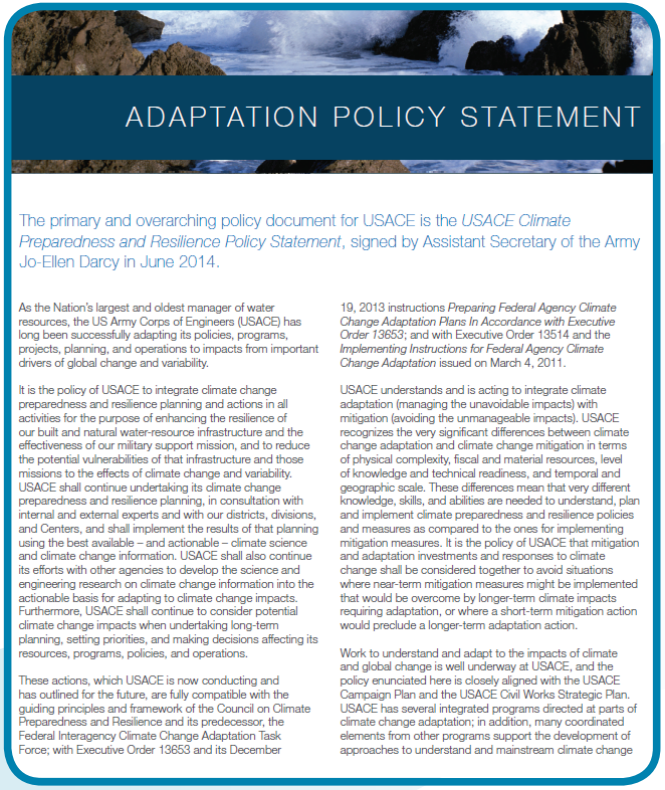
6. Sea Level Rise Policy and the Islamorada Focus Area Prioritization

The USACE requires consideration of the direct and indirect effects of sea level rise on coastal and estuarine zones when "managing, planning, engineering, designing, constructing, operating, and maintaining" civil works projects.[20] Selecting a course of action for USACE projects also must involve consideration of the risks, consequences, and benefits for each possible alternative as they relate to human health and safety, economics, the environment, and society. The USACE adopted a scenario-based approach for dealing with future sea level rise uncertainties by requiring plans and designs to consider three (3) possible projections:

Low	based upon the historic rate of sea level change.
Medium	calculated using National Research Council and Intergrovernmental Panel on Climate Change ("IPCC") projections.
High	exceeding IPCC projections to accommodate for the potential rapid loss of ice from Antarctica and Greenland.

Structural and non-structural alternatives must be developed and assessed for the entire range of future sea level rise projections. The USACE approach is a good basis for approaching other capital planning decisions.

Re-evaluating capital expenditures along the coastline will require sometimes difficult decisions that address the longer-term, sometimes incremental changes in sea levels. Sometimes this difficulty arises from misconceptions and the absence of a sense of urgency to address a slowly emerging problem. Building public support through education and outreach will help decision-makers exercise discretion in approving or denying capital improvement projects ("CIPs") based upon the long-term effects of climate change and sea level rise.



ADAPTATION POLICY STATEMENT

The primary and overarching policy document for USACE is the *USACE Climate Preparedness and Resilience Policy Statement*, signed by Assistant Secretary of the Army Jo-Ellen Darcy in June 2014.

As the Nation's largest and oldest manager of water resources, the US Army Corps of Engineers (USACE) has long been successfully adapting its policies, programs, projects, planning, and operations to impacts from important drivers of global change and variability.

It is the policy of USACE to integrate climate change preparedness and resilience planning and actions in all activities for the purpose of enhancing the resilience of our built and natural water-resource infrastructure and the effectiveness of our military support mission, and to reduce the potential vulnerabilities of that infrastructure and those missions to the effects of climate change and variability. USACE shall continue undertaking its climate change preparedness and resilience planning, in consultation with internal and external experts and with our districts, divisions, and Centers, and shall implement the results of that planning using the best available – and actionable – climate science and climate change information. USACE shall also continue its efforts with other agencies to develop the science and engineering research on climate change information into the actionable basis for adapting to climate change impacts. Furthermore, USACE shall continue to consider potential climate change impacts when undertaking long-term planning, setting priorities, and making decisions affecting its resources, programs, policies, and operations.

These actions, which USACE is now conducting and has outlined for the future, are fully compatible with the guiding principles and framework of the Council on Climate Preparedness and Resilience and its predecessor, the Federal Interagency Climate Change Adaptation Task Force; with Executive Order 13653 and its December 19, 2013 instructions *Preparing Federal Agency Climate Change Adaptation Plans In Accordance with Executive Order 13653*; and with Executive Order 13514 and the *Implementing Instructions for Federal Agency Climate Change Adaptation* issued on March 4, 2011.

USACE understands and is acting to integrate climate adaptation (managing the unavoidable impacts) with mitigation (avoiding the unmanageable impacts). USACE recognizes the very significant differences between climate change adaptation and climate change mitigation in terms of physical complexity, fiscal and material resources, level of knowledge and technical readiness, and temporal and geographic scale. These differences mean that very different knowledge, skills, and abilities are needed to understand, plan and implement climate preparedness and resilience policies and measures as compared to the ones for implementing mitigation measures. It is the policy of USACE that mitigation and adaptation investments and responses to climate change shall be considered together to avoid situations where near-term mitigation measures might be implemented that would be overcome by longer-term climate impacts requiring adaptation, or where a short-term mitigation action would preclude a longer-term adaptation action.

Work to understand and adapt to the impacts of climate and global change is well underway at USACE, and the policy enunciated here is closely aligned with the USACE Campaign Plan and the USACE Civil Works Strategic Plan. USACE has several integrated programs directed at parts of climate change adaptation; in addition, many coordinated elements from other programs support the development of approaches to understand and mainstream climate change

There are four (4) general categories of adaptation strategies: avoid, accommodate, protect, and retreat. After a major event like Hurricane Sandy in 2012, communities are confronted with how to implement these various strategies in the context of rebuilding. Within each of these broad categories, various recommendations for planning ahead can be categorized.

