

**DEP AGREEMENT NO. R1914
CHANGE ORDER NO. 001**

GRANTEE

City of Jacksonville
214 North Hogan Street
Jacksonville, FL 32202

DEP Agreement No. **R1914** as entered into on the 25th day of November 2019, and as amended, is hereby revised as follows:

1. **Attachment 3, Grant Work Plan, Project Timeline** is hereby deleted in its entirety and replaced with the following, due to the Corona Virus Outbreak:

PROJECT TIMELINE			
Task No.	Task Title	Deliverable Due Date	Funding Amount
1	Review of Available Data, Models, Studies, and Design Guidance Documents	6/30/2020	\$10,000
2	Projections of Climate Change and Definition of Climate Scenarios	6/30/2020	\$20,000
3	Perform Preliminary Vulnerability Assessment	6/30/2020	\$25,000
4	Resource Criticality and Prioritization	6/30/2020	\$10,000
5	Assemble a Multi-Agency Task Force to evaluate impacts of sea level rise and increased storm frequency	6/30/2020	\$10,000
Total			\$75,000

All other terms and conditions of the Agreement shall remain unchanged.

CITY OF JACKSONVILLE

nreed@coj.net

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Date: 2020.03.20 11:51:09 -04'00'

Nikita Reed, Grantee Grant Manager

Date: **03/20/2020**

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION

Whitney Gray, DEP Grant Manager

Date: _____

**STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
GRANT WORK PLAN
DEP AGREEMENT NO.: R1914**

ATTACHMENT 3

Project Title: Resiliency Analysis

Grantee Contact Information:

Organization Name: City of Jacksonville
Authorized Signer for the Organization: John P. Pappas, P.E.
Title: Director, Public Works
Address: 214 N. Hogan Street, 10th Floor
City: Jacksonville
Zip Code: 32202
Area Code and Telephone Number: 904-255-8753
E-mail Address: pappas@coj.net

Grant Manager Contact Information:

Organization Name: City of Jacksonville
Name: Nikita Reed, Engineering Manager
Address: 214 N. Hogan Street, 10th Floor
City: Jacksonville
Zip Code: 32202
Area Code and Telephone Number: 904-255-8910
E-mail Address: nreed@coj.net

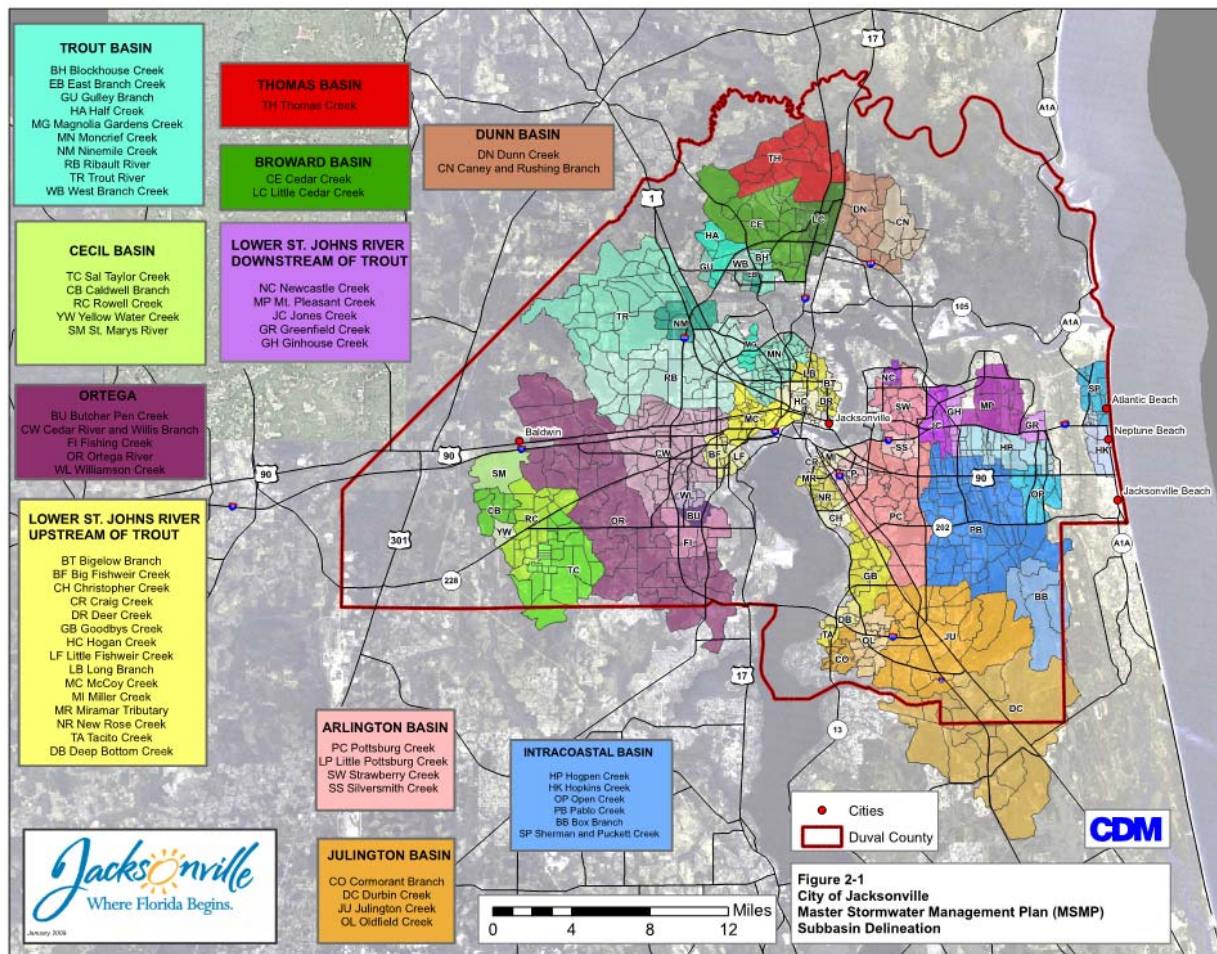
Fiscal Agent Contact Information:

