Regular Council

STAFF MEMO

Meeting: Regular Council - Oct 10 2024

Staff Contact: Jay Hubsch **Department:** Community Development

TITLE

ORDINANCE 08-24, FIRST READING, AN ORDINANCE OF THE VILLAGE COUNCIL OF THE VILLAGE OF TEQUESTA, FLORIDA, AMENDING CHAPTER 76. WATERWAY CONTROL. CREATING AN ENTIRELY NEW ARTICLE IV. ENTITLED “BULKHEADS AND SEAWALLS”; AND AN ENTIRELY NEW ARTICLE V. ENTITLED “FILL PERMITS”; WHICH NEW ARTICLES ARE INTENDED TO LIMIT THE USE OF BULKHEADS AND SEAWALLS IN FAVOR OF PROMOTING LIVING SHORELINES, AND REGULATE THE USE OF FILL WATERWARD OF ADJACENT PROPERTY LINES; PROVIDING THAT EACH AND EVERY OTHER SECTION AND SUBSECTION OF CHAPTER 76. WATERWAY CONTROL SHALL REMAIN IN FULL FORCE AND EFFECT AS PREVIOUSLY ADOPTED; PROVIDING A CONFLICTS CLAUSE; A SEVERABILITY CLAUSE, AND AUTHORITY TO CODIFY; PROVIDING AN EFFECTIVE DATE; AND FOR OTHER PURPOSES.

SUMMARY:

The Village Council has tasked staff with creating a "living shorelines" code to be more consistent with the Village's Comprehensive Plan and the code that the Town of Jupiter adopted in 2015. A living shoreline is a shoreline management practice that uses elements such as mangroves, marsh grasses, oyster reefs, and riprap to stabilize shorelines. Living shorelines are effective at protecting coastal areas from erosion, while also creating wildlife habitat and improving water quality.

Staff workshopped living shorelines code concepts with the Environmental Advisory Committee in December 2023 and July 2024, and Village Council in January 2024. The workshops gave staff guidance on what to adopt in a draft code. Additionally, staff conducted a full review of chapter 76 of the Village Code (Waterway Control). There are two aspects of waterway control that are typically found in municipal codes that are not currently in the Village code. The first being bulkheads and the second is the use of fill on waterfront properties.

Living Shorelines

Staff utilized the Town of Jupiter code as the baseline for creating living shorelines regulations. The Jupiter code requires the installation of riprap and mangroves when existing bulkheads or riprap revetments are replaced, or when new ones are constructed. Similarly, the draft code requires the installation of riprap and mangroves when bulkheads and riprap revetments are replaced, or when new ones are constructed. Like the Jupiter code, the draft code requires 100% of the bulkhead to be comprised of riprap and mangroves. At least 10% of the seawall shall be comprised of established mangroves within two years of final inspection of the bulkhead or revetment. If not, then 20 percent of the shoreline shall be planted with mangroves. The code allows Village staff to grant a one-year extension to the monitoring period if some mangroves have been established.

The code also clarifies that existing natural shorelines or riprap revetments shall remain in their current state and that a zoning variance is needed to armor the shoreline with a new bulkhead. This is consistent with Comprehensive Plan policy 2.11.8 in the Conservation Element, which says:

"Bulkheads and seawalls shall be permitted only to stabilize disturbed shorelines or to replace deteriorated existing bulkheads and seawalls."

Bulkhead Regulations

The Village does not currently have any regulations for the construction of bulkheads. In 2019, the Village of North Palm Beach hired a coastal engineer (Alan Gerwig & Associates) to re-write its bulkhead code. The re-write included an analysis of king tide level data and sea-level rise projections from the Southeast Florida Climate Change Compact to establish appropriate minimum, and maximum bulkhead heights. Village staff utilized aspects of the North Palm Beach code as the baseline for new bulkhead regulations. The draft code states that when existing bulkheads are repaired or replaced where the total cost is more than 50% of the total replacement cost, they shall meet the new regulations. Bulkheads may be reconstructed up to 18 inches waterside of the property line when replacing an existing bulkhead. It is necessary to allow this because new bulkheads have to be constructed waterside of existing ones. Additionally, minimum and maximum height for bulkheads have been added to the draft code. Properties in the X or x500 flood zones can have a minimum seawall cap elevation of 4 feet and a maximum of 6 inches above grade or 4.5 feet, whichever is higher. Properties in the special flood hazard area (AE Flood Zone) can have a minimum seawall cap elevation of 4 feet and a maximum seawall cap elevation of 6 inches above grade or 5 feet, whichever is higher. The heights were established to take into account the possibility of future sea level rise.

Fill Permits

The Village Comprehensive Plan has several sections that discourage dredging and filling activities. However, the Village Code does not address dredging and filling. The draft code has a new article called "Fill Permits" that establishes rules for the placement of fill within the waters of the Village. The draft code does not allow fill to be used waterward of property lines unless needed for the construction of a living shoreline or to construct a new bulkhead 18 inches waterward of an existing bulkhead. Any other fill that is installed is required to obtain a fill permit, which must be approved at a public hearing by the Village Council. Having an established regulations in place to prevent the placement of fill without a permit will enable the Village to utilize the code enforcement process on any violators.

Local Planning Agency Meeting

The Local Planning Agency voted 5-0 to recommend approval of Ordinance 08-24 with the following conditions:

1. In Section 76.34 (3) modify the one-year monitoring period extension to two six-month extensions.
2. Clarify the definition of "disturbed shoreline" and when a zoning variance is requested, require a written a recommendation from the Building Official and Community Development Director indicating if they agree if the shoreline is disturbed.
3. Ensure that the total cost of repairs estimate for bulkheads is based off of linear feet. This estimate shall come from a chart of the typical cost of bulkhead repair and replacement that is maintained by the Community Development Director.
4. Add a provision in the fill permit section allowing for the emergency approval of fill to stabilize natural shorelines or mangroves in the event of a storm event.

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BUDGET INFORMATION:

BUDGET AMOUNT n/a **AMOUNT AVAILABLE** n/a **EXPENDITURE AMOUNT:** n/a

FUNDING SOURCES: n/a

IS THIS A PIGGYBACK:
☐ Yes ☐ N/A

DID YOU OBTAIN 3 QUOTES?
☐ Yes ☐ N/A

COMMENTS/EXPLANATION ON SELECTIONn/a

ATTACHMENTS:

Tequesta Ordinance 08-24 Amending Chapter 76 Creating Article IV. Bulkheads and Seawalls
Living Shorelines Presentation

ORDINANCE NO. 08-24

AN ORDINANCE OF THE VILLAGE COUNCIL OF THE VILLAGE OF TEQUESTA, FLORIDA, AMENDING CHAPTER 76. WATERWAY CONTROL. CREATING AN ENTIRELY NEW ARTICLE IV. ENTITLED "BULKHEADS AND SEAWALLS"; AND AN ENTIRELY NEW ARTICLE V. ENTITLED "FILL PERMITS"; WHICH NEW ARTICLES ARE INTENDED TO LIMIT THE USE OF BULKHEADS AND SEAWALLS IN FAVOR OF PROMOTING LIVING SHORELINES, AND REGULATE THE USE OF FILL WATERWARD OF ADJACENT PROPERTY LINES; PROVIDING THAT EACH AND EVERY OTHER SECTION AND SUBSECTION OF CHAPTER 76. WATERWAY CONTROL SHALL REMAIN IN FULL FORCE AND EFFECT AS PREVIOUSLY ADOPTED; PROVIDING A CONFLICTS CLAUSE; A SEVERABILITY CLAUSE, AND AUTHORITY TO CODIFY; PROVIDING AN EFFECTIVE DATE; AND FOR OTHER PURPOSES.

