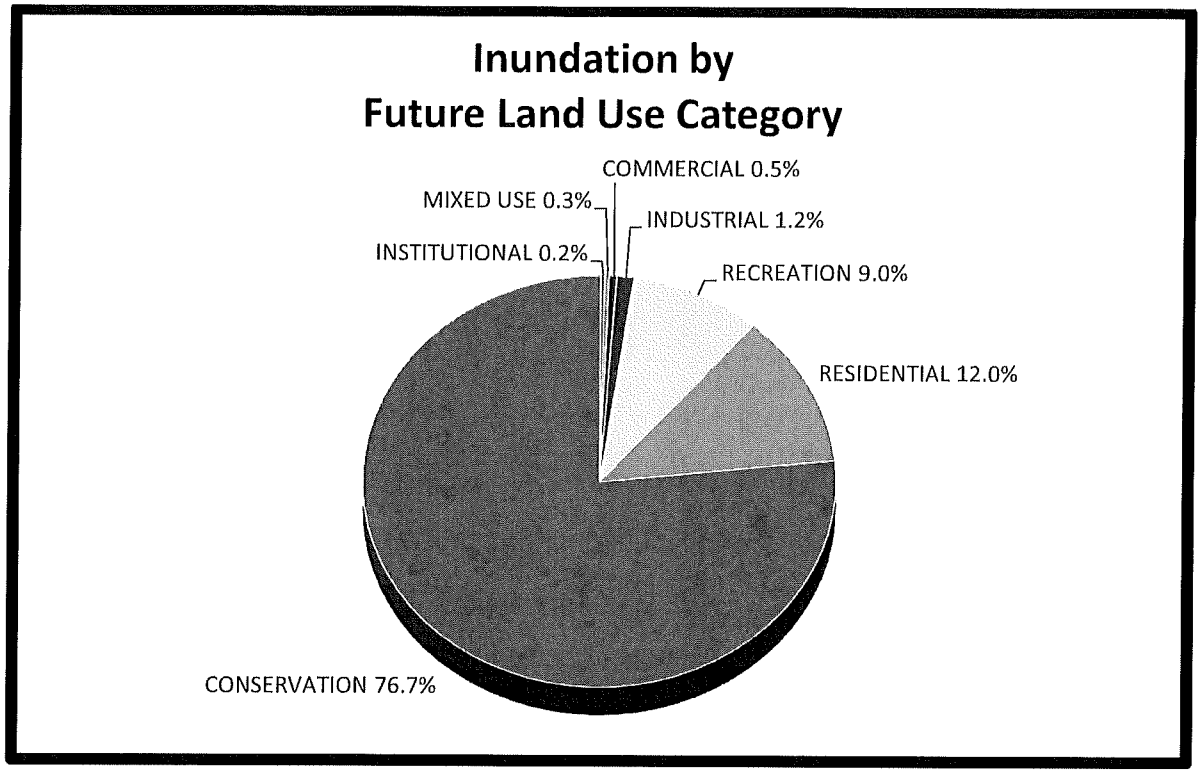
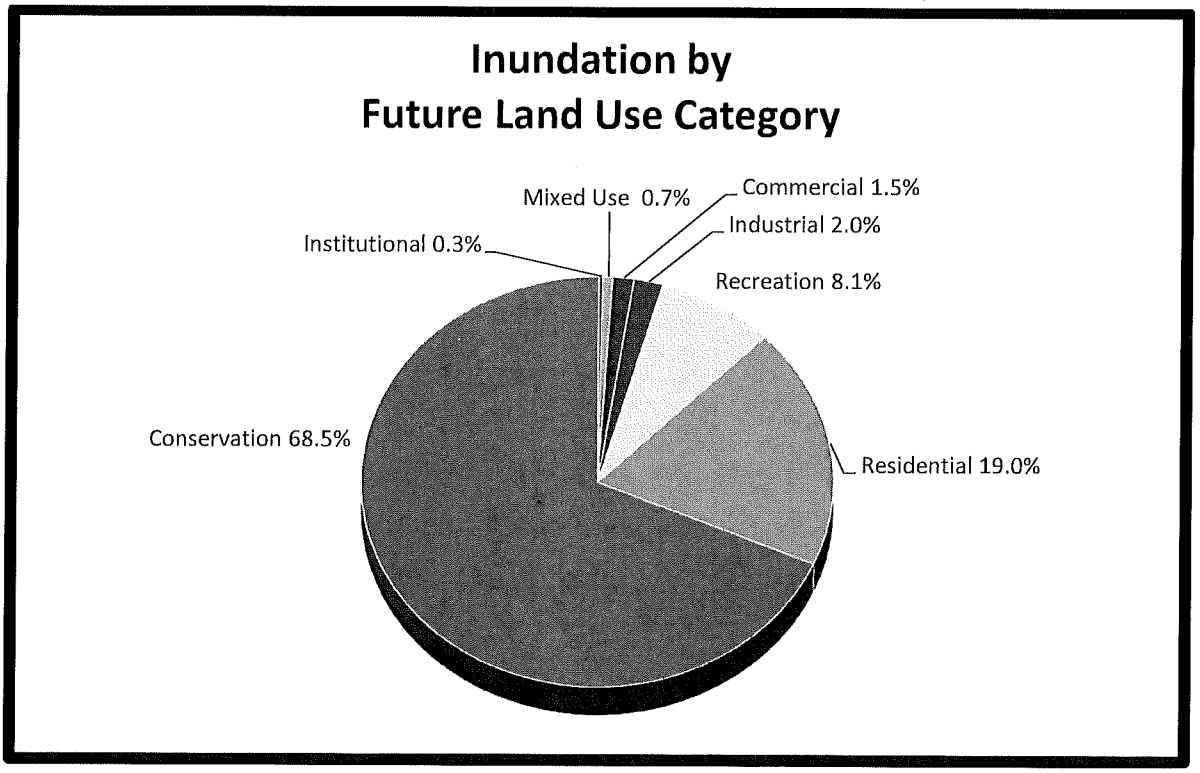