- Avoidance limits new development or infrastructure in areas that are vulnerable to sea level rise by redirecting development to less vulnerable areas. These types of strategies can be implemented through TDRs, conservation easements, setbacks, and other mechanisms.[21]

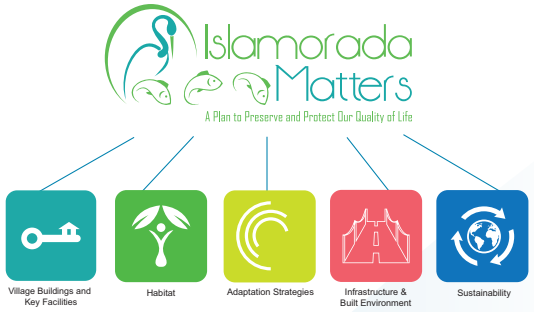
- Accommodation strategies acknowledge the long-term effects of sea level rise on an area, while implementing short-term measures to maintain existing uses.[22] Examples of accommodation strategies include elevating a structure, drainage modifications, green infrastructure, and floodgates, among others.[23]

Seaside Heights, NJ post-Hurricane Sandy
Photo Source: National Geographic Magazine, September 2013

- Protection adaptation strategies focus on protecting land from inundation, erosion, or storm-induced flooding through the construction of various structures such as jetties, groins, living shorelines, bulkheads, and beach nourishment.[24] Construction of these structures helps preserve a static shoreline, which may provide a short-term solution to the long-term impacts of sea level rise.[25] Many of these strategies are already commonly used in Florida, including: periodic beach renourishment projects which have had varying levels of success in maintaining coastal beaches; bulkheads constructed by private homeowners to stabilize their properties; and dikes that protect public infrastructure, low-lying communities, and environmentally-sensitive areas. Hybrid approaches to protecting shorelines are also used to "retain some of the storm-resistance of a hard structure, while also maintaining some of the features of natural shorelines."[26]

- Retreat strategies allow for natural shoreline migration through land conservation and the removal of structures that prevent shoreline movement (e.g. dikes, berms and bulkheads). Depending on the strategy and the timing of the impact, different options may or may not be available due to land availability and current development patterns.

Based on this, five (5) main Focus Areas were specifically identified for Islamorada and are included in this Plan: Habitat, Infrastructure and Built Environment, Village Buildings and Key Facilities, Adaptation Strategies for Homes and Businesses, and Sustainability. These are the primary topics included in this Section because they are more individualized to Islamorada than what could be accomplished using the STAR framework alone. Specific recommendations stemming from the data collection and modeling efforts described in Section 4 have also been developed for these Focus Areas. Finally, best practices research was conducted for all Focus Areas to identify what other governments and agencies are doing relative to sea level rise and climate adaptation planning.



Communications about sea level rise in the future will be important. In conjunction with this project, the Village has created a new section of its website with information about key facts and deliverables from this project. Recommendations related to outreach and education within the community are integrated throughout the various substantive sections of this Plan. The purpose is to holistically approach a Focus Area by including all recommendations related to that particular subject area. Frequently, "outreach activities" are considered to be of lesser importance, but the Team specifically chose to incorporate them to provide them the same importance as all the other recommendations in that Focus Area.

A) Habitat

Habitat

The Habitat Focus Area includes recommendations related to existing public and private recreational and open space facilities within the Village, as well as natural areas and conservation lands within Islamorada. Nearly all of the Village's natural areas containing environmentally-sensitive vegetative communities are located along the shorelines of Islamorada. Other important natural areas in the Village include aquatic habitats consisting of coral reefs, seagrass beds and natural hardbottom habitats.

The predominant upland native habitat in Islamorada is tropical hardwood hammock. Tropical hardwood hammocks can be further characterized by their vegetation to include separate categories recognized as unique and different. Islamorada currently recognizes two upland native habitats: (1) low & high hammock, and (2) beach berm. These habitats contain unique plant and animal species, some of which are endemic, and many of which are listed with special status such as threatened, endangered, and regionally important.

Transitional habitats and wetland areas within Islamorada consist of fringing mangroves, isolated mangrove habitats, and buttonwood transitional zones. Mangroves can be tidally influenced or isolated in pockets that form in saturated soils and low areas. Buttonwood transitional zones are typically located between shoreline habitats and the upland communities, typically low hammock. Buttonwood transitional zones are not tidally influenced other than very high tides during infrequent events. These habitats consist of many threatened and endangered plant animal species due to their fragile and unique composition.

Islamorada's native habitat communities contain unique plant and animal species. Over the decades the State of Florida and local governmental agencies have worked together to purchase these areas for conservation and recreation. Examples of local State parks include: Windley Key State Geological Site, Lignumvitae Key Aquatic Preserve, Lignumvitae Key Botanical State Park, Indian Key Historic State Park, and the San Pedro Underwater Archaeological Preserve Site.

Village recreational areas include pocket parks, neighborhood parks, community parks, special facilities, district parks, regional parks, and natural reservations. Islamorada is known for its abundant recreational areas and quantity of open space. There are ten (10) parks encompassing 105 acres that are owned and maintained by the Village, including:

- Plantation Tropical Preserve
- Plantation Hammock Preserve
- Founders Park
- Southwinds Preserve
- Hurricane Monument
- Library Beach Park
- Green Turtle Hammock Preserve
- Key Tree Cactus Property
- Sea Oats Beach
- Anne's Beach

These parks provide swimming areas, play areas, picnic areas, beaches, boardwalks, athletic courts, boat ramps, marinas, dog parks, and recreational buildings. The Windley Key State Geological Site also includes 28.9 acres of fossil reef. Additionally, there are two (2) FDOT owned roadside recreational areas including the Upper Matecumbe Key Picnic Area and Channel Two Catwalk. Lastly, there are also approximately 34 miles of paved bike lanes and 10.8 miles of pedestrian and bicycle pathways within the Village.

Library Beach Mangroves
Photo Source: Project Team

Islamorada is also home to a diverse marine ecosystem that includes some of the world's most extensive seagrass beds and part of the only living coral barrier reef tract in the continental United States. Aside from providing habitat and feeding grounds for many marine species, the coral reefs surrounding Islamorada reduce wave impacts during storm events while the seagrass beds serve to stabilize the benthic sediments and may reduce wave impacts that potentially cause shoreline erosion.

By the Numbers

- Parks - 105 acres of Village parks, including Plantation Tropical Preserve, Plantation Hammock Preserve, Founders Park, Southwinds Preserve, Hurricane Monument, Library Beach Preserve, Green Turtle Hammock Park, Key Tree Cactus Property, Sea Oats Beach and Anne's Beach.
- Geological Sites - 28.9 acres of fossil reef at Windley Key State Geological Site reef.
- Marine Habitat – thousands of acres of marine habitat surrounding Islamorada.
- Shoreline – 50 miles of shoreline protecting the Village.

While beach and berm formation is relatively infrequent in the Florida Keys, Islamorada does have natural beaches from Upper Matecumbe Key southward, between MM 83 and MM 81 on Upper Matecumbe Key and along the entire oceanside of Lower Matecumbe Key. The only estuarine area in Islamorada is Florida Bay which functions like an estuary during years when the rainfall rate exceeds the rate of evapotranspiration. During these times, the Bay functions as a highly saline tropical lagoon.

