FINAL REPORT: MARTIN COUNTY RESILIENT COASTLINES PROGRAM
(MAY 2019)
TASK 3
COMBINED DELIVERABLES 3.1, 3.2 AND 3.3
County and Critical Facilities: Inventory, Mapping and Vulnerability Priorities

Task 3.1 Inventory of Facilities

To evaluate the County's vulnerability to sea level rise with regard to critical facilities, existing data was requested, collected and analyzed, including but not limited to the following:

- Stormwater GIS, including inlet points and outfall points, line files for drainage pipes, ditches, swales, curbs, gutters; polygons for stormwater retention/detention areas)
- Essential infrastructure datasets
- Critical facilities locations:
    - EMS
    - Hospitals
    - Police stations
    - Fire stations
    - Schools
    - EOC
    - Wastewater treatment plants
    - Potable water treatment plants
    - Public supply wells
    - Wastewater pump stations/lift stations
    - Drinking water pump stations
    - Electrical substations
- Inventory of other County-owned or municipally owned facilities
- City Hall, Courthouses, Public Works, City Offices, Airports, Public Parks, etc.
- Inventory of State and Federal facilities
- Inventory of any other facilities deemed of high priority by the local government (Examples might include large employers, or facilities known to contain hazardous materials)
- Building footprint polygons
- Roads and Highway centerlines
- Bridges line files
- Impervious surface areas
- Tree canopy
- Locations of any green infrastructure (e.g., rain gardens, pervious pavement, treatment wetlands, etc.)

An inventory listing of facilities actually produced by the County and the methodology for deliverables contained within this Task 3.0 can be found attached to this report and electronically as a file entitled "Describing Deliverables". The excel table found in deliverable folder "3.1 List accounting for County Facilities" is a combined data table of the facilities used in the analysis while the tables in deliverable folder "3.3 Priority Ranking" are direct exports of the data tables contained within the deliverable geodatabases and feature both a grid index (corresponding to the page and grid index) and assigned priority ranking system.

Task 3.2 Mapping of Facilities

3.2 SLR Overlay Map Series

Fifteen (15) PDF Map Books depicting features potentially impacted by the NOAA SLR projection.

Martin_NOAA_Analysis2030_	Martin_NOAA_Analysis2060_	Martin_NOAA_Analysis_2100_
Infrastructure	Infrastructure	Infrastructure
PotableWater	PotableWater	PotableWater
Stormwater	Stormwater	Stormwater
Wastewater	Wastewater	Wastewater
Roads	Roads	Roads

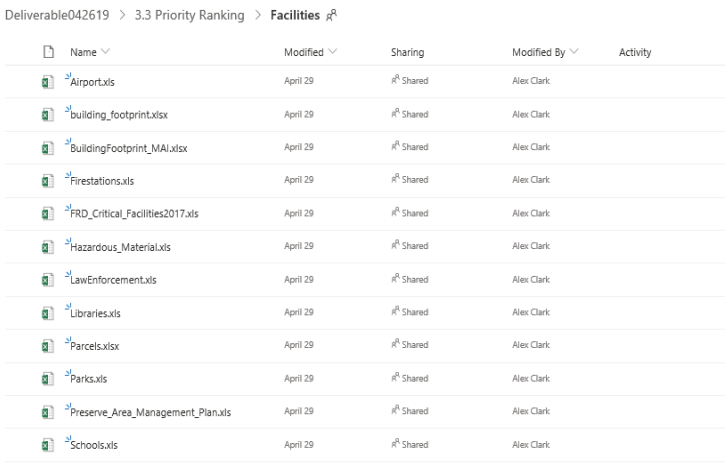
Building upon the sea level rise projections developed in Task 1 and linkages to improving CRS performance related to sea level rise in Task 2, the County, through contracted services, will create an approach that coordinates sea level rise projections with the level of risk associated with various facilities (or natural areas for example) and the types of alternative actions that could adapt to or mitigate future impacts. To combine the sea level rise map series developed in Task 1.2 the inventory list developed in Task 3.1, an overlay was created that can be found in the electronic file entitled "3.2 SLR Overlay Map Series". Maps are broken down by: Infrastructure, Potable Water, Roads, Stormwater, Wastewater for 2030, 2060 and 2100. It should be noted that since this map series was created above and beyond the requirements of the grant, only the NOAA projection was used, but this projection being the highest, was also the most conservative for infrastructure planning purposes.

