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CITY OF COOPER CITY

FLOOD VULNERABILITY ASSESSMENT

TASK ORDER NO. 2023-02

SCOPE OF SERVICES

DECEMBER 18, 2023

PROJECT BACKGROUND

The City of Cooper City (CITY) has requested the services of Hazen and Sawyer (CONSULTANT) to prepare a Vulnerability Assessment (VA) to identify flood vulnerabilities by conducting exposure and sensitivities analyses. Identification of flooding vulnerabilities is the first step in increasing protection of critical infrastructure throughout the CITY. The CITY intends to submit grant applications from the Resilient Florida Grant Program, amongst others, to support the recommendations resulting from this effort.

This task order will require the CONSULTANT to provide the services as required in the attached Florida DEP Grant Agreement, No. 23PLN78 with the CITY to deliver the following:

- Collection and organization of background data including critical/regionally significant assets inventory, topographic data, and flood scenario-related data.
- Utilization of an existing county-wide hydrologic & hydraulic stormwater model aligning with scenarios/simulations required by s. 380.093, F.S. The model will simulate existing conditions including stormwater infrastructure, using current and future boundary conditions, including future projected climatological conditions to include planning horizons for years 2040 and 2070.
- Development of a vulnerability assessment that will include reports, maps and tables presenting results from the exposure and sensitivity analyses in a standardized form to align with the requirements of s. 380.093, F.S.

VULNERABILITY ASSESSMENT

Task No. 1 – Kick-off Meeting

The CONSULTANT will schedule the kick-off meeting to develop an overall project management plan and to address initial actions. Meeting attendees will discuss the project scope, project goals, schedule, key milestones, and deliverables. The kick-off meeting will be hosted by the CITY. Prior to the meeting, the CONSULTANT will prepare the sign-in sheet, draft project schedule and other meeting materials, as necessary.

Task No. 1 Deliverables:

- Kick-off meeting agenda including location, date and time of meeting and copies of all materials created for the meeting.
- Kick-off meeting minutes documenting decisions agreed upon and outcomes of the meeting, to be submitted for review and approval by the CITY and sign-in sheets with attendee names and affiliation.

Task No. 2 – Conduct Initial Public Outreach

Subtask No. 2.1 – Public Outreach Meeting #1

The CONSULTANT will, in coordination with the CITY, conduct an initial public outreach meeting to allow the public to provide input regarding preferred methodologies, data for analyzing potential sea level rise impacts and/or flooding, guiding factors to consider, and critical assets important to the community. The CONSULTANT will be responsible for preparing all presentations, graphics, and other materials utilized during the meeting, based on prior approval from the CITY. The CITY will prepare social media notifications and meeting invitations. Public outreach will be conducted during the data collection stages of the project. Including public outreach early in the project can influence critical asset inventories, particularly when it comes to determining the community's cultural assets. The CONSULTANT will provide a video/audio recording of public outreach meeting for the CITY to upload or share through a publicly accessible webpage to allow citizens to be involved who could not attend.

Task No. 2 Deliverables:

- Meeting agenda, indicating location, date, and time of meeting;
- Sign-in sheet identifying the number of citizens and county/municipality staff attendees;
- Presentation from the meeting;
- Video/audio recording of meeting;
- Summary report including attendee input and meeting outcomes;
- Copies of any presentations and graphics utilized during the conduct of the meeting.

Task No. 3 – Acquire Background Data

The CONSULTANT, in coordination with the CITY, will research and compile the data needed to perform the VA, based on the requirements as defined in s. 380.093, F.S. The data collection for this project will source information pertaining to critical/regionally significant assets, topographic characteristics, and flood scenario-related data. This information will be used to evaluate the existing ground surface and stormwater infrastructure system. An initial Data Gap Analysis will help direct the data collection effort.