Organization Name: City of Jacksonville
Name: Lori West, Contract Specialist
Address: 214 North Hogan Street
City: Jacksonville
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FEID No.: 59-6000344

DUNS No.: 004076998

PROJECT LOCATION: The City of Jacksonville will be performing a resiliency analysis for Duval County, Florida. The analysis may include the Atlantic Ocean, St Johns River, and some of its 54 named tributaries as shown in the figure below. This project will identify critical infrastructure and/or natural resource communities which will be evaluated for impacts under future scenarios. The location of these critical at-risk resources will be determined as part of the evaluation process.



WORK PLAN

- 1. Project Summary:** The City will identify the critical infrastructure and natural resource communities which may be susceptible to increasing levels of precipitation, increasing changes in sea level or increased tidal surge, to identify the challenges and risks associated with these potential variances, and to provide for resiliency against the more severe storms, larger tidal events, and resulting impacts. The first part of this effort will endeavor to establish the vulnerability of infrastructure and natural resources that play an integral role in the City's operations and allow for proactive planning.
- 2. Project Description:** The City of Jacksonville's 2030 Comprehensive Plan contains elements that address Capital Improvements, Conservation Coastal Management, Future Land Use, Historic Preservation, Housing, Infrastructure, Intergovernmental Coordination, Public School Facilities, Recreation and Open Space and Transportation. The City's Coastal Conservation element focuses on the protection and conservation of sensitive coastal resources as well as the protection of public safety, health, and welfare from coastal storm damage. In addition to the 2030 Comprehensive Plan, the City conducted a major update to their 1992 Master Stormwater Management Plan (MSMP) in 2011 and updated the tributary stormwater models in 2013. The 2011 and 2013 MSMP

documents considered combined rainfall and tidal flooding to most accurately define flooding and solutions. Since that time, the City has continued to develop and implement capital improvement projects identified in the MSMP.

Since the 2013 update, additional information for sea level rise (SLR), tidal surge impacts, and tropical storms (e.g., Mathew) provide an opportunity for coastal infrastructure resiliency planning coordination with the City's stormwater program and coastal natural resource planning to further prepare the City for a wide array of possible future conditions. Under this project, the City will incorporate these new data and perform a preliminary vulnerability analysis to identify critical infrastructure and natural resources that may be at risk under different given future SLR scenarios.