Figure A-10, Spring Tide (2060 C4)



INUNDATION WITHIN FUTURE LAND USE CATEGORIES

Figure A-11, Category 1 Storm Surge (Current)

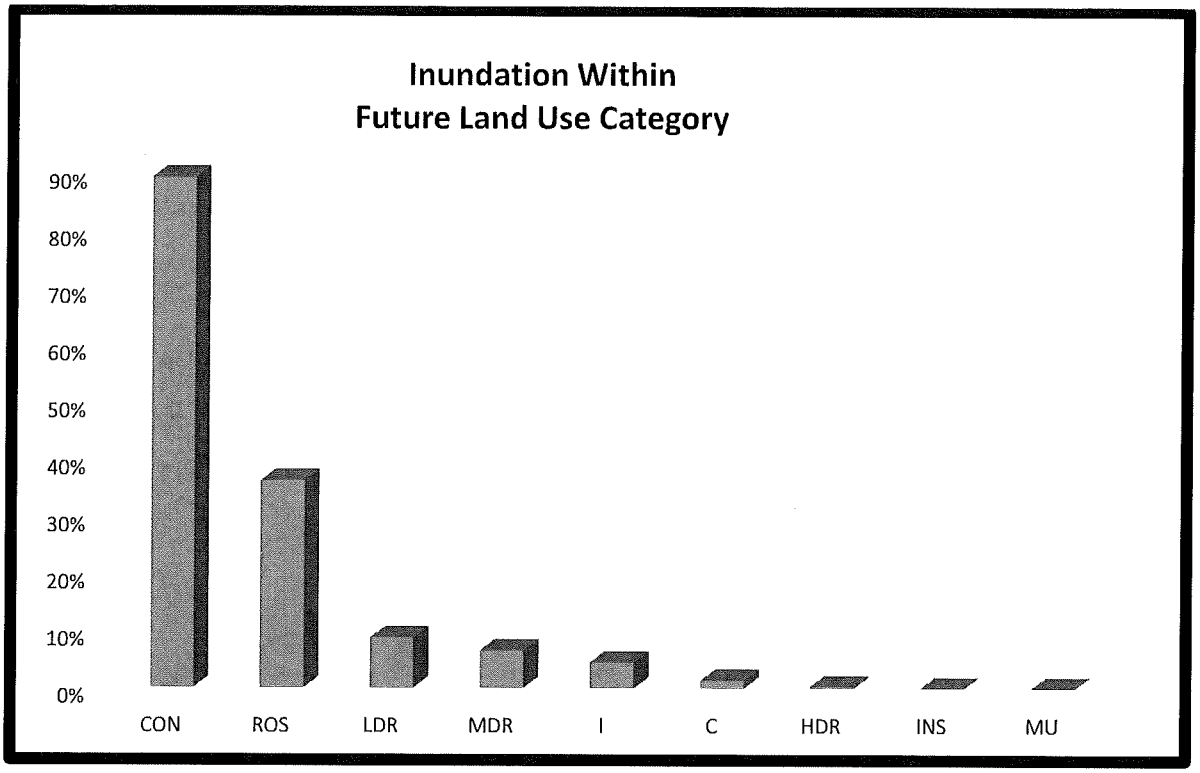