Given the vast array of natural areas and habitat in the Village, this is a critical Focus Area for recommendations and improvements in this Plan. Recommendations within this Focus Area are aimed at helping the community protect and restore the places that provide the resources that support natural systems and wildlife in Islamorada. An ecosystems approach should be used to recognize the wide range of benefits natural systems provide, including water, food, and natural regulating processes affecting climate and floods.

Many of the ecosystems in and surrounding Islamorada help mitigate damage from storms and rising sea levels. For example, coastal marshes and mangrove forests can help dissipate storm surge impacts and slow down coastal erosion. Additionally, coral reefs can help reduce more than 85% of the wave energy along the coast, substantially protecting coastal communities from erosion and storm surges.[27]

Hard and soft protection methods can also be used as mitigation techniques. "Hard" coastal protection is a broad term for most engineered features such as seawalls, revetments, cave fills, and bulkheads that block the landward retreat of the shoreline. Breakwaters, groins, and jetties may or may not be considered hard protection, depending upon their purpose and use with other "soft" protection methods. Although seawalls and shoreline hardening are generally not favored where more natural shorelines exist, they remain central to the discussion of sea level rise adaptation. Although hard armoring disrupts natural processes and may pose risks to property, it may be necessary to protect critical infrastructure in areas where retreat or relocation are not feasible. It should be noted that hardened shorelines in low-lying areas can be expected to slow, or in some cases stop, the movement of tidal systems. Sea level rise may reduce the effectiveness of existing hard armoring structures designed for lower sea levels and reinforcing or expanding these structures may be necessary in some instances over time.

Anne's Beach, Islamorada, FL
Photo Source: Project Team

"Soft" coastal protection methods replenish, enhance, or mimic natural buffers, and they include beach nourishment, living shorelines, or wetlands. They are often most effective where similar soft protection already occurs. Many soft protection methods may also be part of a green infrastructure program. Living shorelines are an approach to stabilize shoreline areas while maintaining habitat and natural shoreline processes. These shorelines are designed with plants, sand, and limited amounts of rock to restore and enhance coastal habitats, promote sedimentation, and protect against shoreline erosion. They are effective in low-to-medium-energy coastal and estuarine areas and tidally influenced creeks, streams, and rivers. Non-structural armoring involves replenishing or mimicking natural buffers. It may also involve elevating land so that structures are less vulnerable to inundation. Examples include dune creation and preservation, and wetland construction and restoration.

While some types of ecosystems have a capacity to adapt to sea level rise, the key to that adaptation is the ability to migrate to higher elevations. Options for this migration are likely constrained where adjacent areas have been intensively developed. Therefore, improved buffering strategies are those that will allow for the natural features of lands to migrate where possible. Environmental mitigation projects and acquisition strategies could help provide for that opportunity. Focusing on habitat connectivity that allows species to shift over time will also be important. This will be particularly important in buttonwood and mangrove areas. Specifically, protecting mangroves provides a protection mechanism due to their ability to build up soil at varying degrees. Finally, creating an initial database to monitor die-back and habitat shifts over time will help in identifying opportunities and constraints for strategy implementation.

As a baseline, the Village (potentially in partnership with the County or another State agency) may consider a more in-depth analysis of its wetlands including: identification of uplands for preservation and acquisition to provide areas for shoreline migration; prevention of the construction of structures that would act as barriers to migration; identification of wetland restoration techniques to allow wetlands to keep pace with sea level rise; cataloging of pertinent research needs; and identification of further policy and regulatory changes.

Given the objectives of this Focus Area and efforts initiated by the Village to date, the following have been prioritized and are recommended for implementation in Islamorada.

Lake Worth Lagoon, FL
Photo Source: Project Team

Table 7. Habitat Recommendations

Habitat

Habitat Recommendations

	Recommendation	Overlap with Sustainability Plan	STAR Points
H.1	Update Stormwater Master Plan to include sea level rise assumptions and incorporate green infrastructure features as a priority.[28]	Land, bullet #7	NS-1(7)
H.2	Conduct a habitat analysis to document species, condition, size and location of trees within the Village. Focus particular attention on identifying priority areas where die-backs may be occurring in upland vegetation or habitat shifts with greater or lesser tolerance to tidal inundation. Also identify areas where up-gradient movement of natural tidal communities can occur (proximate to buttonwoods and mangroves). The inventory can serve as a tool to identify opportunities for strategy implementation as well as create a baseline to monitor changes over time.	Land, bullet #1 Land, bullet #3 Land, bullet #9	
H.3	Identify the areas where living shorelines are most appropriate and develop guidance for implementation, monitoring, and evaluation taking into account future sea level rise projections and storm events.		
H.4	Update requirements for ecological buffers (which may include increases depending on habitat type) and provide guidance on how to establish or adjust these buffers to accommodate sea level rise including the concept of “habitat migration corridors” that allow sensitive habitats and species to migrate inland or upland as sea level rises.		
H.5	Discourage the use of hard protection unless no other feasible alternative is available and require enhanced mitigation if it is not. Require any hard protection or mitigation designs be adapted to changing sea level and require monitoring of impacts over time.		
H.6	Specify priority areas where hard shoreline protection structures should be removed (through property owner incentives), including areas where structures threaten the survival of wetlands and other habitat, or beaches, trails, and other recreational areas.		
H.7	Identify vulnerable habitats, species and open space for prioritized land acquisition and maintenance. The ability of a parcel to provide a means for sea level rise adaptation should be a criterion for acquisition. Rank higher properties that may allow landward migration of wetlands than properties that are currently or predicted to be inundated as waters rise.	Land, bullet #7	

	Recommendation	Overlap with Sustainability Plan	STAR Points
H.8	Identify and map natural inundation buffers which could also provide sea level rise adaptation benefit.		
H.9	Add policies to require site-specific evaluation of potential sea level rise impacts to archeological and paleontological resources on a development site. This would include, but not be limited to, those listed on the Historic Resources Survey list.		
H.10	Identify areas for habitat maintenance where the removal of exotics could improve the quality of that area to serve as a natural or soft protection option. Establish a maintenance schedule that factors in the benefits of managing habitats as a natural defense strategy against sea level rise impacts.		
H.11	Identify impacts to public access and recreation that might result from sea level rise and maintain existing access and visitor serving amenities to ensure maximum protection.		
H.12	Identify and protect "core areas" within the Village with the best chances of persistence during sea level rise and perform intensive management of these areas and ex-situ conservation strategies which may include species relocation. Specific areas should focus on hammocks, beach areas and shorelines that may be stabilized, considering impacts to listed species.		
H.13	To further reduce the impacts of stressors on the natural system, create additional or more aggressive policies to reduce the use of pollutants and runoff entering natural systems and the marine systems. Enhance educational efforts on the benefits of improving water quality and the relationships between environmental stressors and exacerbated impacts from sea level rise.		NS-5(2)
H.14	Review and revise as necessary existing species and habitat impact avoidance, minimization, mitigation, and compensation standards and develop new standards as necessary to address impacts in a manner that incorporates climate change considerations. Prioritize replacement of vegetation standards related to "core areas" identified in H.12 above.		
H.15	Incorporate factors to consider sea level rise in habitat management and mitigation plans, for example impacts in rights-of-ways. Comment on updates to Management Plans for State Parks regarding the projected impacts of sea level rise on those resources.		