Following completion of this scope of work, the City will undertake a second phase of vulnerability analysis which will update the City's 2013 MSMP models to evaluate future land use changes and potential future SLR and precipitation change scenarios.

- 3. Project Need and Benefit:** Recent storms like Hurricanes Hermine, Matthew, and Irma have highlighted the City's vulnerability to storm events. Additionally, more frequent and severe localized storm events have impacted coastal and low-lying areas throughout the city. A proactive approach to identifying and protecting critical infrastructure and sensitive natural resources is needed to address these events and better serve the City's residents.

It is the City's desire to meet the goals of the FDEP Florida Resilient Coastlines Program (FRCP) Priority Area 3 by identifying future threats, educating the public and key stakeholders about these threats, and assessing vulnerability of key City resources. In the next phase of resiliency planning, the City will continue its analysis to proactively plan responses to address the identified vulnerabilities to address them, and ultimately developing amendments to the City's 2030 Comprehensive Plan to better protect both the people of Jacksonville and the infrastructure that serves them.

The proposed project will provide the scientific basis for policies and projects that will address the anticipated impacts of SLR and more frequent and severe precipitation using a collaborative and transparent process. The City will enact a multi-agency committee which could include representatives from state and federal agencies as well as key stakeholders who would be affected by new policies. This committee, along with the City of Jacksonville Public Works and Planning Departments will provide input and vet planning decisions that will become the basis for action at project completion. It is the City's desire that a collaborative and transparent discussion regarding SLR and future storm events will provide a stronger basis for planning decisions that could impact broad sections of the community.

In keeping with the approach that good decision-making is based on sound science, the City will perform a preliminary vulnerability analysis to identify infrastructure, natural resources, and vulnerable communities that could be impacted by future climate scenarios. This work will become the basis for the next phase of vulnerability analysis – detailed hydrologic and hydraulic model updates and recommended mitigation strategies including the hardening or raising of infrastructure, the protection of buffer areas, or development restrictions in vulnerable areas.

- 4. Budget Summary:** Allowable budget categories and costs for this project are listed in the table below.

Budget Summary

FIXED PRICE Grant Amount Awarded	\$75,000
<i>City's Funding Contributions</i>	<i>\$175,000</i>
AGREEMENT TOTAL	\$250,000

- A. Describe how the project costs was determined:** This project phase has been budgeted in the City's CIP for \$250k. The values were obtained from CDM Smith submitted cost estimate for the tasks listed below. The city intends on contributing \$175k, to make up the diffence of funds needed to complete this phase of this project, per the sub-contractors estimates to complete the project.

B. Other Project Funding Sources:

OTHER PROJECT FUNDING SOURCES

Source Name	Task 1	Task 2	Task 3	Task 4	Task 5	TOTAL
<i>City of Jacksonville Funding Contributions</i>	\$25,000	\$25,000	\$75,000	\$25,000	\$25,000	\$175,000
Total						\$175,000

The City of Jacksonville will be supplementing the grant funds to expand the analysis.

- 5. Project Timeline:** All tasks are to be completed and submitted no later than the Deliverable due date listed in the table below. Request for any change must be submitted prior to the current deliverable due date listed in the project timeline. Requests are to be sent via separate email to the Department's Grant Manager, with the details of the request being made and the reason for the request.

PROJECT TIMELINE

Task No.	Task Title	Deliverable Due Date	Funding Amount
1	Review of Available Data, Models, Studies, and Design Guidance Documents	4/30/2020	\$10,000
2	Projections of Climate Change and Definition of Climate Scenarios	4/30/2020	\$20,000
3	Perform Preliminary Vulnerability Assessment	4/30/2020	\$25,000
4	Resource Criticality and Prioritization	4/30/2020	\$10,000
5	Assemble a Multi-Agency Task Force to evaluate impacts of sea level rise and increased storm frequency	4/30/2020	\$10,000
Total			\$75,000

- 6. Performance Measure:** The Department's Grant Manager will review the deliverables to verify that they meet the specifications in the Grant Work Plan and this task description, to include any work being performed by any sub-contractor(s). Upon review and written acceptance by the Department's Grant Manager of all deliverables under this task, the Grantee may proceed with payment request submittal. All deliverable documents must be provided in an electronic downloadable format.