WHEREAS, the Village Council desires to protect and enhance coastal and estuarine environmental quality by creating specific code provision requirements to promote the construction of living shorelines; and

WHEREAS, The Village of Tequesta Comprehensive Plan's Conversation Element Policy 2.11.8 prioritizes the adoption of such requirements: "Bulkheads and seawalls shall be permitted only to stabilize disturbed shorelines or to replace deteriorated existing bulkheads and seawalls. Riprap shall be placed at the toe of all replaced bulkheads and seawalls."; and

WHEREAS, The Village Code does not currently include a permitting process for bulkheads and seawalls, or a fill permit process; and

WHEREAS, the Village Council desires to adopt code provisions to require maintenance of its existing natural shorelines, and to require the placement of riprap at all new bulkheads and seawalls to achieve this purpose; and

WHEREAS, the Village Council has determined that the adoption of such regulations will serve to promote and protect the public health, safety, and welfare.

NOW, THEREFORE, BE IT ORDAINED BY THE VILLAGE COUNCIL OF THE VILLAGE OF TEQUESTA, FLORIDA, THAT:

Section 1: Chapter 76. Waterway Control. of the Code of Ordinances of the

Village of Tequesta is hereby amended to create Article IV. Bulkheads and Seawalls which shall hereafter read as follows:

ARTICLE IV. – BULKHEADS AND SEAWALLS

Sec. 76-32. Specifications.

Bulkheads and seawalls shall be permitted only to stabilize disturbed shorelines or to replace deteriorated existing bulkheads and seawalls. All bulkheads and seawalls constructed within the Village shall be subject to the requirements of this division. Material substitutions and deviations and alternative construction methods may be administratively approved with the consent of the Village Building Official.

(1) Bulkheads and seawalls may be of either the king pile or concrete sheet pile type.

(2) All bulkheads and seawalls shall be capped with a continuous reinforced concrete cap. All concrete corners shall be chamfered three quarters (¾) of an inch minimum.

(3) The design of the bulkhead wall shall conform to recognized engineering standards and calculation methods for bulkhead structures and shall take into account the following:

(a) Load and resistance factors applicable for the engineering analysis and design of the wall;

(b) Differential hydrostatic pressure due to tides and stormwater runoff;

(c) Surcharge loads on the bulkhead wall;

(d) Potential for erosion at the toe of the wall; and

(e) Backflow prevention for drainage outfalls, where applicable.

(5) The dimensions of each component of the concrete wall shall be sized so that the concrete cover over the steel reinforcing bar is a minimum of four (4) inches for all external surfaces and surfaces exposed to saltwater and cast against earth and a minimum of three (3) inches for all formed surfaces not in contact with saltwater.

(6) In accordance with Comprehensive Plan Policy 2.11.8 of the Conservation Element, the Village encourages existing natural shorelines to remain in their natural state. Properties with natural shorelines or riprap revetments shall attempt to utilize living shorelines techniques to stabilize the shoreline in lieu of armoring the shoreline with a bulkhead or seawall. Property owners with natural shorelines or riprap revetments that seek to armor a shoreline with a new bulkhead or seawall shall apply to the Planning & Zoning Board for a Variance as outlined in Section 76-7.

Sec. 76-33. Minimum design requirements for seawalls.

All bulkheads and seawalls constructed within the Village shall comply with the dimensional and compatibility requirements of this section. The provisions of this section shall not apply to repairs to existing bulkheads and seawalls where the total cost of the repairs is less than fifty (50) percent of the replacement cost of the bulkhead or seawall.

(1) Seawalls and bulkheads shall not be constructed beyond the rear property line, provided however, a property owner may reconstruct an existing seawall or bulkhead no more than eighteen (18) inches waterside of the property line. Any extension waterside beyond eighteen (18) inches from the property line shall only be approved by the Village Council in accordance with the fill permit process set forth in Article V of this Code.

(2) Seawall caps shall extend no farther than three (3) feet from the wet face of the seawall or bulkhead or the rear property line, whichever is greater. A portion of the seawall cap may exceed this limitation provided that it meets the required setbacks and dimensions for docks.

(3) The seawall or bulkhead cap shall be placed at the following established minimums and maximum cap elevations:

Property Location	Minimum Cap Elevation	Maximum Cap Elevation (NAVD88)

Zone X & X500 - not in the FEMA Special Flood Hazard Area or Coastal High Hazard Area	Four feet (4′) NAVD88	Six inches (6″) above grade or four feet and six inches (4′6″) NAVD88, whichever is greater. The grade (natural elevation) shall be calculated by selecting a minimum of two (2) elevation points within 1 foot (1′) of the rear property line on each adjoining side property line and calculating the average of the selected elevation points.
In the FEMA Special Flood Hazard Area or Coastal High Hazard Area with an established base flood elevation (BFE)	Four feet (4′) NAVD88	Six inches (6″) above grade as defined above or five feet (5′) NAVD88, whichever is greater.

(4) Seawall caps placed at an elevation greater than the adjacent property shall provide a wall return of the same material and type as the seawall cap, as well as a drainage plan. The drainage plan shall demonstrate that there will be no sheet flow of water to the waterway and adjacent properties. The Building Official may require the modification of plans when it is determined that seawall caps and/or retaining walls will lead to erosion or the degradation of adjacent properties.

(5) All areas of the seawall cap or retaining wall that are visible from adjacent property shall have a finished appearance equivalent to or better than painted concrete stucco. The height of any wall or fence placed on top of the return shall be measured from the grade of the adjacent property. The Building Official may allow relief from fence height requirements when it is necessary for a property to meet pool barrier requirements in Florida Building Code section 454.

(6) In lieu of a replacement seawall or bulkhead, a revetment or natural shoreline may be constructed to replace an existing bulkhead in accordance with Section 76-36 of the Village Code.

Section 76-34. Living Shorelines.

When a new bulkhead or seawall is constructed (if allowed by 76-32(6)) or an existing bulkhead or seawall is replaced, 100 percent of the bulkhead or seawall shall be faced with riprap or mangroves in accordance with Section 76-36. Portions of the bulkhead or seawall where a dock or pier extends waterward, are exempt from the 100 percent calculation.

(1) Upon final inspection of a bulkhead or seawall, a mangrove planting plan shall be provided to the Community Development Director per Sec. 76-36 (2) of this code.

(2) Within two years of final inspection of the bulkhead or seawall, at least ten percent of the shoreline shall be comprised of established mangroves.

(3) If, after two years from the final inspection of bulkhead or seawall less than ten percent of the shoreline is comprised of mangroves, then 20 percent of the shoreline shall be planted with mangroves. If some mangroves have been established, but the minimum requirement of ten percent has not been met, Village Staff may grant a one-year extension to the monitoring period. The mangroves shall meet the standards within Section 76-36 of this Code.

(4) Properties designated on the shoreline exemption map (Figure 1) shall be exempt from installing riprap or mangroves. The exemption only applies to that portion of the property at the mouth of the canal as shown on the shoreline exemption map and shall not apply to the portion of property along the natural waterway.