* Short-term (1-3 yrs.) recommendations in light blue, medium-term (3-5 yrs.) recommendations in light yellow, and long-term (>5 yrs.) recommendations in light pink.
** For long-term recommendations, the Village is not required to wait on implementation if the opportunity for earlier implementation presents itself.

See the Implementation Matrix provided in Appendix F for how these recommendations should be implemented, the recommended timeframe for implementation and potential funding sources available to offset the costs of implementation (where available).

B) Infrastructure and Built Environment

Infrastructure & Built Environment

The Habitat Focus Area includes recommendations related to existing public and private recreational and open space facilities within the Village, as well as natural areas and conservation lands within Islamorada. Nearly all of the Village's natural areas containing environmentally-sensitive vegetative communities are located along the shorelines of Islamorada. Other important natural areas in the Village include aquatic habitats consisting of coral reefs, seagrass beds and natural hardbottom habitats.

This Focus Area is intended to evaluate community development patterns, infrastructure serving development, livability and design characteristics, with an emphasis on providing access and choice to all residents regardless of income or socioeconomic status.

Islamorada's infrastructure includes roads, buildings (non-publicly owned), stormwater, water, wastewater and the power supply. Note that specific Village-owned facilities are included in the Village Buildings and Key Facilities Focus Area discussed in Section 6(c) below. Islamorada's roadway network consists of the major thruway, U.S. Highway 1, and connector and local streets that provide access to abutting land uses and channel traffic towards U.S. Highway 1. In 1999, the Village obtained jurisdiction and responsibility for all of its connector and local streets from Monroe County. Currently, there are 169 named streets in Islamorada totaling 39.31 miles of paved roadways and rights-of-way.

The two (2) primary bicycle facilities in Islamorada are the Overseas Heritage Trail along portion of U.S. Highway 1 and the State Road 4A ("Old Highway"). The Village also contains an extensive network of bicycle facilities shared by pedestrians, cyclists, and other users. This includes approximately 10.8 miles of pedestrian/bicycle network, with additional miles of striped bicycle lanes more recently constructed on Upper Matecumbe Key and along Gardenia Street and Royal Poinciana Boulevard (34 total miles of paved bicycle lanes).

Shared Use Path, Islamorada, FL
Photo Source: www.traillink.com

By the Numbers

- Roads – 169 named streets, 39.32 miles of paved roads and right-of-ways.
- Bike Lanes – 34 miles of paved bicycle lanes.
- Buildings – 5,038 homes and 2,102 businesses in Islamorada.
- Wastewater Facilities - 4 pump stations.
- Canals – 62 residential canals within the Village.

Currently, there are 5,038 houses and 2,102 businesses[29] in Islamorada. The Village regulates development and its rate of growth through their BPAS. This system encourages residential and commercial redevelopment rather than new development, with emphasis on affordable housing. The current building allocation is limited to a total annual unit cap of twenty-two (22) market rate units and six (6) affordable housing units, plus any available unused BPAS allocations from the previous year. This allocation is intended to limit growth and ensure that adequate public facilities and services are provided to residents in accordance with the Village's adopted level of service standards.

From a resiliency perspective, data related to this planning effort has focused on tracking potential inundation and storm-related flooding exacerbated by sea level rise. As discussed in Section 4(e) (Vulnerability Assessment Results for Habitat and Facilities), nuisance flooding (or 1.08 feet above the MHHW stage) will be the first impacts felt on a more regular basis occurring with the natural tide cycle. The visual impact will be more roadway flooding and impacts to low-lying landscapes, but could impose more structural impacts for higher water levels over longer durations. While many structures in Islamorada are constructed on piers or stilts, or even elevated above the floodplain through fill, the other structures that are not and are located in low-lying areas will be the primary focus of strategies for elevation or floodproofing. See Appendix D for a more detailed analysis of homes and businesses at risk within Islamorada.

Case Study: St. Johns County

This case involved several private property owners challenging St. Johns County over their legal responsibility to maintain Old A1A, a coastal road inundated by storms and hurricanes. In 1979, the State deeded Old A1A to the County. By 2005, the County enacted a temporary residential building moratorium for properties along the roadway segment at issue (approximately 60). In response to the County's actions, a complaint was filed in 2005 against St. Johns County claiming generally that the County had deprived these landowners of access to their land.

A total five claims, were raised involving whether the County had a duty to maintain Old A1A and whether their failure to do so constituted a legal taking under the law. The case ultimately settled whereby the County and property owners came to agreement on levels of service for the road in the future, recognizing the environmental challenges impacting the quality of the road in the future.

The County adopted an Ordinance in 2012 to specifically address natural forces' degradation and damage to public roads and streets and other improved public rights-of-way used for travel and recreation. The law is far from settled on this issue, but lessons learned to date can, and should, be used to guide future Village planning decisions especially in relation to "environmentally- compromised" infrastructure.

Wastewater plant piping installation within Islamorada
Photo Source: www.reynoldswaterislamorada.com.

Wastewater treatment in Islamorada was historically privately owned. Small facilities discharged wastewater into septic tanks, while larger facilities treated wastewater onsite using wastewater treatment package plants. In 2007, the Village constructed the first public wastewater treatment facility, the North Plantation Key Wastewater Treatment Plant, with a designed capacity of 0.355 million gallons per day. As discussed above, the Village recently extended sanitary sewer service to its incorporated islands of Plantation Key (North Plantation Key and South Plantation Key), Windley Key, and Upper and Lower Matecumbe Keys. During the project, the Village entered into an interlocal agreement with the Key Largo Wastewater Treatment Plant, allowing Islamorada to transmit its wastewater for treatment at the Key Largo Plant and convert the North Plantation Key Facility into a master repump station. The project met the State of Florida's amended statutory deadline of December 2015, with substantial completion by November 20, 2015. The statutory deadline, extended from the original 2009 deadline, required upgrading wastewater systems to eliminate septic systems and package plants to eliminate discharges to nearshore waters and improve water quality. Now, in Islamorada, wastewater is collected from residential and commercial areas and conveyed to the Key Largo Wastewater Treatment Facility via a transmission main installed along U.S. Highway 1. This project resulted in the elimination of all septic systems and package plants within the Village. As currently projected, the Wastewater Pump Station at 142 Sunshine Boulevard shows a very high near term vulnerability to sea level rise due to its elevation.