Subtask No. 3.1 – Critical/Regionally Significant Assets Inventory

The CONSULTANT will coordinate with the CITY to identify, collect, and organize critical or regionally significant assets. The inventory will include:

- *Transportation assets and evacuation routes,* including airports, bridges, bus terminals, ports, major roadways, marinas, rail facilities, and railroad bridges.
- *Critical infrastructure,* including wastewater treatment facilities and lift stations, stormwater treatment facilities and pump stations, drinking water facilities, solid and hazardous waste facilities, military installations, communications facilities, and disaster debris management sites.
- *Critical community and emergency facilities,* including schools, colleges, universities, community centers, correctional facilities, disaster recovery centers, emergency medical service facilities, emergency operation centers, fire stations, health care facilities, hospitals, law enforcement facilities, CITY facilities, logistical staging areas, affordable public housing, risk shelter inventory, and state government facilities.
- *Natural, cultural, and historical resources,* including conservation lands, parks, shorelines, surface waters, wetlands, and historical and cultural assets.

Subtask No. 3.2 – Topographic Data

The CONSULTANT will utilize best LiDAR data and derived Digital Elevation Model (DEM) available in the region as well as available survey data to best model topography, finished floor elevations and roadway crests for critical assets. The DEM used for the vulnerability assessment will be 3-meter cell size at a minimum.

Subtask No. 3.3 – Flood Scenario-Related Data

The CONSULTANT will utilize the existing Broward County stormwater model developed by the CONSULTANT for the Broward County Resiliency Plan. The county-wide results from this model will be clipped to the Cooper City boundary and used for the Exposure and Sensitivity Analysis.

Aerial photography and parcel data will be obtained from the County property appraiser's office. The CONSULTANT will request on the CITY's behalf to obtain the most recent aerials and parcels from the County, along with the associated backup and metadata in support of this project.

Task No. 3 Deliverables:

- Draft of Data Collection Summary Technical Report
- Database of the data collected including the floodplain rasters, critical infrastructure and attributes collected for use in the Vulnerability Assessment (in electronic format).
- GIS metadata will incorporate a layer for each of the four asset types as defined in s. 380.093(2) 1-4, to include locations of critical asserts owned or maintained by the CITY and regionally significant assets.
- GIS files and associated metadata adhering to the FDEP Resilient Florida's GIS Data and Metadata Standards, and raw data sources will be defined within the associated metadata (see Appendix C: GIS Data Standards).

Task No. 3 Assumptions:

- GIS data provided by the CITY is sufficiently accurate to inform the vulnerability assessment. It is assumed no field survey or other verification of this information will be required.
- Sea level rise projection data will include NOAA's most recent intermediate-high and intermediate-low projections for 2040 and 2070.

Hydraulic modeling data and results will be acquired from the *Broward Countywide Risk Assessment and Resiliency Plan*.

Task No. 4 – Draft Vulnerability Assessment

Subtask No. 4.1 – Exposure Analysis

The CONSULTANT will perform an exposure analysis to identify the depth of water caused by each sea level rise, storm surge, rainfall, and/or compound flood scenario. As defined in s. 380.093, F.S., the water surface depths (i.e., flood scenarios) used to evaluate assets will include the following data:

- Tidal flooding, including future high tide flooding, which will use thresholds published

and provided by FDEP. The analysis will also geographically display the number of tidal flood days expected for each scenario and planning horizon.

- Current and future storm surge flooding, using the 2017 NOAA projections. The analyses will include the Intermediate Low and Intermediate High scenarios as defined by NOAA along with FEMA storm surge data.
- Rainfall-induced flooding using spatiotemporal analysis or hydrologic and hydraulic modeling results. Future boundary conditions will be modified to consider sea-level rise and high tide conditions. The 100 year 24 hour design storm will be used.
- Compound flooding or the combination of tidal, storm surge, and rainfall-induced flooding.