7. **Consequences for Non-Performance:** The Department will reduce each Task Funding Amount by 5% for every day that the Deliverable(s) is not received on the specified due date in the most recent Project Timeline, for the Agreement. Should a Change Order or Amendment be requested on the date of or after the most current Deliverable Due Date, the 5% reduction of that Task Funding Amount will be imposed until the date of the requested change is received, via email by the Department.
8. **Payment Request Schedule:** Grantee may submit a request for the Task Funding Amount to be paid using the Exhibit C, after all Deliverables for that Task have been approved by the Department. Request(s) for payment must include the Exhibit A showing 100% completion of that Task and must be submitted within 45 days of the Deliverable Due Date.

Or

Grantee may submit one request for the Grant Amount Awarded, by using the Exhibit C, after the project is 100% completed. The request for the Grant Amount Awarded, must include an Exhibit A showing 100% completion for all Tasks, and must be submitted within 45 days of the Deliverable Due Date.

TASKS & DELIVERABLES

Task #1

- A. **Title:** Review of Available Data, Models, Studies, and Design Guidance Documents
- B. **Description:** This task will include collecting information on known infrastructure assets, natural, and cultural resources, and determining data gaps to identify system exposure and vulnerabilities. Data sets that will be requested include:
- o USACE South Atlantic Coastal Study (SACS) GIS Coverage for:
 - Population Dataset (based on 2015 census tracts)
 - Infrastructure Datasets - Department of Homeland Security - Homeland Infrastructure Foundation Level Data (HIFLD)
 - Environmental Datasets (USFWS - CBRA Zones, NWR's, Critical Habitat, NOAA - National Estuarine Research Reserves, Audubon - Important Bird Areas, TNC Conservation Areas, Parks – DHS)
 - Habitat Datasets (Seagrass - UN Environment Program, NOAA - Coastal Change Analysis Program, Environmental Sensitivity Index, USFWS - National Wetlands Inventory)
 - Cultural Resources Datasets (NPS - National Register of Historic Places, USGS - Protected Area Dataset)
 - Social Vulnerability Datasets (Socioeconomic Status, Household Composition and Disability, Minority Status and Language, Housing and Transportation)
 - o City of Jacksonville evacuation routes and transportation layers
 - o City of Jacksonville critical assets for the JEA Resiliency Assessment
 - o JEA critical assets for the JEA Resiliency Assessment
 - o North Florida Regional Planning Council First Coast Vision to identify potential future land use patterns
 - o City of Jacksonville 2015 LiDAR
 - o City of Jacksonville NPDES Inventory

At the completion of this task, preliminary GIS data layers will be compiled for each resource category (e.g. infrastructure, cultural, environmental) to be considered as well as a list of data gaps or records that are only available in paper format. This information will be used to

develop a preliminary list of resources at risk which will be prioritized based on a mutually agreed on methodology develop with the City.

- C. Deliverable:** Data Evaluation Section of the Climate Resiliency Report showing the following, and submitted via an electronic pdf document(s) if possible, clearly labeled.
- a) Preliminary GIS data layers for each resource category.
 - b) Listing of data gaps or records.
 - c) Preliminary list of resources at risk with prioritization on methodology development with the City.

Task #2

A. Title: Projections of Climate Change and Definition of Climate Scenarios.

B. Description: This Task provides a review of existing climate hazards and future climate scenarios likely to impact COJ water resources and operations. The project team will begin with the climate scenarios previously adopted by JEA's Resiliency Assessment and confirm their appropriateness for COJ Resiliency Assessments. Future weather scenarios will include projections for:

- o Sea Level Rise (SLR) – NOAA Intermediate High Projection
- o Rainfall precipitation intensity-duration-frequency (IDF) – Use stochastic rainfall generator with seasonal hourly observed time series data as a probability dataset to produce future hourly precipitation time series based on GCM daily precipitation estimates for the period 2080 – 2100. IDFs will be developed for the 10-yr, 100yr, and Category 5 Hurricane (0.001 Probability).
- o Stillwater elevation - 1-year tidal stillwater hydraulic model boundary condition, either as defined in the City's current MSMP or as tabulated via regression analysis on a statistically significant long-term period of record. These stillwater elevations will be added to sea level projections to understand the combined impact of sea level rise and storm surge.
- o Planning horizons – 2040, 2070, 2100 (near-term, mid-term and long-term horizons based on varying asset service life)
- o GHG scenarios
- o Range of projections from ensemble of GCMs
- o Storm surge scenarios (return periods, historical hurricane climatology, and others)