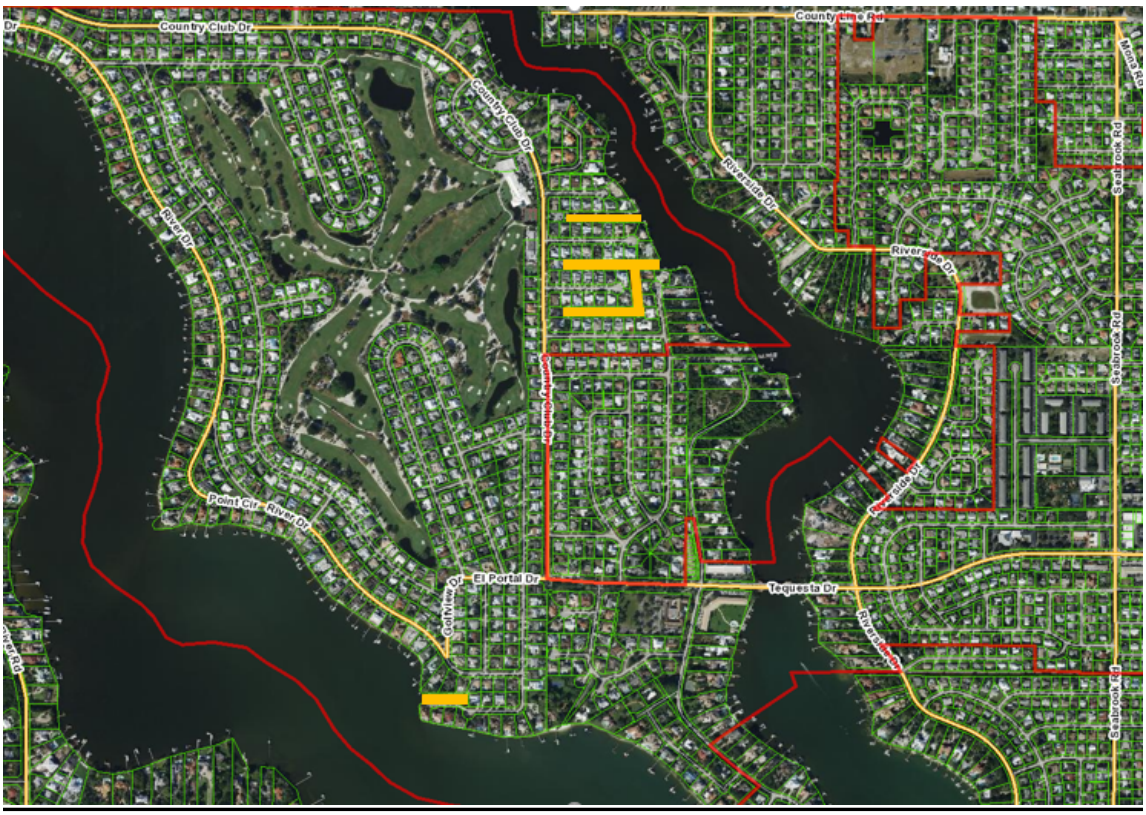


Figure 1. Shoreline Exemption Map

Section 76-35. Revetments.

Existing riprap revetments may be replaced with a new riprap revetment provided it meets the following standards:

(1) The revetment shall be constructed in the same place as the existing revetment.

(2) An existing revetment which was constructed with loose boulders, rocks, or clean concrete rubble with no exposed reinforcing rods or protrusions may remain and riprap may be placed over top of the existing materials.

(3) An existing revetment constructed of material not consistent with loose boulders, rocks, or clean concrete rubble with no exposed reinforcing rods or protrusions shall be removed prior to replacement.

(4) When at least 50% of an existing revetment is replaced with a new revetment, mangroves shall be planted in accordance with the regulations set forth in Section 76-34 and 76-36 of this Code.

(5) Properties with existing riprap revetments shall attempt to utilize living shorelines techniques to stabilize the shoreline in lieu of armoring the shoreline with a bulkhead or seawall. Property owners with riprap revetments that seek to armor a shoreline with a new bulkhead or seawall shall apply to the Planning & Zoning Board for a Variance as outlined in Section 76-7.

Section 76-36. Riprap And Mangrove Installation.

(1) When riprap is installed in conjunction with a new or replacement seawall, it shall be placed such that the bottom 50 percent of the bulkhead is covered, and sloped at a maximum two to one, vertical to horizontal ratio. At no point shall riprap extend more than eight feet waterward of the mean high water line or jurisdictional line of the state. Riprap placed waterward of bulkheads does not require filter cloth.

(2) Following the final inspection of the bulkhead or seawall as outlined in Section 76-34 of this Code, a mangrove planting plan shall be submitted to the Village which shall include:

(a) The species of mangroves and whether they are appropriate for the location;

(b) The size, species, number, and spacing of mangroves to be planted;

(c) The identification of the location of at least two photo stations which shall be the designated photo station from which photos will be provided for each monitoring report;

(d) Photos clearly showing the mangrove plantings in their entirety;

(e) The location of bulkheads, docks, or other structures relative to the plantings.

(3) The property owner shall submit a time zero monitoring report to the Village within 30 days from the Village's initial inspection, marking the beginning of the monitoring period.

(4) The property owner shall monitor the mangroves annually for survivability for five years. On or before the anniversary date of the annual time zero report

each year, the property owner shall submit at least two photographs taken from each of the designated photo stations and submit these photos to the town for its review and approval. The report shall also identify the number and location of the mangroves which have been planted. If less than 80 percent of originally planted mangroves have survived, the property owner shall replant the number of mangroves which have expired. If photographs are not received by the required date, an inspection will be conducted by Village staff in order to inspect the condition of the mangroves.

(5) The Village may require that hand placed riprap be installed to support the growth of mangroves which have been planted in high wave energy areas.

(6) In the event a jurisdictional agency requires a permit for the placement of riprap or mangroves within their jurisdiction, but will not issue the permit, then the property shall be exempt from providing riprap or mangroves in the jurisdictional area.

(7) Where the placement of riprap would result in the destruction of sea grasses, the property owner shall not be required to install riprap or mangroves. The property owner must submit a sea grass study, not more than six months old, documenting the location of the sea grasses.

Sec. 76-37. Permitting and inspection.

All seawalls and bulkheads shall be subject to the following permitting and inspection requirements:

(1) *Permitting.* The Building Department shall review all permits for seawalls and bulkheads for structural integrity and consistency with the requirements of this division. All permit applications shall include the following information:

(a) Engineering plans signed and sealed by a professional engineer licensed in the State of Florida.

(b) A cross section of wall indicating the channel bottom elevation, the cap elevation and identifying the type, size and location of wall components.

(d) Documentation demonstrating that all concrete satisfies the requirements of ACI 318 Exposure Class C2.

(h) Plans demonstrating that exposed steel tie back anchor rods and other anchors shall be coated with a heavy-duty protective coating to prohibit corrosion.

(i) A copy of the pollution control plan required by the Florida Department of Environmental Protection (FDEP) permit depicting the location and types of pollution control mitigation measures. During the course of construction, the permittee shall be required to submit to the village all reports required by the National Pollutant Discharge Elimination System (NPDES) permit prior to the village's issuance of a certificate of occupancy.

(2) *Inspection.* The permittee shall notify the Village Building Inspector at least forty-eight (48) hours prior to the following events so as to allow for inspection:

(a) the first installation of any structural support, including a king pile or concrete sheet;

(b) the backfilling of structural supports, including any anchors or tie rods;

(c) the pouring any cast-in-place construction; and

(d) the final cap pouring.

(e) Pile driving certifications by a licensed engineer.

ARTICLE V. FILL PERMITS

Sec 76-38 Filling operations beyond property line; prohibited.

No fill shall be made, deposited or maintained in the waters of the Loxahatchee River, Indian River Lagoon, canals, or other tidal waters within the corporate limits of the village, waterward or outward from any shoreline, in such a manner so that such fill shall extend beyond any property line except as provided in sections 76-33 through 76-36 and 76-42 of this Code. Fill needed to construct, repair, or maintain living shorelines, mangroves, or riprap revetments may extend beyond the property line if approved by the building official and community development director.