Additional comments on mapping are addressed as follows:

- 3.2 SLR Overlay Map Series Stormwater nodes (depicted in the Stormwater VA Map series) and storm surge zones (depicted across the entire map series) will be removed in future iterations of the map series.
- The roadway and railroad shapefiles provided in the folder "ImpactedRoadwayInfrastructure" have been clipped to the extent of inundation for the SLR scenarios and saved under the naming convention of (Roadway/Railroad_SLR Scenario). For example: Roads_NOAA2060_DepthGrid_Poly.shp is in reference to roadways that are inundated under the NOAA 2060 scenario. Please see the remaining shapefiles for specific sections of infrastructure that may be affected.
- The apparent differences in extent of inundation shown in the Task 1.2 SLR Map Series and Task 3.2 Overlay Map Series comes from the SLR map series depicting all three timelines (2030, 2060, AND 2100) in one map document while the Overlay/Vulnerability Assessment map series only shows one of the three timelines (2030, 2060 OR 2100) per map book.

Task 3.3 Prioritization of Facilities

The priority ranking system is directly related to the timeframe of potential impacts of SLR and this data is available via the attribute tables of analyzed features. Features that were identified as impacted (water depth values greater than 0) by the NOAA 2030 projection was designated as "High", features that were identified as impacted by the NOAA 2060 projection are designated as "Medium" and features that were identified as impacted by the NOAA 2100 projection are designated as "Low".



The actual prioritization of the facilities is marked in columns in an electronic file entitled "3.3 Priority Ranking". Facilities within this folder are further broken down by type as indicated such as Facilities, Potable Water, Stormwater and Wastewater. Further breakdowns occur within each of these categories such as Facilities by Airports, Building Footprints, Fire Stations, etc. It should be noted that other non-County "Critical Facilities" were also included due to their importance.

As part of Task 3.0, the types of alternative actions that can be taken to adapt or mitigate future impacts were to be discussed. Recommendations for sea level rise mitigation adaptation strategies are included below. The high priority consideration was due to the short timeline to projected inundation. These recommendations should not be considered the only options that Martin County can take to become a more resilient community. Additionally, this Project is considered a first step towards developing a more comprehensive Vulnerability Assessment over time. Ongoing, enhanced coordination and data exchange with local planning departments, agencies and governments is critical for accurate and harmonized planning.

Climate Data

The County should continually update its sea level rise projection data. The Unified Sea Level Rise Projection is updated at least every five years. It was last updated in 2015 and a 2020 update is currently in progress. Projections should be revisited upon the publication of new Unified Sea Level Rise projections by the Compact after reviewing the extent of those updates.

- Incorporate sea level rise projections into policy decisions related to Capital Improvements.
- Incorporate language into Comprehensive Plan linking sea level rise assumptions and capital planning.
- Develop Code recommendations for any needed changes to design criteria in Land Development Regulations.
- Evaluate procurement policy to potentially incorporate sea level rise projections into road, stormwater or other relevant projects.
- Update assumptions in tandem with Compact projections.

Stormwater

Future updates to Martin County's Stormwater Drainage Master Plan should address sea level rise adaption and mitigation strategies that are deemed appropriate for the most current projected conditions. To more accurately assess potential impacts, we recommend collection of the invert pipe elevations of stormwater infrastructure. Our assessment was limited to an estimated ground elevation derived from the 2016 county provided DEM. Coordination with the SFWMD is critical to address efforts related to sea level rise impacts on coastal structures upon which Martin County's drainage capacity is linked.

- Include sea level rise projections into updates of Stormwater Plans.
- Collect invert pipe elevations for all stormwater infrastructure and outfalls.
- Continue coordination with SFWMD on future retrofits and capital projects that link to coastal structures and drainage capacity.