Figure A-12, Category 1 Storm Surge (2040 C2)

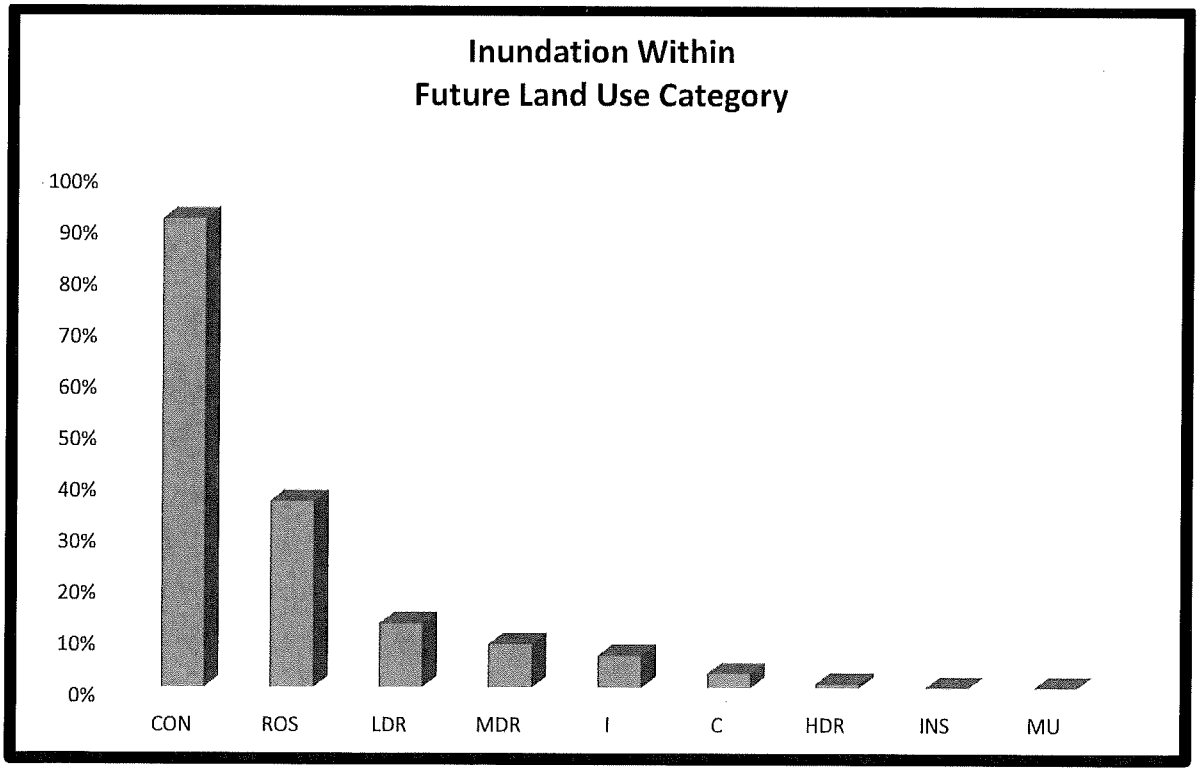


Figure A-13, Category 1 Storm Surge (2040 C4)