Section 76-39 Unlawful fill; removal.

Any fill which shall be made contrary to the provisions of this Chapter shall be unlawful and subject to removal upon order of the Village Council.

Section 76-40 Fill Permit Required

(a) No person may make or deposit any fill or undertake the filling, creation or extension of land by pumping, dredging, pumping sand, rock or earth or otherwise within the waters of the Loxahatchee River, Indian River Lagoon, canals, or other tidal waters within the limits of the village without first having received a permit therefor from the Village Council. All filling shall be made in accordance with the plans and specifications designated in the application for such permit.

(b) Notwithstanding the foregoing, a fill permit shall not be required for any fill associated with the replacement or reconstruction of an existing seawall or bulkhead no more than eighteen (18) inches waterward of the property line as provided in Section 76-33 of this Code or fill needed to construct, repair, or maintain living shorelines, mangroves, or riprap revetments if approved by the building official and community development director.

Sec. 76-41 Public hearing.

(a) Before any petition or application for a permit to fill or dredge, the Village Council shall consider all applications for a fill permit at a duly noticed public hearing.

(b) Notice of the public hearing shall be published in a newspaper of general circulation or the Village's Public Notices Portal at least seven (7) days prior to the hearing at which the application is considered. Additionally, notice shall be mailed to all property owners of record within three hundred (300) feet of the property to which the application relates, as derived from the official tax roll of Palm Beach County, at last ten (10) days prior to the hearing. The applicant shall provide an affidavit attesting to the completeness and accuracy of the property owner's list and confirming that the notice was sent to all property owners included on the list. The notice shall contain the following information:

(1) A brief description of the fill permit application;

(2) Time, date and location of the public hearing;

(3) The street address of the property upon which the fill activities are proposed (or in the event there is no address, a legal description and location map); and

(4) Name, address and telephone number of the office where additional information may be obtained.

(c) The terms of this Chapter shall be in addition to any terms set forth in this Code which are concerned with applications for dredge and fill permits, and shall not be considered to be in lieu of any requirements contained herein.

Section 76-42 Application; issuance.

(a) Applications for the permit required by this article shall be in writing and directed to the Community Development Director and shall be accompanied by a surveyor's sketch plan of what is proposed to be done and shall also show the details of any proposed construction, the proposed area to be filled, the area to be dredged for procuring fill materials, if the proposed construction is intended to be created from dredged material, and such other information and data as may be pertinent to the proposed filling.

(b) The Village Council shall not grant any fill permit that would violate any statute, zoning law, ordinance or other applicable restriction. In determining whether to grant, grant with conditions or deny any fill permit application, the village council shall consider:

(1) whether any harmful obstruction to or alteration of the natural flow of the adjacent navigable waters will arise from the proposed construction;

(2) whether any harmful or increased erosion, shoaling of channels or stagnant areas of water will be created thereby; and

(3) whether any material injury or monetary damage to adjoining land will accrue from the proposed activities. All fill permits are subject to approval by the trustees of the internal improvement fund of the state and by the U.S. Army Corps of Engineers, as applicable.

Section 76-43 Application fees.

Each application shall be accompanied by a deposit of the estimated costs of the Village in processing the application. Upon the Village determining the actual costs, applicants shall pay the balance, if any, in full of such costs including advertising and cost of review by the Village Staff prior to final consideration of the application by the Village Council. If the deposit exceeds actual costs, the balance shall be refunded to applicant. Each change in plans and specifications subsequent to the issuance of a permit shall be the subject of a new or supplemental application and a like fee shall be paid upon the filing of such application as was paid in the case of the original application.

Section 76-44 Expiration date; renewal; revocation

(a) All permits issued under this article shall be valid for a period of two (2) years from the date thereof, but shall be automatically revoked if the proposed work is not completed within such period except for good cause shown.

(b) The renewal of any permit prior to sixty (60) days after its expiration may be granted by the Community Development Director for good cause shown.

(c) For violation of or noncompliance with the terms of a permit, such permit may be revoked after notice of intention to do so has been communicated to the holder and opportunity afforded within a reasonable time for a hearing thereon before the Village Council.

Section 2: Each and every other section and subsection of Chapter 76. Waterway Control. shall remain in full force and effect as previously adopted.

Section 3: All ordinances or parts of ordinances in conflict be and the same are hereby repealed.

Section 4: Should any section or provision of this Ordinance or any portion thereof, any paragraph, sentence or word be declared by a court of competent jurisdiction to be invalid, such decision shall not affect the validity of the remainder of this Ordinance.

Section 5: Specific authority is hereby granted to codify this Ordinance.

Section 6: This Ordinance shall take effect immediately upon adoption.

LIVING SHORELINES

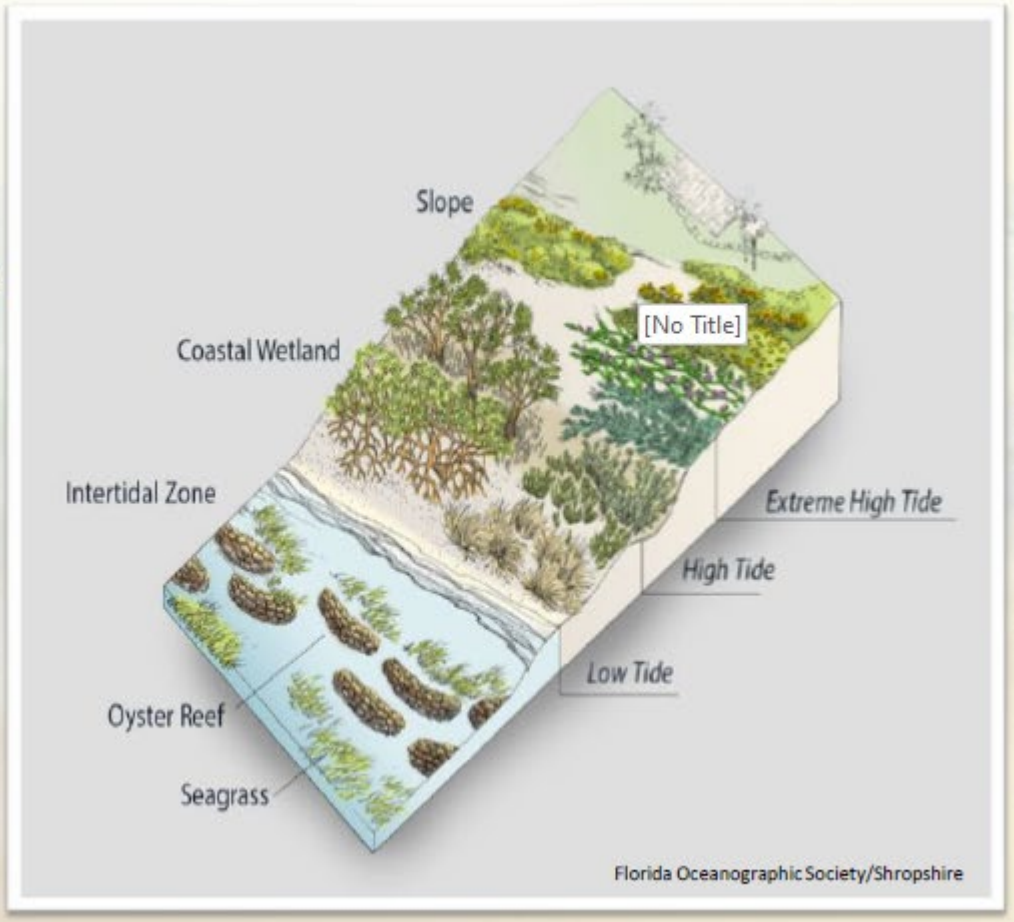
THE VILLAGE OF Tequesta

Department of Community Development

What is a Living Shoreline?