Facilities and Assets

Sea level rise adaptation and mitigation strategies for buildings and similar assets should address the intended life of the structure, use of the facility, and general access to said facility. To assess potential impacts more accurately, we recommend collection of building elevation certificates produced from a licensed professional survey. The projected sea level rise may be lower than the finished first floor

elevation/top of bottom floor like when buildings are elevated on pilings. Florida Division of Emergency Management (FDEM) has an online utility for viewing some elevation certificate information and is available at https://www.floridadisaster.org/elevation-certificates/

Engineering assessments addressing the floodwater resistance of critical infrastructure is a recommended to determine the future vulnerability of the structure. Environmental impact assessments addressing sea level rise adaptation strategies specific to hazardous materials located within these zones need is recommended.

- Compile more complete data base of building elevation certificates for County and critical facilities.
- Digitize such information to integrate with asset management planning procedures.
- Better assess floodwater resistance of critical infrastructure and identify at any areas where hazardous materials are stored or used.

Roads and Railway

We recommend maintaining an accurate roadway inventory that is complete with elevation data. Roadway improvement programs may be available to secure capital funding for elevating roadways or railbeds. It is important to consider not just what is directly impacted but also what is inaccessible due to the inundation. Coordination with other agencies or jurisdictions that are responsible for certain roadway systems may be necessary.

We also recommend addressing sea level rise in emergency management and response action planning to ensure evacuation, supply, and heavy equipment transportation routes are resilient to sea level rise.

- Integrate road and elevation data, especially proximate to County and critical facilities.

Water Supply

Further monitoring and investigation of potential saltwater intrusion into Martin County's groundwater supply may be warranted.

- Continue collecting data and agency coordination efforts related to saltwater intrusion.

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Delivered Via EMAIL to Kathy Fitzpatrick on 4/25/2019

Kathy Fitzpatrick
Martin County Public Works
2401 SE Monterey Road
Stuart, FL 34996
RE: **The Martin County Resilient Coastlines Program CM933**

Martin County - Vulnerability Assessment

Outline of Deliverables

The outline below is to document files transferred from Clearview Geographic LLC to Martin County on 4/25/2019. Files were transferred via a Microsoft Office Sharepoint Folder.

1.2 Sea Level Rise Map Series

Three (3) PDF Map Books of the SLR projections overlaid on a base map.

Martin_IPCCAR5_Median	Martin_NOAA_High
	Martin_USACE_High

3.1 List Accounting for County Facilities

Merged Tabular output of county facilities as supplied by Martin County staff via Sea_Level_Rise.gdb on 3/1/2019. The GPS coordinates included in the table were calculated using the NAD 1983 HARN StatePlane Florida East FIPS 0901 projected coordinate system. See feature classes in the delivered geodatabase for more information.

3.2 SLR Overlay Map Series

Fifteen (15) PDF Map Books depicting features potentially impacted by the NOAA SLR projection.

Martin_NOAA_Analysis2030_	Martin_NOAA_Analysis2060_	Martin_NOAA_Analysis_2100_
Infrastructure	Infrastructure	Infrastructure
PotableWater	PotableWater	PotableWater
Stormwater	Stormwater	Stormwater
Wastewater	Wastewater	Wastewater
Roads	Roads	Roads

3.3 Priority Ranking

The priority ranking system is directly related to the timeframe of potential impacts of SLR and this data is available via the attribute tables of analyzed features. Features that were identified as impacted (water depth values greater than 0) by the NOAA 2030 projection was demarcated as “High”, features that were identified as impacted by the NOAA 2060 projection are

demarcated as “Medium” and features that were identified as impacted by the NOAA 2100 projection are demarcated as “Low”. See individual feature classes in the geodatabase deliverables for more information.

Supplemental GIS Files

Contains multiple MXDs and geodatabases which were used to create the deliverables.