As defined in s. 380.093, F.S., the following scenarios and standards should be used for the exposure analysis:

- All analyses performed in North American Vertical Datum of 1988 (NAVD88).
- Two local sea-level rise scenarios, including the 2017 NOAA Intermediate-Low and Intermediate-High sea-level rise projections.
- Planning horizons for the years 2040 and 2070.
- Local sea level data that has been interpolated between the two closest NOAA tide gauges. Local sea level data may be taken from one such gauge if the gauge has higher mean sea level.
- Encompassing entire municipality/county and including all critical assets owned or maintained by the municipality/county.
- The exposure analysis will use the most recent publicly available DEM which meets the defined minimum standard of 3-meter cell size.
- The existing modeling scenarios that meet the requirements listed above are summarized in the table below:

Hydrologic – Hydraulic Modeling Scenarios to be used in the Vulnerability Assessment

Scenario No.	Rainfall	Sea Level Rise Projection	Planning Horizon	Tidal Condition
VA-3	100-yr	N/A	2021- Current	Normal High Tide
VA-6	100-yr	2017 NOAA Intermediate Low	2040	
VA-9	100-yr	2017 NOAA Intermediate High		
VA-12	100-yr	2017 NOAA Intermediate Low	2070	
VA-15	100-yr	2017 NOAA Intermediate High		
VA-18	100-yr	N/A	2021- Current	Storm Surge (100-year)
VA-21	100-yr	2017 NOAA Intermediate Low	2040	
VA-24	100-yr	2017 NOAA Intermediate High		
VA-27	100-yr	2017 NOAA Intermediate Low	2070	
VA-30	100-yr	2017 NOAA Intermediate High		

Subtask No. 4.2 – Sensitivity Analysis

The CONSULTANT will perform a sensitivity analysis to measure the impact of flooding on assets, applying the data from the exposure analysis to the inventory of critical assets created in the previous task. The analysis will include an evaluation of the impact of flood severity on each asset type at each flood scenario and assign a risk level based on percentages of land area inundated and number of critical assets affected.

Task No. 4.2 Deliverables:

- Draft Vulnerability Assessment documenting the modeling process, type of models utilized and resulting tables and maps illustrating flood depths for each flood scenario as well as findings of the exposure analysis and the sensitivity analysis, including visual presentation of the data via maps and tables, based on the statutory scenarios and standards. Accompanying report maps and tables should use the terminology and color coding from Table 6 of the *Standardized Vulnerability Assessment: Scope of Work Guidance May 2022* to illustrate the extent of flooding.
- GIS files with results of exposure analysis for each flood scenario, with appropriate metadata identifying the methods used to create the flood layers. GIS files and associated metadata adhering to FDEP Resilient Florida's GIS Data and Metadata Standards (see Appendix C: GIS Data Standards).
- List of critical and regionally significant assets that are impacted by flooding and sea-level rise, prioritized by area or immediate need, specifying for each asset which flood scenario(s) it was impacted by.

Subtask No. 4.3 – Public Outreach Meeting #2

The CONSULTANT will, in coordination with the CITY, conduct a second public meeting to present the results from the exposure analysis, sensitivity analysis, and draft Vulnerability Assessment. The purpose of this meeting is to allow the public to provide community-specific input on the results of the analysis and to reconsider methodologies and assumptions used in the analysis. Additionally, during this meeting, the CONSULTANT will conduct exercises to encourage the public to prioritize focus areas of flooding and the critical assets in preparation for the development of adaptation strategies and project development. Criteria will be established to guide the public's input for the selection of focus areas. The CONSULTANT will be responsible for preparing all presentations, graphics and other materials utilized during the meeting, based on prior approval from the CITY. The CITY will prepare social media notifications and meeting invitations. The CONSULTANT will provide a video/audio recording of public outreach meeting for the CITY to upload or share through a publicly accessible webpage to allow citizens to be involved who could not attend.

Subtask No. 4.3 Deliverables:

- Meeting agenda, indicating location, date, and time of meeting;
- sign-in sheet identifying the number of citizens, and county/municipality staff attendees;
- presentation from the meeting;
- video/audio recording of meeting;
- summary report including attendee input and meeting outcomes;
- copies of any presentations and graphics utilized during the conduct of the meeting.

Subtask No. 4.4 – Identify Focus Areas

Based on the results of the second Public Outreach Meeting, the CONSULTANT will identify critical focus areas, following the guidelines in Chapter 2 of the Florida Adaptation Planning Guidebook. Based on the exposure and sensitivity analyses, a community may assign focus areas to locations or assets that are particularly vulnerable and require the development of adaptation strategies.