"A shoreline management practice that provides erosion control benefits; protects, restores, or enhances natural shoreline habitat; and maintains coastal processes through the strategic placement of plants, stone, sand fill, and other structural organic materials (e.g. biologs, oyster reefs, etc)."

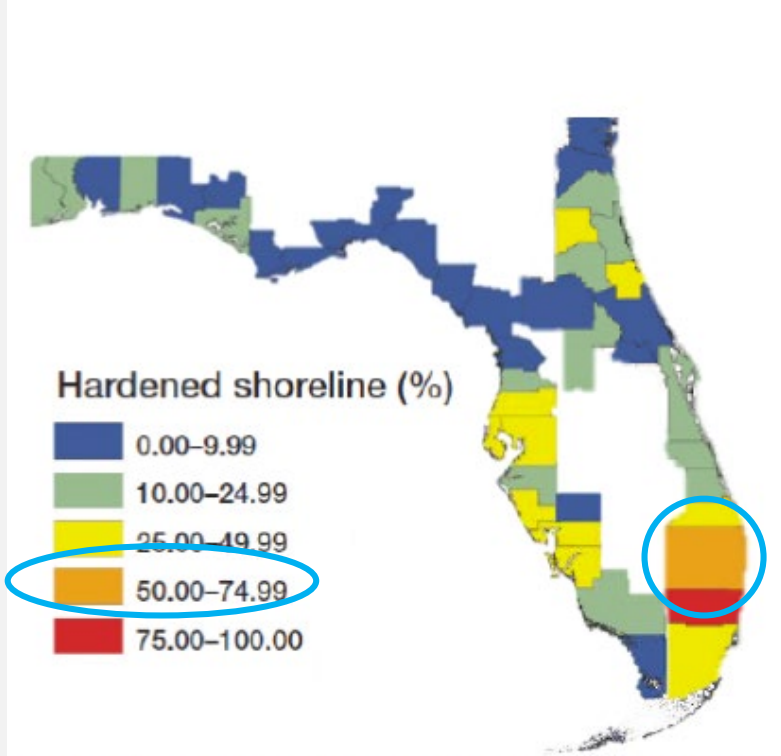
National Oceanic and Atmospheric Administration



WHAT IS SHORELINE ARMORING

Also known as hard infrastructure: seawalls, bulkheads, retaining walls placed to separate land and water interface for protection against erosion.

Approximately 14% of the US Coastline has been armored, with a much higher rate in Florida and Palm Beach County (50-75%)



Source of Data on both graphics: *Gittman et al. 2015. Engineering away our natural defenses.*

PROBLEMS WITH SHORELINE ARMORING

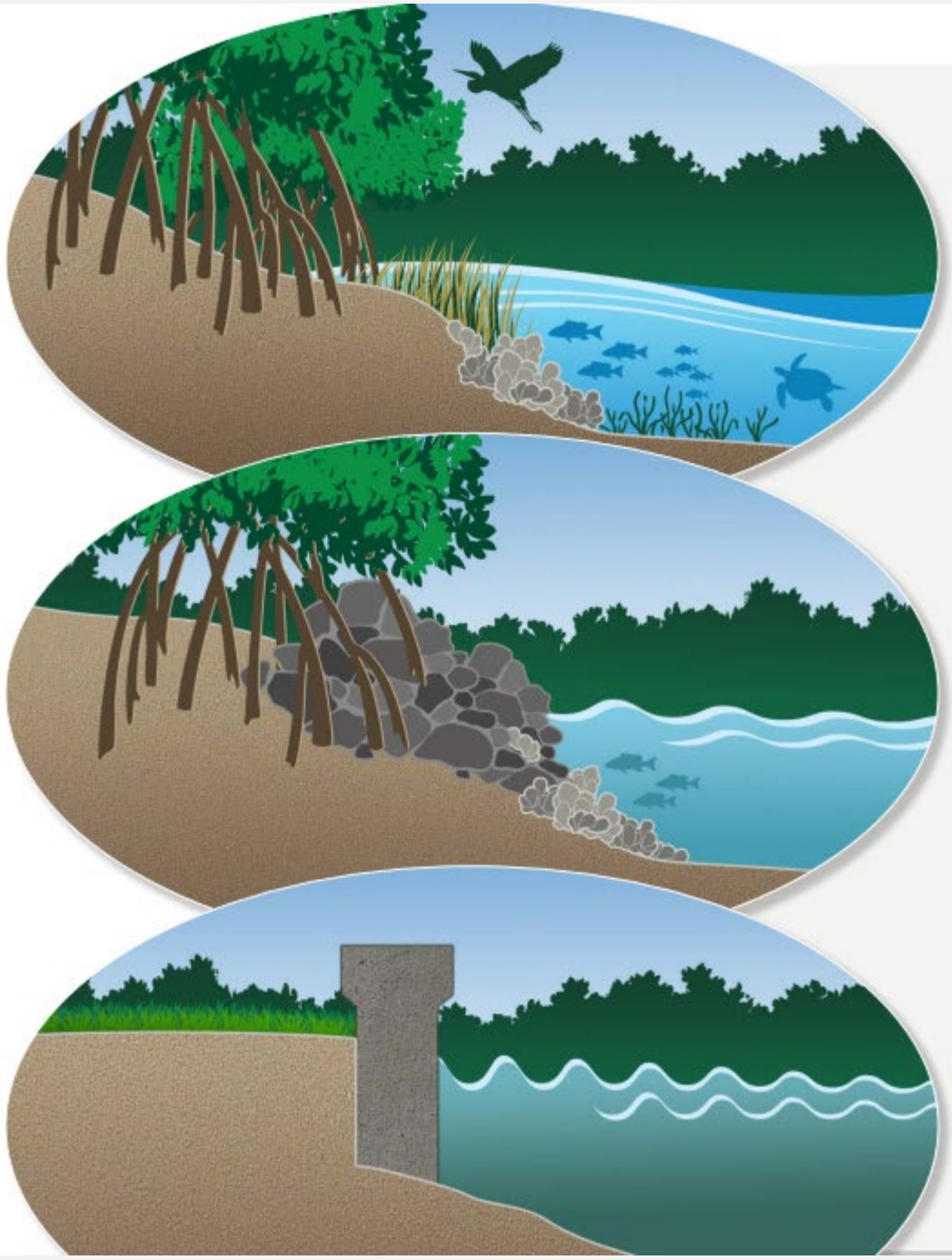
- **Armoring creates a fixed point in relation to rising sea levels and coastal flooding** The big one is resiliency. As sea levels rise and frequency of coastal flooding increases, the integrity of armored shorelines are increasingly under greater threat.

- **Loss of habitat due to an abrupt transition from shoreline to water** Loss of ecotone when a shoreline is bulkheaded. The intertidal zone is effectively the wall itself, with a much narrower band of habitat formation.

- **Seawalls will eventually fail – high cost to repair or replace** All seawalls will eventually fail, with erosion occurring behind and at the base. Hardened structures may also hasten erosion downdrift from its location, furthering more shoreline armoring.

Living Shorelines...

- Protect shorelines by improving stability and reducing erosion.
- Offer a less expensive, sustainable option to traditional seawalls if they are designed so components establish and thrive.
- Provide essential habitat for fish and other animals which promotes better fishing and ecotourism.
- Improve water clarity while filtering stormwater run off.
- Create feeding areas for wading birds.
- Encourage seagrass growth and reduce sediments in the water.



Shoreline Types

Methods to protect property from erosion have varied costs and benefits. On-site conditions may not always support a simple living shoreline, but all stabilization projects can be designed to maximize their benefit to the shoreline and local ecology.