Map Documents

Assessment:

1. Martin_NOAA_Analysis2030_
    a. Infrastructure.mxd
    b. PotableWater.mxd
    c. Stormwater.mxd
    d. Wastewater.mxd
    e. Roads.mxd
2. Martin_NOAA_Analysis2060_
    a. Infrastructure.mxd
    b. PotableWater.mxd
    c. Stormwater.mxd
    d. Wastewater.mxd
    e. Roads.mxd
3. Martin_NOAA_Analysis2100_
    a. Infrastructure.mxd
    b. PotableWater.mxd
    c. Stormwater.mxd
    d. Wastewater.mxd
    e. Roads.mxd

SLR Projections:

1. Martin_IPCCAR5_Median.mxd
    a. Estimated extent of inundation for 2030, 2060 and 2100 using the IPCCAR5 SLR curve
2. Martin_NOAA_High.mxd
    a. Estimated extent of inundation for 2030, 2060 and 2100 using the NOAA SLR curve
3. Martin_USACE_High.mxd
    a. Estimated extent of inundation for 2030, 2060 and 2100 using the USACE SLR curve

Sea Level Rise Data Geodatabase

Feature classes provided by Martin County staff for conducting the vulnerability assessment.

Feature classes included:

i. Airport
    1. Polygon
    2. Analyzed via Zonal Statistics as Table using Zone field “Airport Name”
    3. See attribute table for min, max and average water depths in feet.

ii. Bridges
    1. Line
    2. Not included in Analysis
iii. Building_Footprint
    1. Polygon
    2. Analyzed via Zonal Statistics as Table using Zone field “Object ID”
    3. See attribute table for area, min, max and average water depths in feet.
iv. BuildingFootprint_MAI
    1. Polygon (Source from https://github.com/Microsoft/USBuildingFootprints)
    2. Analyzed via Zonal Statistics as Table using Zone field “Unique ID”
    3. See attribute table for area, min, max and average water depths in feet.
v. FEMA_Flood_Zones
    1. Polygon
    2. Analyzed via Zonal Statistics as Table using Zone field “Unique ID”
    3. See attribute table for min, max and average water depths in feet.
vi. FireStations
    1. Point
    2. Analyzed point location via Multi-value to Point
    3. See attribute table for scenario water depths in feet.
vii. FRD_Critical_Facilities2017
    1. Point
    2. Analyzed point location via Multi-value to Point
    3. See attribute table for scenario water depths in feet.
viii. Hazardous_Material
    1. Point
    2. Analyzed point location via Multi-value to Point
    3. See attribute table for scenario water depths in feet.
ix. LawEnforcement
    1. Point
    2. Analyzed point location via Multi-value to Point
    3. See attribute table for scenario water depths in feet.
x. Libraries
    1. Point
    2. Analyzed point location via Multi-value to Point
    3. See attribute table for scenario water depths in feet.
xi. Parcels
    1. Polygon
    2. Analyzed via Zonal Statistics as Table using Zone field “PCN”
    3. See attribute table for min, max and average water depths in feet.
xii. Parks
    1. Polygon
    2. Analyzed via Zonal Statistics as Table using Zone field “Name”
    3. See attribute table for min, max and average water depths in feet.
xiii. Preserve_Area_Management_Plan
    1. Polygon
    2. Not included in the analysis.
xiv. RailRoads

1. Line
2. Not included in the analysis.

xv. road_arc
1. Line
2. Used for visual overlay of roadway features.

xvi. Schools
1. Point
2. Analyzed point location via Multi-value to Point
3. See attribute table for scenario water depths in feet.

xvii. Storm_Surge
1. Polygon
2. Analyzed via Zonal Statistics as Table using Zone field “Zone”
3. See attribute table for min, max and average depths in feet.

xviii. SW_BACKFLOW
1. Point
2. Analyzed point location via Multi-value to Point
3. See attribute table for scenario water depths in feet.

xix. SW_CHANNEL
1. Line
2. Not included in the analysis.

xx. SW_INLET
1. Point
2. Analyzed point location via Multi-value to Point
3. See attribute table for scenario water depths in feet.

xxi. SW_MAIN
1. Line
2. Not included in the analysis.

xxii. SW_MANHOLE
1. Point
2. Analyzed point location via Multi-value to Point
3. See attribute table for scenario water depths in feet.

xxiii. SW_MISC
1. Point
2. Analyzed point location via Multi-value to Point
3. See attribute table for scenario water depths in feet.

xxiv. SW_NODE
1. Point
2. Analyzed point location via Multi-value to Point
3. See attribute table for scenario water depths in feet.

xxv. SW_STGBASIN
1. Point
2. Analyzed point location via Multi-value to Point
3. See attribute table for scenario water depths in feet.

xxvi. SW_STGBASIN_PLY
1. Polygon
2. Analyzed via UNITID
3. See attribute table for min, max and average water depths in feet.

xxvii. sWells
    1. Point
    2. Analyzed point location via Multi-value to Point
    3. See attribute table for scenario water depths in feet.