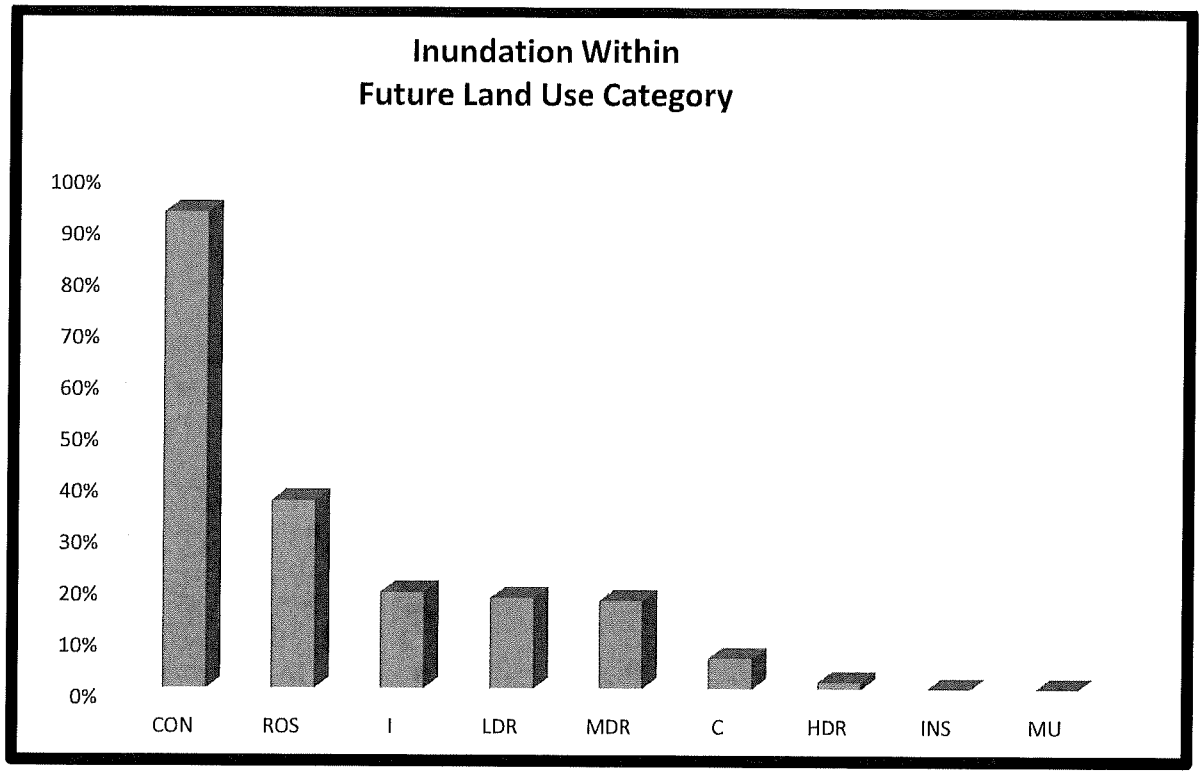


Figure A-14, Category 1 Storm Surge (2060 C2)