From a water supply perspective, FKAA manages the water source and distribution system serving the Village. Potable water resources are located at FKAA's wellfields in Florida City on the mainland and water is treated after it is withdrawn from the Biscayne Aquifer but before distribution in the Keys. While saltwater intrusion to that source of water supply is of concern due to a myriad of different stressors, sea level rise is but one of numerous impacts that must be monitored. Other impacts include naturally occurring groundwater flows which depend on currently planned restoration projects, withdrawals from other wellfields which are proximate to FKAA's wellfields as well as other sources of potential saltwater intrusion impact. Protection of this water supply resource will require regional and agency coordination because of the location and multi-jurisdictional management of the source.

One priority area of coordination will be with the South Florida Water Management District as they complete their next Lower East Coast Regional Water Supply Plan Update in the next three (3) years.

Stormwater is not managed through a centralized system in the Village, but there are stormwater management requirements for all new impervious surfaces. Stormwater management is also integrally tied to water quality because the waters surrounding the Keys are designated as OFWs. To date, water quality enhancement and addressing localized flooding have been the primary drivers of stormwater planning and retrofits. Levels of service and permitting requirements for stormwater are controlled by an initial Stormwater Management Master Plan, agreements and regulations with other state agencies as well as local regulations. Drainage structures and outfalls include swales, roadside ditches, access ways, canals, discharge into Bay and Ocean waters and direct percolation into the land's surface. In addition to these features, there are some storm sewers and retention basins, most of which are on private property or located along U.S. Highway 1 and the Old Highway. The Village has already begun important steps related to infrastructure preparedness including: 1) infrastructure vulnerability analysis and 2) beginning to address drainage "hot spots". An enhanced effort should be made to continue identifying neighborhood, business owner and staff complaints and observations related to storm events and documenting inundation during extreme high tides in the spring and fall (King Tides). Additionally, the Village may want to enhance stormwater regulations planning for higher design storm events where appropriate.

Results of the vulnerability assessment suggest potential susceptibility to future nuisance-level flooding in select transport corridors. If sea level rise rates tend toward the higher scenario projected by the SFRCCC (2011), there may be compelling need to elevate the transportation lanes between Fire Station #19 and U.S. Highway 1 before 2030 to ensure safe emergency vehicle access after extreme storm events. Additionally, U.S. Highway 1 is built to a low grade between White Marlin Boulevard and Palm Drive. As sea levels rise, this low grade may result in increased nuisance flooding of U.S. Highway 1, potentially slowing or restricting the movement of emergency vehicles based at the Fire Station #19 site. Long-term flood resilience and sea level rise adaptation planning for Fire Station #19 should therefore be closely coordinated with drainage improvements and FDOT's increased grade elevation of U.S. Highway 1 within this low-lying corridor.

The Village has a system of sixty-two (62) residential canals, ten (10) of which are considered poor quality. The Village is currently in the process of implementing canal restoration projects, in tandem with Monroe County, to improve water quality. To date, the Village has committed $100,000 for canal restoration of its most impaired residential canals. Restoration efforts will improve the overall health of the canal system, as well as surrounding nearshore water quality. This is important as environmental stressors will become compounded with the effects of compromised drainage and increased direct runoff.

In terms of the built or developed areas of the Village, and from a land use perspective, development in extremely low-elevation land areas where tidal flooding is common and storm surge is severe will become inherently more risky as future sea level rise poses more of a threat. Although building codes are enforced and flood insurance is required, these waterfront properties will see more risk. Once certain thresholds are approached in terms of future sea level rise, policies could require periodic updates to the Code to reflect new risk. Traditional controls, like land-use zoning, could be used to limit development in such areas or create stricter "above code" requirements for redevelopment such as higher freeboard standards. Vulnerability data from this planning process can also be used to identify some areas where an overlay or adaptation action area may be established.

Finally, as retreat may be a strategy that is utilized over time, many private and public buildings and other infrastructure, such as roads, may become impractical to maintain as the environment changes. There are many public health and safety implications that must be addressed, such as abandonment of certain infrastructure or negotiated levels of service. Issues could include loss of access to a property, reduced quality of access or loss of property value due to removal of an inter-related public or private asset.

Given the objectives of this Focus Area and efforts initiated by the Village to date, the following have been prioritized and are recommended for implementation in Islamorada.

Projected Water Inundation at U.S. Highway 1 and White Marlin Boulevard
Photo Source: Project Team

Table 8. Infrastructure and Built Environment Recommendations

Infrastructure & Built Environment

Infrastructure and Built Environment Recommendations

	Recommendation	Overlap with Sustainability Plan	Gain STAR Points
I.1	Improve data related to properties and infrastructure facilities including digitizing all building footprints and linking flood elevation certificate information where available (finished flood elevations). Maintain a GIS database of all facilities and infrastructure.	Land, bullet #7	NS-1(7)
I.2	Identify key segments and other road segments for retrofits with coordinating agencies or in the Capital Improvements Element ("CIE"). Develop database of real-time flood impacts to road segments providing anecdotal evidence that will serve as the basis for more detailed survey-based analysis if necessary.	Land, bullet #1 Land, bullet #3 Land, bullet #9	
I.3	Establish adaptation action areas or zoning overlays where enhanced or higher elevation and additional design criteria will be developed to protect infrastructure (such as water and wastewater) and development. Periodically revisit criteria as certain sea level rise milestones or thresholds are approached (by year or by level of rise).		
I.4	Establish triggers for retrofit, relocation or removal of a structure impacted by changing site conditions such as when erosion is within a certain distance of the foundation; when monthly high tides are within a certain distance of the finished floor elevation; or when a setback decreases to a certain width. Consider the following concepts in development and redevelopment principles: • Address sea level rise in "non-conforming" structure policies; • Address sea level rise in redevelopment or replacement of existing structures; • Use rolling easements in property development and redevelopment strategy;[30] • Enhance Transfer of Development Rights program parameters to account for sea level rise impacts by directing growth to land outside of potentially vulnerable areas.		
I.5	Explore funding and grant opportunities for voluntary property acquisition programs or voluntary retrofit programs. Consider the need for user-based assessments for capital or neighborhood retrofits where needed.		