Natural

Natural shorelines include seagrasses and oysters that stabilize submerged sediments and reduce wave energy on the shoreline. At the water's edge, smooth cord grass and mangrove trees support a gradual slope. These living shorelines can be a cost-effective alternative to seawalls and rip rap when properly designed and located. Even existing seawalls can have a living shoreline component. Permitting for coastal protection may be easier if the proposed project allows a living shoreline to persist.

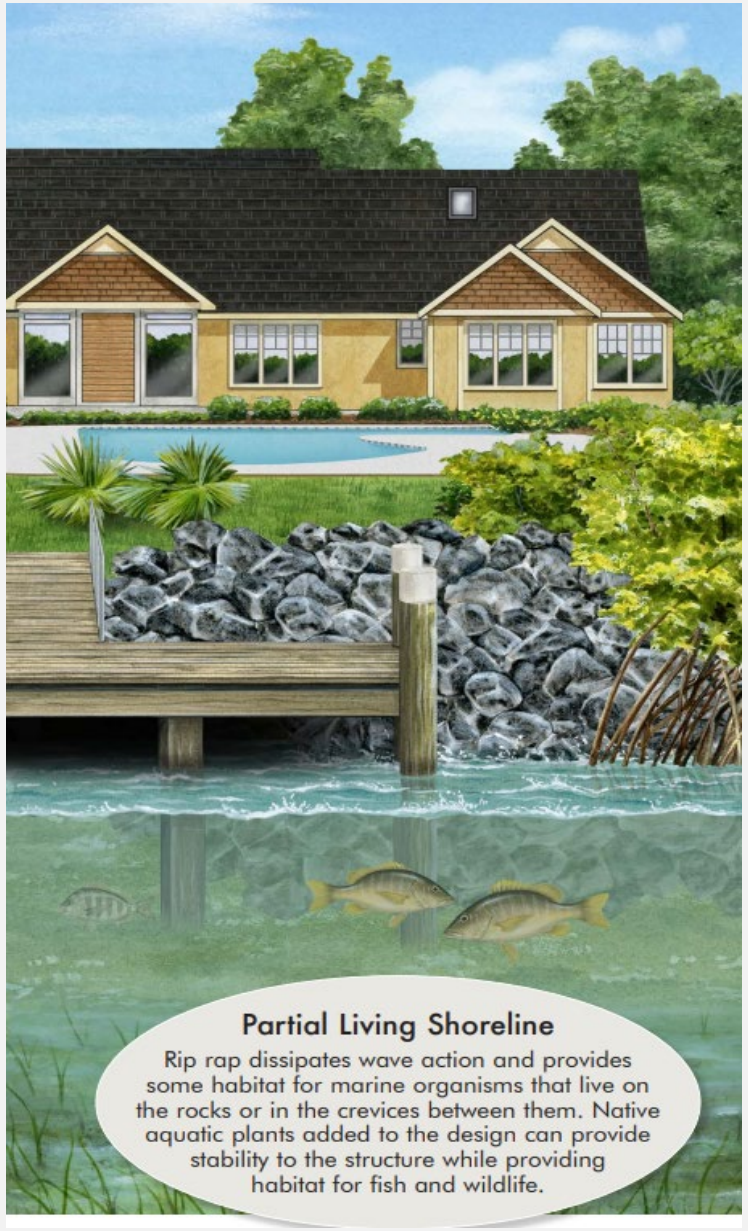
Rip Rap

Rip rap is a sloped barrier of rocks that absorbs wave action where moderate/high wave energy causes erosion. Natural limestone (coquina) is generally recommended because it supports native plant and animal species, slowly breaks down into sand/shell, and provides surfaces for oysters to live.

Seawalls

Seawalls are hardened structures of concrete, wood, or vinyl designed to reduce erosion of sediment exposed to moderate/high wave energy. Although upland soil is retained, sediment on the water side of the wall can be lost. These structures are expensive to build and maintain.


No Living Shoreline
Because seawalls are a fixed height, waves can crash over them during storms leading to erosion, damage, or collapse. Seawalls can fail when waves erode their bases, and provide minimal habitat for fish and wildlife. Wave action causes rough water and low visibility.


Partial Living Shoreline
Rip rap dissipates wave action and provides some habitat for marine organisms that live on the rocks or in the crevices between them. Native aquatic plants added to the design can provide stability to the structure while providing habitat for fish and wildlife.


Living Shoreline!
An economically and environmentally good choice. Natural shorelines provide the stabilization that protects property, while providing much-needed habitat for the wildlife we enjoy we enjoy, and support our community economy.


LIVING SHORELINES SUPPORT RESILIENT COMMUNITIES
Living shorelines use plants or other natural elements—sometimes in combination with harder shoreline structures—to stabilize estuarine coasts, bays, and tributaries.
One square mile of salt marsh stores the carbon equivalent of 76,000 gal of gas annually.
Marshes trap sediments from tidal waters, allowing them to grow in elevation as sea level rises.
Living shorelines improve water quality, provide fisheries habitat, increase biodiversity, and promote recreation.
Marshes and oyster reefs act as natural barriers to waves. 15 ft of marsh can absorb 50% of incoming wave energy.
Living shorelines are more resilient against storms than bulkheads.
33% of shorelines in the U.S. will be hardened by 2100, decreasing fisheries habitat and biodiversity.
Hard shoreline structures like bulkheads prevent natural marsh migration and may create seaward erosion.
The National Centers for Coastal Ocean Science | coastalscience.noaa.gov

Cost Comparison

Design, Permitting & Construction

	LIVING SHORELINE	SEAWALL
Shallow Water/Low Wake	$85,000	$130,000
Shallow Water/High Wake	$105,000	$155,000
Deep Water/Low Wake	$155,000	$165,000
Deep Water/High Wake	$130,000	$195,000

Estimates are based on 100 ft shoreline, 2018 costs rounded. Living shoreline costs do not include/require seawall replacement.

Unit Cost

	COST	UNIT
Turbidity Curtain	$17	Linear Foot
Silt Fence	$4	Linear Foot
Clearing & Grubbing	$11,000	Acre
Native Estuarine/Upland Plantings	$20	Each
Earthen Berm/Embankment Fill	$36	Cubic Yard
Impervious Liner	$125	Linear Foot
Geotextile	$20	Linear Foot
Rip Rap (Rock sill)	$300	Ton
Oyster Bags	$3	Each
Seed/Sod	$9	Square Foot
French Drain	$160	Linear Foot
8" HDPE Pipe	$150	Linear Foot
Check Valve	$500	Each
Living Floating Dock	$400	Square Foot
Precast Planter	$5,000	Each
Concrete Seatwall	$350	Linear Foot
Concrete Stairs	$3,000	Each
Remove Seawall	$150	Linear Foot
3 ft Stem Wall	$350	Linear Foot
Precast Seawall with texture	$800	Linear Foot
Glass Flood Wall	$350	Linear Foot
Habitat Panels	$40	Linear Foot
Annual Maintenance	5%	Lump Sum

- Design and Permitting Costs include survey, geotechnical analysis and biological assessment costs.
- Construction costs are based on RS Means Database and FDOT Index for Broward and Miami-Dade Counties.
- Prices include raising the crest elevation of the shoreline protection option to +5 feet NAVD 88 to account for sea level rise.
- Planting costs will vary depending on type, size and maturity.
- Maintenance of living shoreline and planting elements are lower cost, but more frequent in the first 2 years after installation. Then the maintenance is typical monthly/seasonal landscaping costs, so costs decrease with time.
- Maintenance of concrete structures is typically 3 or more years after installation. Maintenance is more extensive and higher cost to grind & fill cracks and spalled areas with epoxy and paint. Maintenance costs increase with time.