Subtask No. 4.4 Deliverables:

- A report summarizing the areas identified as focus areas, with justification for choosing each area;
- tables listing each focus area with any critical assets that are contained inside the focus area;
- maps illustrating the location of each focus area compared to the location of all critical assets within the geographic extent of the study, and
- GIS files illustrating geographic boundaries of the identified focus areas.

Task No. 5 – Final Vulnerability Assessment

Subtask No. 5.1 – Report, Maps, and Tables

Based upon input from the Public Outreach efforts, as well as the CITY, the CONSULTANT will further develop, refine, and finalize the Vulnerability Assessment per the guidelines in s. 380.093, F.S., including identification of focus areas.

The final Vulnerability Assessment will include results from the exposure and sensitivity analyses, as well as a summary of identified risks and assigned focus areas. It will include a list of critical and regionally significant assets that are impacted by flooding and sea-level rise,

specifying for each asset the flood scenario(s) impacting the asset.

Subtask No. 5.1 Deliverables:

- Final Vulnerability Assessment Report detailing the findings, including illustrations via maps and tables, based on the statutory scenarios and standards outlined in the Technical Standards Guidance;
- Final list of critical and regionally significant assets that are impacted by flooding, prioritized by area or immediate need, specifying for each asset which flood scenario(s) it was impacted by.
- Completed Vulnerability Assessment Compliance Checklist (See Appendix E: Vulnerability Assessment Compliance Checklist)

Subtask No. 5.2 – Public Presentation

The CONSULTANT will present the final Vulnerability Assessment results to local governing boards, technical committees, or other appropriate officers or elected officials. The purpose of this presentation is to share the findings from the final Vulnerability Assessment and recommend actions for adaptation strategies and project funding. The presentation will also inform the public of the results and the future risk of sea level rise and increased flooding and encourage community participation when identifying mitigation strategies to address the flooding vulnerabilities. The CONSULTANT will be responsible for preparing all presentations, graphics, and other materials utilized during the meeting, based on prior approval from the CITY. The CITY will prepare social media notifications and meeting invitations.

Subtask No. 5.2 Deliverables:

- Meeting agenda, indicating location, date, and time of meeting;
- sign-in sheet identifying the number of citizens, and county/municipality staff attendees;
- presentation from the meeting;
- video/audio recording of meeting;
- summary report including attendee input and meeting outcomes;
- copies of any presentations and graphics utilized during the conduct of the meeting.

SCHEDULE

The CONSULTANT will perform the services identified in Tasks 1 – 5 within 365 days of the written Notice to Proceed.

COMPENSATION

This project will be performed by the CONSULTANT for the lump sum costs shown below. The CONSULTANT will bill the CITY on a percent complete basis by tasks.

Task No.	Task Title	Lump Sum Fees
VULNERBILITY ASSESSMENT		
1	Kick-off Meeting	$6,267
2	Acquire Background Data	$10,663
3	Exposure Analysis	$30,364
4	Sensitivity Analysis	$85,575
5	Final Vulnerability Assessment Report, Maps, and Tables	$37,131
	TOTAL PART	**$170,000**

ASSUMPTIONS

1. The CONSULTANT will use the model previously developed for the Broward County Resiliency Plan to execute this Vulnerability Assessment.
2. This scope of work follows the Resilient Florida Program *Standardized Vulnerability Assessment: Scope of Work Guidance May 2022* as recommended by FDEP.
3. Grant tracking and reporting will be performed by CITY and/or separate consultant.
4. Stormwater improvements and master planning are not included in this effort.

TIME OF PERFORMANCE

- The draft vulnerability assessment will be completed with 335 days of receipt of notice to proceed. The final vulnerability assessment will be completed within 30 days of receipt of CITY comments.

SUBMITTED BY:

Hazen and Sawyer

BY: _____

Janeen M. Wietgrefe, Vice President

Dated this 18th day of December 2023

APPROVED BY:

CITY of Cooper CITY

BY: _____

Ryan Eggleston, City Manager

Dated this 9 day of JAN, 2024