SLR Processing Geodatabase

Feature classes and raster datasets provided by Clearview Geographic staff after conducting the vulnerability assessment.

Feature classes included:

i. CountyBoundaries
    1. Polygon
    2. Gathered from US Census Geodata and used in representing county boundary and grey fill.

ii. IPPC2030_DepthGrid_Poly
    1. Polygon
    2. Vector mask polygon representing footprint of potential SLR inundation derived from corresponding depth grid.

iii. IPPC2060_DepthGrid_Poly
    1. Polygon
    2. Vector mask polygon representing footprint of potential SLR inundation derived from corresponding depth grid.

iv. IPPC2100_DepthGrid_Poly
    1. Polygon
    2. Vector mask polygon representing footprint of potential SLR inundation derived from corresponding depth grid.

v. NOAA2030_DepthGrid_Poly
    1. Polygon
    2. Vector mask polygon representing footprint of potential SLR inundation derived from corresponding depth grid.

vi. NOAA2060_DepthGrid_Poly
    1. Polygon
    2. Vector mask polygon representing footprint of potential SLR inundation derived from corresponding depth grid.

vii. NOAA2100_DepthGrid_Poly
    1. Polygon
    2. Vector mask polygon representing footprint of potential SLR inundation derived from corresponding depth grid.

viii. USACE2030_DepthGrid_Poly
    1. Polygon
    2. Vector mask polygon representing footprint of potential SLR inundation derived from corresponding depth grid.

ix. USACE2060_DepthGrid_Poly
    1. Polygon
    2. Vector mask polygon representing footprint of potential SLR inundation derived from corresponding depth grid.

x. USACE2100_DepthGrid_Poly
   1. Polygon
   2. Vector mask polygon representing footprint of potential SLR inundation derived from corresponding depth grid.

xi. MapBookDDP
   1. Polygon
   2. Grid Index and Data Driven Page shapefile used in creating map series.

xii. SLRMapBookDDP
   1. Polygon
   2. Grid Index and Data Driven Page shapefile used in creating map series.

Raster datasets included:

i. COMPDEM2016
   a. 2016 Digital elevation model used as a base for the modeling.

ii. DEM_MHHW
   a. Digital elevation model converted to MHHW elevation using VDatumConversionSurface.

iii. VDatumConversionSurface
   a. Conversion surface used in converting from NAVD88 to MHHW.

iv. IPPC2030_DepthGrid
   a. Estimate of water depth used in assessing provided feature inventories.

v. IPPC2060_DepthGrid
   a. Estimate of water depth used in assessing provided feature inventories.

vi. IPPC2100_DepthGrid
   a. Estimate of water depth used in assessing provided feature inventories.

vii. NOAA2030_DepthGrid
   a. Estimate of water depth used in assessing provided feature inventories.

viii. NOAA2060_DepthGrid
   a. Estimate of water depth used in assessing provided feature inventories.

ix. NOAA2100_DepthGrid
   a. Estimate of water depth used in assessing provided feature inventories.

x. USACE2030_DepthGrid
   a. Estimate of water depth used in assessing provided feature inventories.

xi. USACE2060_DepthGrid
   a. Estimate of water depth used in assessing provided feature inventories.

xii. USACE2100_DepthGrid
   a. Estimate of water depth used in assessing provided feature inventories.

Utilities Geodatabase

Feature classes provided by Martin County staff for conducting the vulnerability assessment.