	Recommendation	Overlap with Sustainability Plan	Gain STAR Points
I.6	Incentivize new "resiliency" construction standards such as Resilience STAR™ (U.S. Department of Homeland Security ("DHS")), the Institute for Business and Home Safety's FORTIFIED Home™, FORTIFIED Commercial, FORTIFIED Safer Business, FORTIFIED for Safer Living® or RELi standards.[31] Other systems related to infrastructure project analysis include Envision and Infrastructure Voluntary Evaluation Sustainability Tool ("INVEST").		
I.7	To address the compounding impacts of poor water quality with sea level rise, update any required best management practices ("BMPs") for water quality improvement such as those that provide greater infiltration/inflow of rainwater, increased stormwater capture and/or water recycling programs, the use of low impact on natural retention strategies development, improved maintenance procedures for public sewer mains, policies to address impaired private sewer laterals, and other proactive measures.	Stormwater, bullet #5	
I.8	Update Landscape Manual and landscaping requirements in the Code to more specifically require water conservation efforts in private landscaping within the Village.		
I.9	Draft an ordinance to address natural forces' degradation and damage to public roads, streets, highways, bridges, sidewalks, curbs and curb ramps, crosswalks, bicycle ways, hiking and walking paths and trails, underpasses, overpasses, and other improved public rights-of-way used for travel and recreation or other appropriate infrastructure. (See Appendix J for a model ordinance.)		
I.10	Conduct a comprehensive review of the Code for potential improvements to address future flood risk. For example, add a provision to the Residential and Nonresidential Building Permit Allocation Evaluation Criteria and Awards related to future flood risk. The provision could incentivize elevation above base flood elevation and design of property serving infrastructure and mechanical systems that factor in future flood risk.		
I.11	Work with FDOT to develop site surveys of road bed elevation and, as appropriate, suggest engineering designs to raise portions of U.S. Highway 1 that currently show vulnerability to nuisance tidal flooding by 2030.		
I.12	Utilize the tidal flood vulnerability maps for roads as a guide for a public outreach campaign to develop a photographic record that documents the date, time, and severity of nuisance tidal flooding events.		

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** For long-term recommendations, the Village is not required to wait on implementation if the opportunity for earlier implementation presents itself.

See the Implementation Matrix provided in Appendix F for how these recommendations should be implemented, the recommended timeframe for implementation and potential funding sources available to offset the costs of implementation (where available).

C) Village Buildings and Key Facilities

Village Buildings and Key Facilities

The Village owns and maintains several buildings and key facilities, including administrative buildings, public buildings, and parks. On two (2) levels, the Village can prepare buildings and facilities for sea level rise by 1) mitigating the impacts of excessive energy use making buildings more water and energy efficient and 2) prepare for the impacts of sea level rise by considering how buildings are located, constructed and adapted. By continuing to implement energy efficiency upgrades, the Village is saving on utility bills while lowering its GHG emissions. By preparing for the impacts of sea level rise, the Village is taking precautionary actions to assure buildings can withstand more regular instances of nuisance flooding over time.

As part of this Islamorada Matters planning process, the Team developed a digitized building footprint layer for eighty (80) public and critical infrastructure buildings and facilities within the Village to provide better elevation data. Modeling of these buildings and facilities was also performed to determine which structures and facilities are most vulnerable to sea level rise. As previously reported, two (2) facilities that showed the most near-term vulnerability to enhanced flood risks by 2030 from sea level rise were the wastewater pump station located at 142 Sunshine Boulevard and the Fire Station #19 located at 74070 U.S. Highway 1. For both facilities, the first floor elevation is near or below the 2030 extreme event flood threshold for the high sea level rise scenario (6.58 feet above MHHW). With a high sea level rise projection, impacts to these facilities could occur as early as 2030, or with a low sea level rise projection impacts would occur between 2046 and 2051. Regardless, these two (2) facilities appear to be the most vulnerable. Other public facilities in the Village that show new exposure of buildings to extreme event flooding within the 2060 planning horizon are the Islamorada Master Repump Station and Monroe County's Roth Building, which both show exposure to first floor storm surge damage. Additionally, Founders Park and the S & H Inc. Debris Site, because their elevations, show a potential for nuisance flooding impacts by 2030 (under high sea level rise scenario) or 2060 (under a low sea level rise scenario). As more visible impacts of sea level rise occur, "managed retreat" or planning for projected increases in sea levels by relocating vulnerable buildings, infrastructure and public facilities before significant inundation will need to occur. Appendix B contains a full analysis of Village infrastructure.

In addition to climate change and sea level rise vulnerability, this Focus Area also evaluates efforts the Village can implement to increase the sustainability of Village buildings and facilities. This includes energy and water conservation techniques, renewable and alternative energy development, and the reduction of chemicals that are harmful to humans and the natural environment. Note that Chapter 255 of the Florida Statutes requires that newly constructed and renovated public buildings be designed and constructed to be energy and water efficient in accordance with a sustainable building rating or national model green building code.[32]

The recommendations in this section concentrate on efficiency as well as enhancing the quality of Village buildings and facilities. Given the objectives of this Focus Area and efforts initiated by the Village to date, the following have been prioritized and are recommended for implementation in Islamorada.

Islamorada, FL
Photo Source: Project Team

Table 9. Village Buildings and Key Facilities Recommendations

Village Buildings and Key Facilities

Village Buildings and Key Facilities Recommendations

	Recommendation	Overlap with Sustainability Plan	Gain STAR Points
VB.1	Consider sea level rise impacts in capital planning by identifying critical assets (habitat and infrastructure) over time through enhanced data sets and field observations to continually plan for managed relocation of at-risk facilities, and/or other measures to ensure continuity of at risk assets. When risk is identified, consider repair and maintenance, elevation or spot-repair of key components, or fortification of structures where needed including when to consider managed retreat rather than continue with repairs and maintenance in light of sea level rise.	Land, bullet #7	NS-1(7)
VB.2	Conduct detailed site-level flood exposure audits for the wastewater pump station facility at 142 Sunshine Blvd. and the Islamorada Master Repump Station to determine above ground elevations and, as appropriate, structural flood resistance for electronics and mechanical components. Develop detailed GIS datasets, including bottom of invert elevation for access and junction points, to support site-level vulnerability assessments of underground wastewater infrastructure within the Village of Islamorada.	Land, bullet #1 Land, bullet #3 Land, bullet #9	
VB.3	Develop long-term flood resilience alternatives for Fire Station #19, located at 74070 U.S. Highway 1 (close coordination with FDOT will be required to ensure transport access this facility is maintained).		
VB.4	Development and maintenance of recording protocols and, as necessary, engineering assessments to assess resilience of below-grade pipes and pump infrastructure to increased saltwater incursion associated with sea level rise.		
VB.5	Develop and maintain a comprehensive GIS-based inventory that includes building footprints, finished first floor elevation data, and elevations of accessory electrical equipment for all existing critical infrastructure and Village of Islamorada facilities.		
VB.6	Link energy efficiency upgrades to capital asset improvements, renovations, or additions.	Energy, bullet #1 Energy, bullet #2	
VB.7	Conduct American Society of Heating, Refrigerating, and Air-Conditioning Engineers (“ASHRAE”) Level I or Level II energy audits on Village facilities to identify energy conservation measures.		
VB.8	Optimize planning, management and maintenance of Village assets to reduce GHG emissions.		