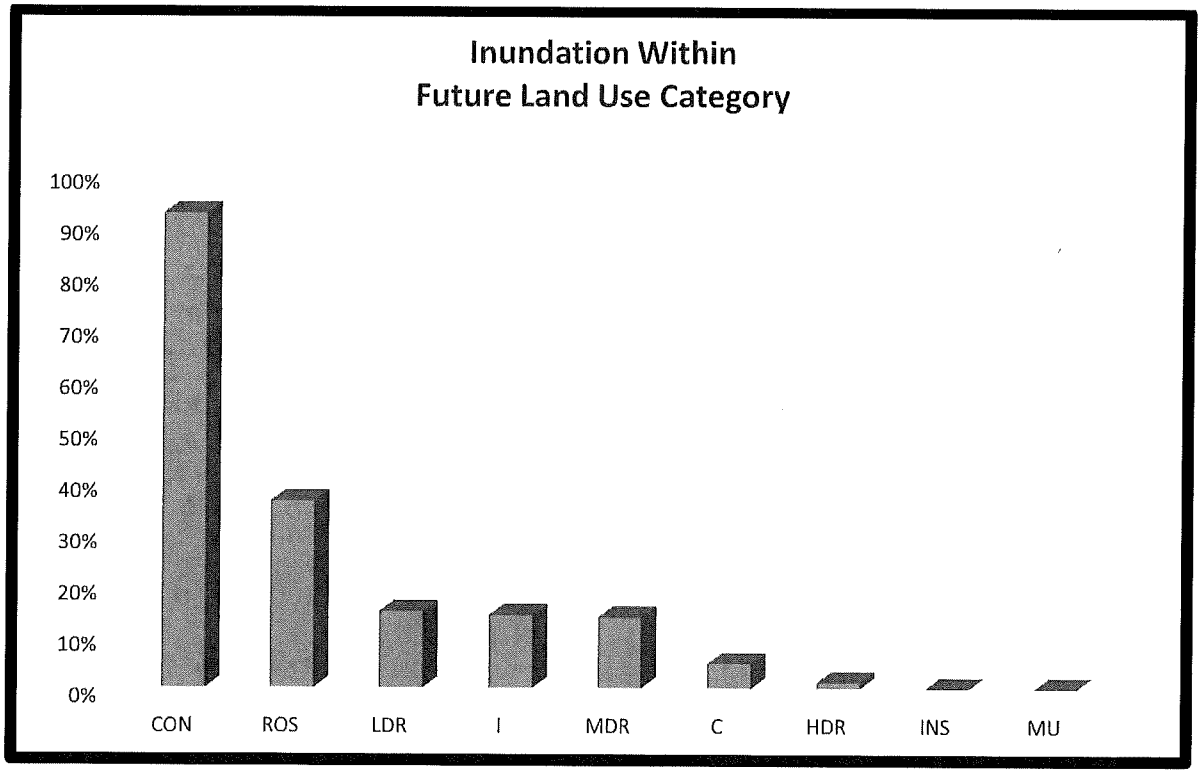


Figure A-15, Category 1 Storm Surge (2060 C4)

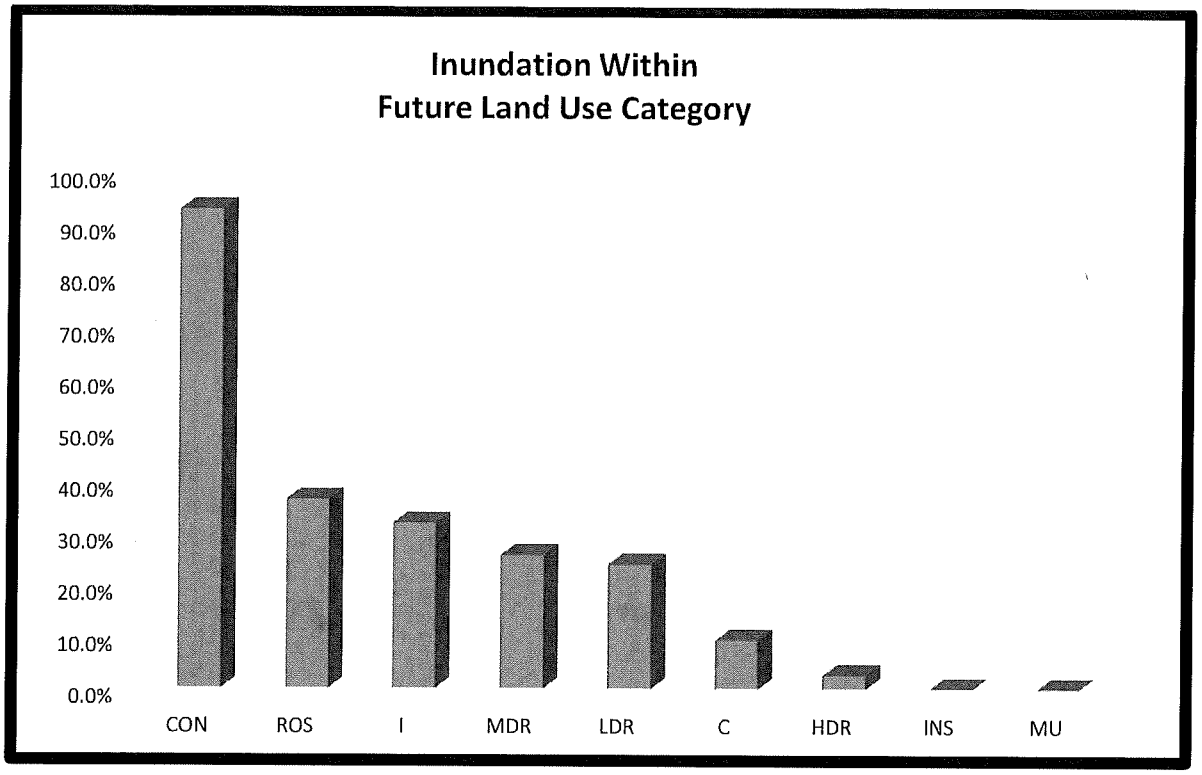


Figure A-16, Spring Tide (Current)