Feature classes included:

i. sLaterals
   1. Line
   2. Not Included in Analysis

ii. sLiftstations

1. Point
2. Analyzed point location via Multi-value to Point
3. See attribute table for scenario water depths in feet.

iii. sMains
1. Line
2. Not Included in Analysis

iv. sManholes
1. Point
2. Analyzed point location via Multi-value to Point
3. See attribute table for scenario water depths in feet.

v. sNodes
1. Point
2. Analyzed point location via Multi-value to Point
3. See attribute table for scenario water depths in feet.

vi. sPlants
1. Point
2. Analyzed point location via Multi-value to Point
3. See attribute table for scenario water depths in feet.

vii. sPumps
1. Point
2. Analyzed point location via Multi-value to Point
3. See attribute table for scenario water depths in feet.

viii. sServices
1. Point
2. Analyzed point location via Multi-value to Point
3. See attribute table for scenario water depths in feet.

ix. wBackflows
1. Point
2. Analyzed point location via Multi-value to Point
3. See attribute table for scenario water depths in feet.

x. wHydrants
1. Point
2. Analyzed point location via Multi-value to Point
3. See attribute table for scenario water depths in feet.

xi. wLaterals
4. Line
5. Not Included in Analysis

xii. wMains
6. Line
7. Not Included in Analysis

xiii. wMeters
8. Point
9. Analyzed point location via Multi-value to Point
10. See attribute table for scenario water depths in feet.

xiv. wNodes
11. Point
12. Analyzed point location via Multi-value to Point

13. See attribute table for scenario water depths in feet.

xv. wPlants
14. Point
15. Analyzed point location via Multi-value to Point
16. See attribute table for scenario water depths in feet.

xvi. wPumps
17. Point
18. Analyzed point location via Multi-value to Point
19. See attribute table for scenario water depths in feet.

xvii. wValves
20. Point
21. Analyzed point location via Multi-value to Point
22. See attribute table for scenario water depths in feet.

xviii. wWells
23. Point
24. Analyzed point location via Multi-value to Point
25. See attribute table for scenario water depths in feet.

Supplemental SLR Animation

Contains a MP4 video file showing a map animation of the sea level rise projections over time.

Brief Methodology Detail

Utilizing the NOAA VDatum 3.4 tool, ClearGeo staff converted the 2016 county-wide digital elevation model (DEM) from NAVD88 to mean higher high water (MHHW) tidal datum values (as currently defined by the 1992 National Tidal Datum Epoch (NTDE)) using a grid-based conversion surface. Following a methodology consistent with bathtub inundation modeling staff developed a series of SLR projection specific (Table 1) water depth models which were then spatially joined with the available analysis data. A description of the results of the spatial join is included below.

Maps depicting the three sea level rise curves were produced (1.2 Sea Level Rise Map Series) along with a series of maps depicting potentially inundated features for years 2030, 2060 and 2100 (3.2 SLR Overlay Map Series). The two map legends on the analysis map series correspond with both a total feature count and a count of potentially impacted features within the visible map extent. An animation (Supplemental SLR Animation) was produced to depict the progression of the various sea level rise scenarios. Potentially impacted features are defined as those that may be affected by the projected water's extent which show a water depth value greater than 0.

The excel table found in deliverable folder "3.1 List accounting for County Facilities" is a combined data table of the facilities used in the analysis while the tables in deliverable folder "3.3 Priority Ranking" are direct exports of the data tables contained within the deliverable geodatabases and feature both a grid index (corresponding to the page and grid index) and assigned priority ranking system.

For the sake of concision, the analysis map visualizations refer only to the NOAA projection. Data developed and stored within the delivered geodatabases can be readily utilized to develop

additional assessments of other sea-level rise scenarios that may be necessitated by future updates of technical projection guidance and/or compliance with other policy and planning processes.

Table 1: Southeast Florida Regional Climate Change Compact SLR Projections (Inches)

Projection Year	IPCCAR5	NOAA	USACE
2030	6	12	10
2060	14	34	26
2100	31	81	61

Additions to Geodatabase data tables

Original polygon feature classes were left relatively unchanged aside from the following additions to the data table. The schema outline below was added to the polygon feature classes included in the analysis.