	Recommendation	Overlap with Sustainability Plan	Gain STAR Points
VB.9	Negotiate terms to allow for the Village to purchase plug-in electric or plug-in hybrid vehicles.	Transportation, bullet #3	
VB.10	Conduct feasibility studies for alternative energy at Village facilities.		

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** For long-term recommendations, the Village is not required to wait on implementation if the opportunity for earlier implementation presents itself.

See the Implementation Matrix provided in Appendix F for how these recommendations should be implemented, the recommended timeframe for implementation and potential funding sources available to offset the costs of implementation (where available).

D) Adaptation Strategies for Homes and Businesses

Adaptation Strategies

Individuals and business owners affected by future sea level rise will need to make adaptation decisions about their own homes, land and businesses. A main goal of this planning process and the recommendations in this section is to assist individuals and business owners in making the best, most informed decisions for their own particular circumstances. Individuals and business owners may choose to elevate or relocate structures further away from vulnerable areas. Alternatively, they may choose not to make any structural or relocation decisions based upon the anticipated consequences of sea level rise.

In this Focus Area, the Team married the modeling results discussed in Section 4(f) above with potential adaptation strategies that homeowners and business owners can use to mitigate the damage from storm surge and sea level rise. There are several options, or adaptation strategies, that can be implemented to respond to sea level rise and increased storm surge. Options are broken into four (4) categories, including: 1) Avoid, 2) Accommodate, 3) Protect, and 4) Retreat.

Adaptation strategies focused on **Avoidance** limit development in particularly vulnerable areas, redirecting development to less vulnerable areas. Adaptation strategies that **Protect** use hard or soft structures to protect structures and prevent flood waters from reaching community assets. Hard structures could include seawalls or bulkheads, while soft structures could include geotextiles tubes and giant fabric sandbags designed to be replaced after storms. This strategy does not protect wetlands and beaches in front of these structures which are at risk of disappearing as they are pinched out between the rising water levels and the fortifying structures behind them. Adaptation strategies that **Accommodate** modify community assets to reduce the impact of flood waters from storm surge, but do not completely protect against sea level rise. Accommodation acknowledges long-term effects and that structures will become wet, but implements short-term actions to make structures more resilient, such as elevating structures or their critical systems. Lastly, **Retreat** involves relocating existing structures, people and land uses away from high-risk flood areas to new locations to eliminate the flooding risk, damage and loss. This adaptation strategy allows wetlands, beaches and natural coastal habitats to migrate to higher elevations naturally.

Within Islamorada, in the COAST modeling process, three (3) plausible adaptations strategies were evaluated, including: 1) elevate and floodproof buildings (accommodation), 2) offshore constructed barriers (protection), and 3) relocation through voluntary buyout (retreat). As was more thoroughly discussed in Section 4(f) above, elevating and floodproofing buildings within the Village showed the most potential for mitigating damages from sea level rise, as compared to the other adaptation strategies evaluated. Note however that this is not the sole solution for Islamorada, as it does not address or mitigate impacts to other critical infrastructure like roads and sewer services.

In addition to reduced damages from employing adaptation strategies, home and business owners can see additional benefits such as reductions in flood insurance premium rates for Islamorada's participation in programs like FEMA's CRS, as briefly discussed above. As of October 1, 2014, there were 3,061 NFIP policies issued within the Village with coverage totals of $776,762,500. Since 1978, 229 claims have been paid totaling $5,191,466.[33] There are also new standards applicable to substantial renovations in Islamorada, another attempt to encourage homeowners and business owners to floodproof their structures. The NFIP's CRS is a voluntary program that recognizes a community's efforts to implement strategies that go beyond NFIP standards.

Islamorada's Code identities specific requirements for home and business owners intended to bring existing structures into compliance with FEMA's NFIP requirements. These efforts are similarly used to achieve additional CRS credits to reduce insurance premiums within the Village. Islamorada's Code includes specific requirements for improvements and repairs to existing homes and commercial structures. Under Chapter 6, Article III, Section 6-85, the Code requires that if a building is "substantially damaged" or "substantially improved," where the cost of the repair or improvement equals or exceeds 50% of the market value, the structure must be floodproofed. For both residential and nonresidential structures, floodproofing means having the lowest floor elevated to or above the base flood level. For nonresidential structures located in the AE-zones, floodproofing can be done in lieu of elevation provided that the structures are designed to be watertight with walls substantially impermeable to the passage of water. While compliance with the Code will come at an upfront cost to the property owner, the owner will subsequently benefit from the reduced flood insurance rates and further protection from the effects of rising sea levels over time.

New strategies to mitigate against sea level rise may include rolling easements which are used to ensure that coastal development does not interfere with the natural migration of shorelines as they move inland due to sea level rise. Rolling easements can be implemented in several ways, including development of state or local statutes, placement of conditions on development permits or voluntary agreements. These land use restrictions are usually developed with reference to a tide line, or other natural feature, which allow the feature to "dynamically fluctuate with natural coastal processes."[34] Therefore, as the sea level rises and the natural feature moves, the associated development or land use restrictions "roll" inland and allow for natural shoreline erosion and wetland migration to occur.[35]

Given the objectives of this Focus Area and efforts initiated by the Village to date, the following have been prioritized and are recommended for implementation in Islamorada. These recommendations concentrate on adaptation strategies most appropriate for homes and businesses within the Village.

Founders Park, Islamorada, FL
Photo Source: Project Team

Table 10. Adaptation Strategies for Homes and Businesses Recommendations

Adaptation Strategies

Adaptation Strategies for Homes and Businesses Recommendations

	Recommendation	Overlap with Sustainability Plan	Gain STAR Points
AS.1	Continue discussing sea level rise vulnerability with residents and stakeholders, along with the importance of having a method to weigh different adaptation actions against one another to ensure the most beneficial strategies are implemented. Implement this through annual workshops on the progress of implementing the Islamorada Matters Plan. Annual workshops should occur at the beginning of the capital budgeting process.	Other, bullet #2	NS-1(7)
AS.2	Development and implementation of a geographic database (GIS and listing of "events") for Village employees (and interested residents) to document the time and location of nuisance flood events that affect neighborhoods and facilities in neighborhoods. Development of such a database over the course of several years will not only raise public awareness about any increase in tidal flood issues, but will also provide critical data that can inform future decisions to elevate or otherwise adapt roads with vulnerability to future sea level rise. Database should be updated and reported upon at Annual Workshops described in AS.1.		
AS.3	Ensure that future flood vulnerability assessments in Islamorada build upon the work in the Islamorada Matters project and continue efforts to develop a more complete digital record of Elevation Certificates for homes and businesses. Use, integrate and improve Elevation Certificate record to promote higher confidence in flood risk assessments, providing a basis for development of a building by building prioritization for flood retrofit and/or rebuilding as conditions warrant.		
AS.4	Pursue funding strategies and tools to help private property owners elevate structures in the FEMA Velocity flood zone.		
AS.6	Develop a framework for using new knowledge to engage with residents so that consensus on an eventual adaptation action is both data and stakeholder driven. Expand communications on sea level rise and align them with future efforts within the CRS program to provide information about areas predicted to experience more flooding impacts in the future due to sea level rise (for example CRS Credit 322.c).	Other, bullet #2	