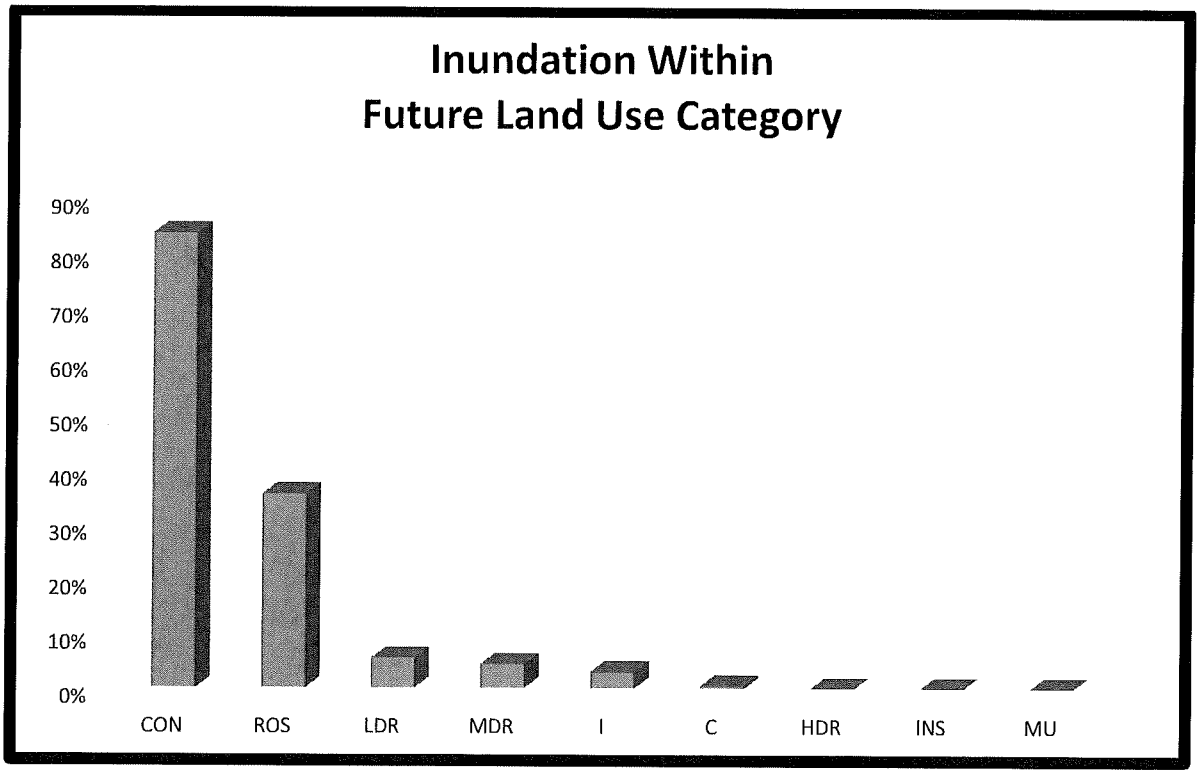


Figure A-17, Spring Tide (2040 C2)