1. wAreaI2030 –Estimated IPCC SLR curve water area within the polygon footprint for 2030
2. wMinI2030 – Estimated IPCC SLR curve minimum water depth within the polygon footprint for 2030
3. wMaxI2030 – Estimated IPCC SLR curve maximum water depth within the polygon footprint for 2030
4. wMeanI2030 – Estimated IPCC SLR curve mean water depth within the polygon footprint for 2030
5. wAreaI2060 – Estimated IPCC SLR curve water area within the polygon footprint for 2060
6. wMinI2060 – Estimated IPCC SLR curve minimum water depth within the polygon footprint for 2060
7. wMaxI2060 – Estimated IPCC SLR curve maximum water depth within the polygon footprint for 2060
8. wMeanI2060 – Estimated IPCC SLR curve mean water depth within the polygon footprint for 2060
9. wAreaI2100 – Estimated IPCC SLR curve water area within the polygon footprint for 2100
10. wMinI2100 – Estimated IPCC SLR curve minimum water depth within the polygon footprint for 2100
11. wMaxI2100 – Estimated IPCC SLR curve maximum water depth within the polygon footprint for 2100
12. wMeanI2100 – Estimated IPCC SLR curve mean water depth within the polygon footprint for 2100
13. wAreaN2030 – Estimated NOAA SLR curve water area within the polygon footprint for 2030
14. wMinN2030 – Estimated NOAA SLR curve minimum water depth within the polygon footprint for 2030
15. wMaxN2030 – Estimated NOAA SLR curve maximum water depth within the polygon footprint for 2030
16. wMeanN2030 – Estimated NOAA SLR curve mean water depth within the polygon footprint for 2030
17. wAreaN2060 – Estimated NOAA SLR curve water area within the polygon footprint for 2060
18. wMinN2060 – Estimated NOAA SLR curve minimum water depth within the polygon footprint for 2060
19. wMaxN2060 – Estimated NOAA SLR curve maximum water depth within the polygon footprint for 2060

20. wMeanN2060 – Estimated NOAA SLR curve mean water depth within the polygon footprint for 2060
21. wAreaN2100 – Estimated NOAA SLR curve water area within the polygon footprint for 2100
22. wMinN2100 – Estimated NOAA SLR curve minimum water depth within the polygon footprint for 2100
23. wMaxN2100 – Estimated NOAA SLR curve maximum water depth within the polygon footprint for 2100
24. wMeanN2100 – Estimated NOAA SLR curve mean water depth within the polygon footprint for 2100
25. wAreaU2030 – Estimated USACE SLR curve water area within the polygon footprint for 2030
26. wMinU2030 – Estimated USACE SLR curve minimum water depth within the polygon footprint for 2030
27. wMaxU2030 – Estimated USACE SLR curve maximum water depth within the polygon footprint for 2030
28. wMeanU2030 – Estimated USACE SLR curve mean water depth within the polygon footprint for 2030
29. wAreaU2060 – Estimated USACE SLR curve water area within the polygon footprint for 2060
30. wMinU2060 – Estimated USACE SLR curve minimum water depth within the polygon footprint for 2060
31. wMaxU2060 – Estimated USACE SLR curve maximum water depth within the polygon footprint for 2060
32. wMeanU2060 – Estimated USACE SLR curve mean water depth within the polygon footprint for 2060
33. wAreaU2100 – Estimated USACE SLR curve water area within the polygon footprint for 2100
34. wMinU2100 – Estimated USACE SLR curve minimum water depth within the polygon footprint for 2100
35. wMaxU2100 – Estimated USACE SLR curve maximum water depth within the polygon footprint for 2100
36. wMeanU2100 – Estimated USACE SLR curve mean water depth within the polygon footprint for 2100
37. GridIndex – Page number | Grid ID. Note if a feature appears on multiple pages, multiple database entries were created. For example if a feature appeared on page 3 in grid H8 and also page 4 in grid A3, two “duplicate” features exist with the GridIndex value of 3 | H8 and 4 | A3.
38. Rank – Priority ranking system referenced in deliverable 3.3

Original point feature classes were left relatively unchanged aside from the following additions to the data table. The schema outline below was added to the point feature classes included in the analysis.