C. Deliverable: A summary of the analysis and recommended climate change scenarios, in an electronic pdf format.

Task #3

A. Title: Perform Preliminary Vulnerability Assessment

B. Description: The resources identified in Task #1 will be evaluated for their vulnerability to extreme flooding events. We will couple the spatial asset data with existing USGS flood inundation data and FEMA flood depth grids, and compare the information to Light Detection and Ranging (LiDAR)-derived Digital Elevation Model (DEM) surfaces. The water surface elevation at flood peak will be compared to the elevation of the resource, to derive a preliminary estimate of the maximum depth of inundation for each critical resource.

Using the inundation maps and our institutional knowledge of the City's stormwater system, we will assess resource vulnerability. The team will identify the exposure, stress, sensitivity, and adaptive capacity of the resources. This will be a desktop analysis in a Microsoft Excel workbook format. The steps of this Vulnerability Assessment include:

- o Stress Factors – Identify and evaluate the stresses from coastal flooding, stormwater runoff and riverine flooding. This will include identifying the elevation of assets, the relative age and condition of the assets, and, in the case of bridges and culverts, the degree to which piers, headwalls, and abutments are vulnerable to scour from floodwaters.
- o Sensitivities – Determine the degree to which the resource is affected by the climate conditions.
- o Adaptive Capacity – Determine the ability of the resource to accommodate coastal flooding, stormwater runoff and riverine flooding, return to normalcy after a disruption.
- o Asset Criticality – Assess each resource’s importance with respect to disaster management, evacuation, business continuity, economy, and social aspects of the region. (See Task #3)
- o Determine Asset Vulnerability – Use relative sensitivity, adaptive capacity, and criticality of assessments to establish the vulnerability of each resource. For example, a low sensitivity, low criticality, and high adaptive capacity would indicate a resource with a low vulnerability – an infrastructure element that could hold up well in the face of climate stressors.

C. Deliverable: Preliminary Vulnerability Section of the Climate Resiliency Report in an electronic pdf format.

Task #4

A. Title: Resource Criticality and Prioritization

B. Description: This Task describes the systemwide identification and assessment of at-risk COJ assets and asset classes. Asset criticality designation will be based on the principles associated with the engineering reconnaissance process described in the Department of the Army Field Manual and also used in the USACE South Atlantic Coastal Study (SACS) Tier I Risk Assessment. This method prioritizes sewage, water, electricity, academics, trash, medical, safety and other considerations (SWEAT-MSO) related assets and allows COJ to weight criticality.

COJ will engage their Multi-Agency Task Force (Task #5) to establish the criticality weighting and prioritization methodology that will be used in both the preliminary and detailed vulnerability assessments. The preliminary exposure analysis will be completed in GIS by overlaying COJ assets with flooding and inundation layers (as identified in Task 2) to identify those assets at risk. Critical facilities will proceed to the next step of assessment for their relative vulnerability to flood hazards.

C. Deliverable: Resource Criticality and Prioritization Section of the Climate Resiliency Report in an electronic pdf format.

Task #5

A. Title: Assemble a Multi-Agency Task Force to evaluate impacts of sea level rise and increased storm frequency

B. Description: The City will assemble an multi-agency committee which could include representatives from the Florida Department of Environmental Protection (FDEP), U.S. Army Corps of Engineers (USACE), Federal Emergency management Association (FEMA), St. Johns River Water Management District (SJRWMD), City of Jacksonville Public Works, and the City Council who will represent both residential, commercial, and governmental interests throughout the city. Two public meetings are anticipated based on the following topics:

- o Provide a primer on climate science, review recommended planning horizons, and review climate projection scenarios to confirm appropriateness for project planning
- o Review resource vulnerability and prioritization methodology for critical infrastructure lists to confirm appropriateness for project planning

C. Deliverable: Listing of Assembled Multi-Agency Task Force Members and the Two Public Meetings to include the following in an electronic pdf format for each meeting.

- a. Sign in sheets,
- b. Presentation materials, and
- c. Meeting minutes, or meeting summaries