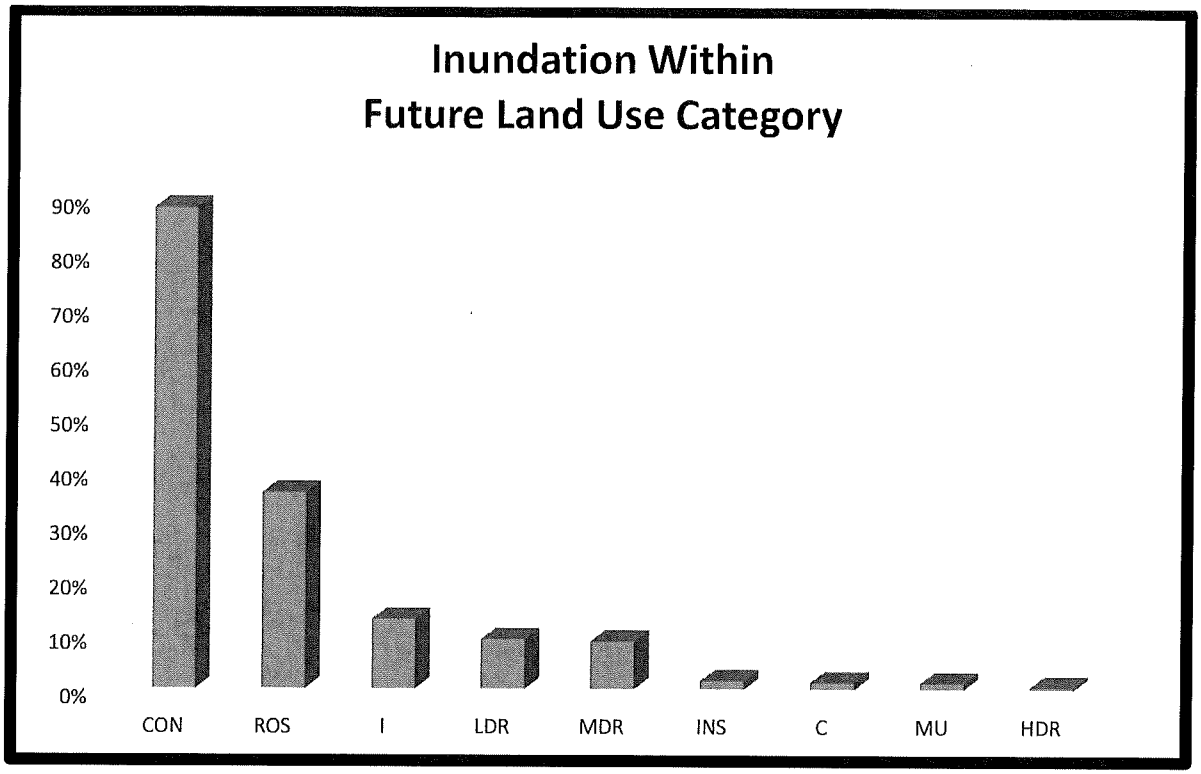


Figure A-18, Spring Tide (2040 C4)