	Recommendation	Overlap with Sustainability Plan	Gain STAR Points
AS.7	Conduct additional study of an initiative to elevate and floodproof buildings within Islamorada. Identify additional barriers to elevating strategies such as height restrictions that may curtail the ability of someone to construct to higher elevations. • Provide updates in Village communications as needed on progress made on Islamorada Matters Plan; • Highlight "demonstration" projects to provide examples of benefits to residents and business owners; • Distribute information about Islamorada Matters planning efforts at Village events.		
AS.8	In future modeling efforts, model benefits and costs of joint action for adapting roads and buildings.		
AS.9	Collaborate to consider mandatory construction setbacks that prohibit construction and significant redevelopment in areas that will likely be impacted by sea level rise within the life of the structure.		
AS.10	Strengthen rebuilding restrictions for nonconforming structures.		
AS.11	Develop incentive program for developers and property owners who relocate structures landward, site development in upland areas, conserve open space along the shoreline, and/or preserve or restore natural flood buffers.		

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E) Sustainability

Sustainability

Sustainability is a holistic concept centered around meeting current community needs without compromising the ability of future generations to meet their needs. Sustainability is much broader than most people think, including not only environmental needs but also the economic and social needs of a community. From the local government perspective, sustainability is achieved when "the three e's," environment, economic and equity (social), are balanced.

The environmental component of sustainability includes ecosystem restoration and habitat preservation (both terrestrial and aquatic), water conservation, and GHG emissions reductions. The equity (social) component of sustainability aims to optimize the quality of life for community residents and includes social equity, livability, community health and safety, affordable housing, and cultural diversity. Finally, the economic component of sustainability includes workforce development, economic opportunity, and sustainable business practices.

Sustainability is in essence about efficiency, prioritizing ways to efficiently use resources, enhance quality of life and promote economic viability for future generations. Often analogized as a three-legged stool, sustainability cannot be achieved without careful consideration of each "leg" of the stool. When one "leg" of the stool is eliminated or underachieved, the balance of the stool – sustainability – is lost.

Woven into the social concept of sustainability is the need to adapt to changing conditions to ensure the health of community residents. The Centers for Disease Control and Prevention ("CDC") and the National Environmental Health Association ("NEHA") have identified several health impacts specifically related to climate change, including: 1) heat impacts, 2) vector borne diseases, 3) extreme weather events, 4) air quality, and 5) waterborne diseases.

Heat stress is of great importance to the Village given the tropical climate and current average temperatures. Increasing temperatures and the resultant heat stress can impact human health in serval ways, exacerbating chronic conditions like respiratory and cardiovascular disease. Vector borne diseases are also an important consideration in Islamorada due to the warm climate and established vector populations (mosquitoes). A number of additional diseases may be able to prevail in new environments as the natural barriers of inhospitable environments to the vectors of such diseases are diminished in a warming climate. Islamorada has, and will continue to see, stronger storms with the potential to displace animals and insects and change migration routes as ecosystems change. Floods, hurricanes, and tropical storms have numerous immediate to long-term physical and emotional health impacts, including injury, drowning, death from structural collapses, infectious and chronic disease, displacement, and socioeconomic disruption. Air quality impacts may result in heightened levels of allergies and respiratory disease due to increased ground-level pollutants. Additionally, pathogens and pollutants from runoff and flooding have the potential to enter water supplies, while increased temperatures will support pathogen growth, and concentration of these agents under drought conditions will increase the threat of waterborne disease.

This Focus Areas covers a wide spectrum of efforts, from those aimed at reducing climate change impacts and increasing resource efficiency to those that create safer and healthier communities. The Village has made continued progress toward increasing overall sustainability since 2007. To determine the Village's current level of sustainability, the Team evaluated both STAR actions and other best practices for achieving sustainability within a local government. Where applicable, the Team cross-referenced these recommendations with existing recommendations made in the Village's 2007 Sustainability Plan and all annual updates.

Given the objectives of this Focus Area and efforts initiated by the Village to date, the following have been prioritized and are recommended for implementation in Islamorada.

Table 11. Sustainability Recommendations

Sustainability Recommendations

	Recommendation	Overlap with Sustainability Plan	Gain STAR Points
S.1	Promote a cultural shift aimed at saving money and reducing carbon emissions.	Other, bullet #2	
S.2	Consistently highlight available and pending incentives for residents desiring to perform energy retrofits or renewable energy deployment. Work with Florida Keys Electric Cooperative on promoting their programs.	Other, bullet #2	
S.3	Adopt more energy efficiency regulations for buildings within the jurisdiction.		HS-1(6)
S.4	Train inspectors to enforce water/energy efficiency standards in adopted building codes.		CE-5(7)
S.5	Achieve recognition as a Bicycle Friendly Community or Walk Friendly Community.	Energy, bullet #4	CE-2(6)
S.6	Implement specific programs and services or create facility upgrades that transition the community towards the use of alternative modes of transportation and low-emission vehicles. Look for opportunities to improve the efficiency of Village fleet.		CE-2(8)
S.7	Create incentives to help relocate residents from hazardous areas.		HS-6(7)
S.8	Adopt a waste management plan that identifies community's greatest sources of waste, sets formal waste reduction targets and establishe actions to help reach the community's waste reduction goals.		CE-7(1)
S.9	Collaboratively create/run at least two targeted recycling programs at key locations in the community.	Waste, bullet #2; Waste, bullet #3; Waste, bullet #4; Waste, bullet #5	CE-7(7)
S.10	Implement incentives ensuring that residents and businesses are working toward community waste reduction targets.		CE-7(5)
S.11	Implement specific programs and services or create facility upgrades that reduce waste in the community.		CE-2(9)

	Recommendation	Overlap with Sustainability Plan	Gain STAR Points
S.12	Create guidelines to encourage incorporation of active building design[36] in new buildings.		HS-1(3)
S.13	Adopt an energy/water use information disclosure ordinance[37] requiring users to disclose consumption levels.		CE-5(3)
S.14	Adopt specific product bans to significantly advance progress toward waste reduction goals. For example, bans on single use plastic grocery bags and disposable food containers have been banned in other U.S. cities.		CE-7(2)

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See the Implementation Matrix provided in Appendix F for how these recommendations should be implemented, the recommended timeframe for implementation and potential funding sources available to offset the costs of implementation (where available).