TEQUESTA CODE

- The Village does not currently have **ANY** regulations regarding bulkhead/seawall construction or the placement of fill waterward of property lines.

- It is difficult for the Building Department to regulate construction of bulkheads and seawalls without defined regulations.

- In 2015, the Town of Jupiter adopted new regulations that required some elements of living shorelines to be installed when bulkheads or revetments were replaced. The Jupiter Code **does not require anything to be done to existing** bulkheads, revetments, or natural shorelines. It simply requires mangroves or riprap to be installed during new projects.

- In 2019, the Village of North Palm Beach underwent an extensive re-write of its bulkhead and seawall code, with the assistance of a local Coastal Engineer (Alan Gerwig &Associates).


County Line Rd
County Line Rd
Village Blvd
Old Dixie Hwy
Beach Rd
TEQUESTA
1
Tequesta
Loxahatchee River Rd
Tequesta
Jupiter
N Old Dixie Hwy
Beach Rd
N Alternate A1A
1
Ocean
JUPITER INLET COLONY
Jupiter
N A1A
N Alternate A1A
Center St
Center St
Center St

ISSUE #1: HARDENING SHORELINES

Conservation Element Policy: 2.11.8 Bulkheads and seawalls **shall be permitted only** to stabilize disturbed shorelines or to replace deteriorated existing bulkheads and seawalls. Riprap shall be placed at the toe of all replaced bulkheads and seawalls.

Coastal Management Policy: 6.1.7 The Village shall evaluate opportunities to protect coastal investments and infrastructure, as necessary and feasible, from the impacts of climate change. Specifically, the Village shall maintain shoreline protection and erosion control by:
c) Considering hard structures, such as seawalls, **only when alternative options are unavailable**.

Draft Section 76.32 Bulkheads and seawalls **shall be permitted only** to stabilize disturbed shorelines or to replace deteriorated existing bulkheads and seawalls.

Draft 76.32 (6) In accordance with Comprehensive Plan Policy 2.11.8 of the Conservation Element, the Village encourages existing natural shorelines to remain in their natural state. Properties with natural shorelines shall attempt to utilize living shorelines techniques to stabilize the shoreline in lieu of armoring the shoreline with a bulkhead or seawall. Property owners with natural shorelines or riprap revetments that seek to armor a shoreline with a new bulkhead or seawall **shall apply to the Planning & Zoning Board for a Variance** as outlined in Section 76-7.

JID 2013 Shoreline Assessment

ISSUE #2: ESTABLISHING SEAWALL AND BULKHEAD SETBACKS

- Seawalls and bulkheads that are being repaired where the total cost is more than 50% of the replacement cost shall meet these new standards:

- New seawalls and bulkheads cannot be constructed beyond the rear property line, but an existing seawall may be reconstructed 18 inches waterside of the property line. Jupiter and North Palm Beach both allow replacement 18 inches waterside of the property line.

- Allowing bulkheads to be replaced waterside of the existing bulkhead is necessary because the existing bulkhead must remain during installation of new bulkhead.

- Seawall caps shall extend no further than three feet from the wet face of the bulkhead.

ISSUE #3: ESTABLISHING SEAWALL AND BULKHEAD HEIGHT

Intergovernmental Coordination Objective 1.7.0 Adopt and implement strategies which increase community resiliency and protect property, infrastructure, and cultural and natural resources from the impacts of sea level rise, changes in rainfall patterns, and extreme weather events.

Coastal Management Objective: 6.1.0 The Village shall consider investigating and adopt and implement appropriate and cost-effective strategies which increase community resiliency and protect property, infrastructure, and cultural and natural resources from the impacts of climate change, sea level rise, changes in rainfall patterns, and extreme weather events.

Coastal Management Policy: 6.1.1 The Village shall utilize best practices and initiate mitigation strategies to reduce the risk of flooding in coastal areas that may result from high tide events, storm surge, flash floods, stormwater runoff, and shall consider the related impacts of sea level rise. [Section 163.3178, F.S (Chapter 2015-69, Section 1)]

ISSUE #3: ESTABLISHING SEAWALL AND BULKHEAD HEIGHT

- In 2019, NPB staff and a coastal engineer (Alan Gerwig & Associates) evaluated king tide level data and sea-level rise projections by the South East Florida Climate Change Compact to establish appropriate minimum and maximum seawall heights.

- Properties in the X and X500 Flood Zones can have a minimum seawall cap elevation of 4 feet and a maximum seawall cap elevation of 6 inches above grade or 4.5 feet, whichever is higher.

- Properties in the Special Flood hazard area (AE Zone) can have a minimum seawall cap elevation of 4 feet and a maximum seawall cap elevation of 6 inches above grade or 5 feet, whichever is higher.

ISSUE #4 COMPATIBILITY BETWEEN PROPERTIES

- Seawall caps at an elevation greater than the adjacent property shall provide a wall return of the same material and type as the seawall cap.

- All areas of the seawall cap or retaining wall that are visible from adjacent property shall have a finished appearance equivalent to or better than painted concrete stucco.

- Seawall caps at a greater elevation of neighboring properties shall also provide a drainage plan that demonstrates there will be no sheet flow of water to the waterway and adjacent properties. The Building Official will review the plan to ensure there is no major erosion or degradation of adjacent property in these instances.