1. wDeptI2030 – Estimated IPCC SLR curve water depth value for 2030
2. wDeptI2060 – Estimated IPCC SLR curve water depth value for 2060
3. wDeptI2100 – Estimated IPCC SLR curve water depth value for 2100
4. wDeptN2030 – Estimated NOAA SLR curve water depth value for 2030
5. wDeptN2060 – Estimated NOAA SLR curve water depth value for 2060
6. wDeptN2100 – Estimated NOAA SLR curve water depth value for 2100
7. wDeptU2030 – Estimated USACE SLR curve water depth value for 2030
8. wDeptU2060 – Estimated USACE SLR curve water depth value for 2060

9. wDeptU2100 – Estimated USACE SLR curve water depth value for 2100
10. GridIndex – Page number | Grid ID. Note if a feature appears on multiple pages, multiple database entries were created. For example if a feature appeared on page 3 in grid H8 and also page 4 in grid A3, two “duplicate” features exist with the GridIndex value of 3 | H8 and 4 | A3.
11. Rank – Priority ranking system referenced in deliverable 3.3

CLEARVIEW GEOGRAPHIC

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(615) 492-0146 | Deland, Florida
www.clearviewgeographic.com

Delivered Via EMAIL to Erin Deady on 5/9/2019

Erin L. Deady, P.A.
Erin Deady Law
54 ½ SE 6th Avenue
Delray Beach, FL 33483
RE: Martin County Resilient Coastlines Program – CM933

SLR Adaptation/Mitigation Strategies and Recommendations

High Priority – Features projected to be inundated by 2030
Medium Priority – Features projected to be inundated by 2060
Low Priority – Features projected to be inundated by 2100

Recommendations for sea level rise mitigation adaptation strategies are included below. The high priority consideration was due to the short timeline to projected inundation. Integrating these data into the county's GIS web resources could improve overall access and understanding of them.

Climate Data	Sea level rise projections from the Southeast Florida Regional Climate Compact ("Compact") or other relevant agencies such as the National Oceanic and Atmospheric Administration ("NOAA") or the U.S. Army Corps of Engineers ("USACE") should be continually reviewed for updates.
Stormwater	Future updates to Martin County's Stormwater Drainage Master Plan should address sea level rise adaption and mitigation strategies that are deemed appropriate for the most current projected conditions. To more accurately assess potential impacts we recommend collection of the invert pipe elevations of stormwater infrastructure. Our assessment wanted limited to an estimated ground elevation derived from the 2016 county provided DEM. Coordination with the South Florida Water Management District ("SFWMD") is critical to address efforts related to sea level rise impacts on coastal structures upon which Martin County's drainage capacity is linked.
Facilities & Assets	Sea level rise adaptation and mitigation strategies for buildings and similar assets should address the intended life of the structure, use of the facility, and general access to said facility.

To assess potential impacts more accurately, we recommend collection of building elevation certificates produced from a licensed professional survey. The projected sea level rise may be lower than the finished first floor elevation/top of bottom floor like when buildings are elevated on pilings. Florida Division of Emergency Management (FDEM) has an online utility for viewing some elevation certificate information and is available at https://www.floridadisaster.org/elevation-certificates/

Engineering assessments addressing the floodwater resistance of critical infrastructure is a recommended to determine the future vulnerability of the structure. Environmental impact assessments addressing sea level rise adaptation strategies specific to hazardous materials located within these zones need is recommended.

Roads & Railway

We recommend maintaining an accurate roadway inventory that is complete with elevation data. Roadway improvement programs may be available to secure capital funding for elevating roadways or railbeds.

It is important to consider not just what is directly impacted but also what is inaccessible due to the inundation. Coordination with other agencies or jurisdictions that are responsible for certain roadway systems may be necessary.

We also recommend addressing sea level rise in emergency management and response action planning to ensure evacuation, supply, and heavy equipment transportation routes are resilient to sea level rise.

Water Supply

Further monitoring and investigation of potential saltwater intrusion into Martin County's groundwater supply may be warranted.

These recommendations should not be considered the only options that Martin County can take to become a more resilient community. Continual, enhanced coordination and data exchange with local planning departments, agencies and governments is critical for accurate and harmonized planning.