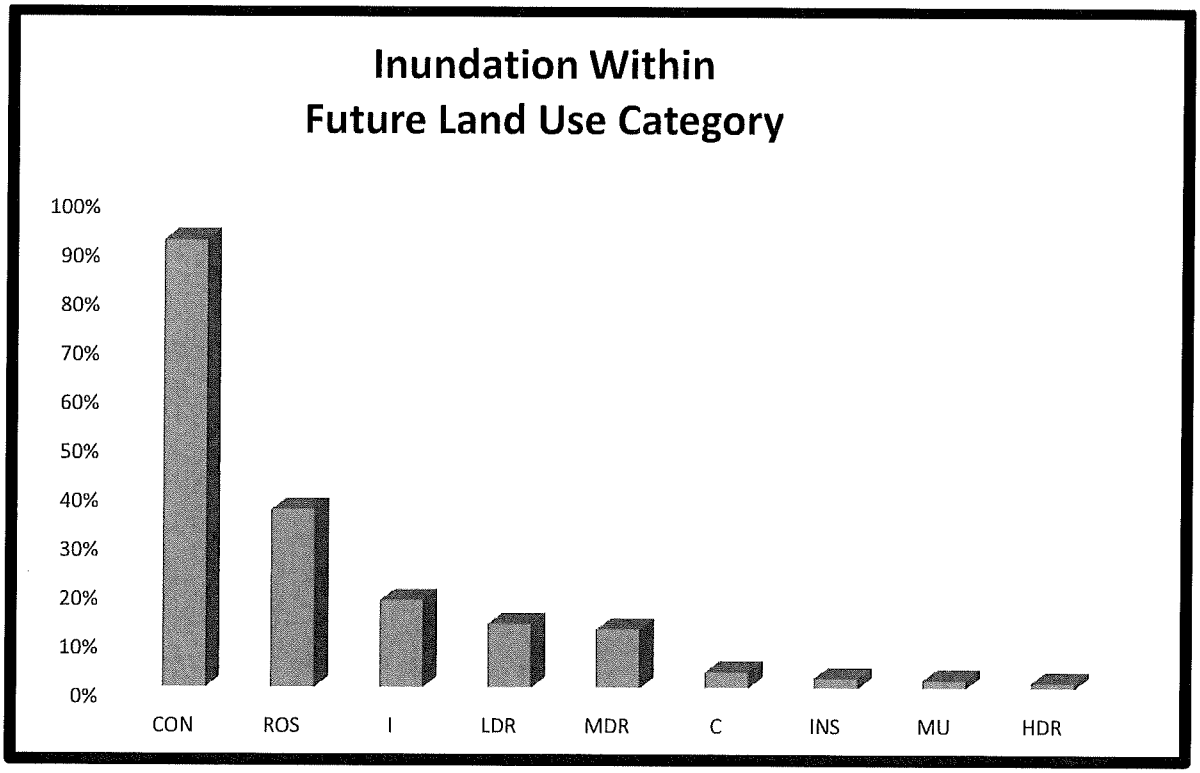


Figure A-19, Spring Tide (2060 C2)

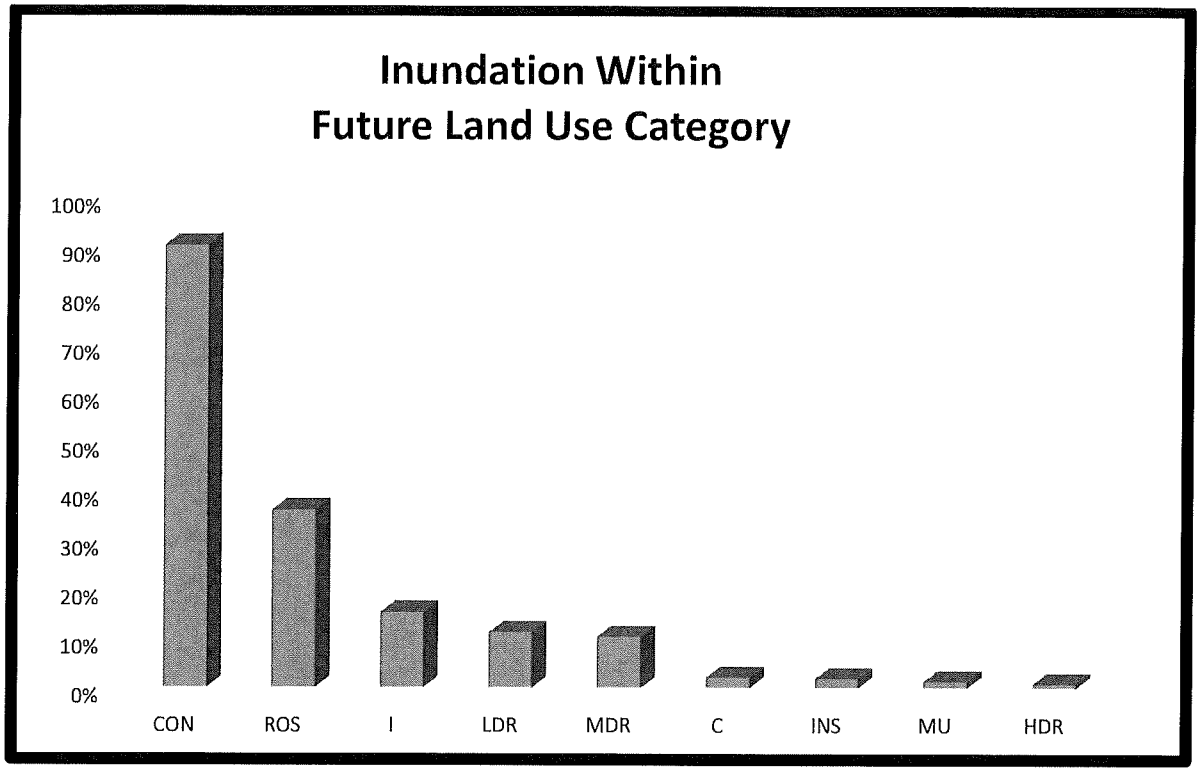


Figure A-20, Spring Tide (2060 C4)