ISSUE #5: CREATING LIVING SHORELINES

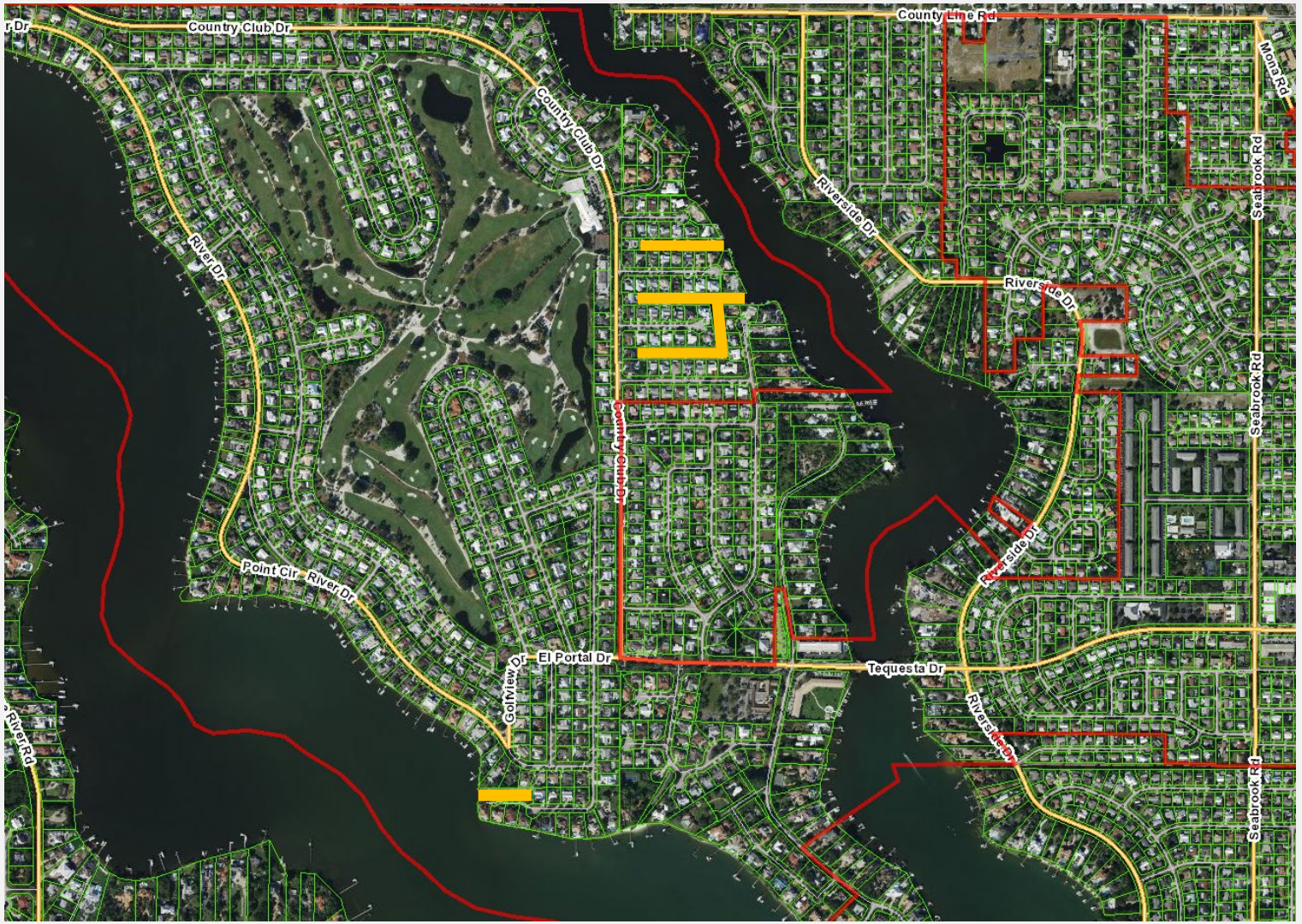
ISSUE #5: CREATING LIVING SHORELINES

- Housing Element: Policy: 1.3.2 Continue to institute policies which minimize adverse environmental effects of residential development. Utilize those management practices which will alleviate residential water pollution problems. Special attention should be given to the environmentally sensitive areas abutting the Loxahatchee River, Intracoastal Waterway and the Atlantic Ocean.
- Coastal Management Objective: 1.1.0 Protect and enhance coastal and estuarine environmental quality and other natural resources by maintaining specific ordinances or revising existing code provisions related to water quality, shoreline stabilization, wetland preservation and wildlife and habitat protection.
- Coastal Management Element: Policy1.1.1 The Village shall cooperate with agencies and municipalities serving to protect the resources of the Loxahatchee River and Indian River Lagoon Aquatic Preserve by actively participating in the development of estuarine policies that are consistent with present management.
- Coastal Management Objective: 1.2.0 The Village shall continue to provide for the protection of estuarine water quality and resources in its Code of Ordinances.

ISSUE #5: CREATING LIVING SHORELINES

- When a new bulkhead is constructed or when an existing one is replaced, 100% of the bulkhead or seawall shall be faced with riprap or mangroves (excluding dock or pier).
- Within 2 years of final inspection of a bulkhead, at least 10% of the shoreline shall be comprised of established mangroves.
- If after 2 years from the final inspection of a bulkhead, less than 10% is comprised of mangroves, then 20% shall be planted with mangroves.
- Properties designated on the shoreline exemption map (canals) are exempt from installing riprap or mangroves.
- Where riprap or mangroves will disturb seagrasses or when another jurisdictional agency (DEP, Army Corps, etc.) denies a permit, riprap or mangroves are not required.

TEQUESTA'S SHORELINE STABILIZATION EXCEPTION MAP DRAFT



ISSUE #6: REVETMENT'S

Existing revetments may be replaced with a new revetment according to the following regulations:

- 100% of the revetment shall be faced with riprap or mangroves when at least 50% of revetment is replaced
- An existing revetment with clean materials may remain and be reinforced with new riprap
- An existing revetment with unclean materials shall be removed prior to replacement.
- Properties on the shoreline exemption map are exempt from riprap or mangroves.
- Properties with existing revetments shall attempt to utilize living shorelines techniques to stabilize the shoreline in lieu of armoring the shoreline with a bulkhead or seawall. Property owners with riprap revetments that seek to armor a shoreline with a new bulkhead or seawall **shall apply to the Planning & Zoning Board for a Variance** as outlined in Section 76-7.

ISSUE #7 FILL PERMIT PROCESS

Conservation Policy: 2.11.9 No dredging or filling shall be permitted within mangrove and wetland areas or on seagrass beds in the Village unless project alternatives that would avoid mangrove, wetland and seagrass impacts are unavailable and sufficient mitigation is provided by the applicant to offset adverse impacts.

Coastal Management Policy 1.3.2 The Village shall preserve and protect existing sea grass areas as a vital food source for manatees and a nursery for estuarine species by prohibiting dredging and filling activities in or near these areas except where expressly provided for in the development of water-dependent land uses or where it is necessary for the general health, safety and welfare of the public.

Coastal Management Objective 4.1.0 Objective: 4.1.0 The Village will continue to prohibit the disturbance of the sensitive sea grass beds and productive mangrove and high marsh areas adjacent and within the Indian River Lagoon Aquatic Preserve, except when necessary for the continued health, safety and welfare of the public.

ISSUE #7 FILL PERMIT PROCESS

- The Village Code **does not** currently have a prohibition on dredging and filling on properties waterward of the property line.

- A Fill Permit process has been created in the draft code. It says:

No fill shall be made, deposited or maintained in the waters of the Loxahatchee River, Indian River Lagoon, canals, or other tidal waters within the corporate limits of the village, waterward or outward from any shoreline, in such a manner so that such fill shall extend beyond any property line.

-There is an exception to allow fill 18 inches waterward of property line, when a bulkhead extends 18 inches waterward, as proposed in the code.

-There is an exception to allow fill that is needed to construct, repair, or maintain living shorelines, mangroves, or riprap revetments that extend waterward of the property line. However, this has to be approved by the building official and community development director.

ISSUE #7 FILL PERMIT PROCESS

- The Village Council has to approve a fill permit.

- Public Notice is required, including letters to any neighbors within 300 feet.

The Village Council shall not grant any fill permit that would violate any statute, zoning law, ordinance or other applicable restriction. In determining whether to grant, grant with conditions or deny any fill permit application, the village council shall consider:
(1) whether any harmful obstruction to or alteration of the natural flow of the adjacent navigable waters will arise from the proposed construction;
(2) whether any harmful or increased erosion, shoaling of channels or stagnant areas of water will be created thereby; and
(3) whether any material injury or monetary damage to adjoining land will accrue from the proposed activities. All fill permits are subject to approval by the trustees of the internal improvement fund of the state and by the U.S. Army Corps of Engineers, as applicable.

SEC. 76-7. - VARIANCES.

(a)Any person desiring a variance from the terms of this chapter shall make application for such variance to the planning and zoning board of the village in accordance with the procedures set forth in this section.

(b)In order to authorize any variance from the terms of this chapter, the planning and zoning board must find with respect to the proposed project as follows:

(1)The variance being requested meets the definition of the term "variance" as that term is used and understood in chapter 78, zoning.

(2) No hazardous condition would be created.

(3) The flow of water would not be impeded or interfered with.

(4) No obstruction to navigation would occur.

(5) It would not interfere with traditional public uses of the waterway including, but not limited to, swimming, fishing, or boating.

(6) It would not create an appreciable obstruction of waterway views or otherwise detract from aesthetic values.

(7) It would not appreciably disrupt, interfere with, or disturb marine or benthic life.

(8) It would not contribute to the pollution of the waterway or the degradation of its condition.

(9) It would not interfere with the lawful rights of riparian owners.

(10)It would be consistent with any other applicable laws, rules or plans.