DEP AGREEMENT NO. R1918
CHANGE ORDER NO. 002

GRANTEE

Broward County
115 S. Andrews Ave., Rm 329H
Fort Lauderdale, FL 33301

DEP Agreement No. **R1918** as entered into on the 23rd day of September 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	Assessment of Avoided Losses	06/30/2020	$25,000
2	Analysis of Economic Benefits	06/30/2020	$15,000
3	Projection of Indirect Economic Benefits	06/30/2020	$10,000
4	Recommendations for Economic Resilience Strategy	06/30/2020	$10,000
5	Public Outreach & Engagement	06/30/2020	$15,000
Total			**$75,000**

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

BROWARD COUNTY

Jennifer Jurado, Grantee Grant Manager

Date: 3/24/20

STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Whitney Gray, DEP Grant Manager

Date: 4/2/20

DEP AGREEMENT NO. R1918
CHANGE ORDER NO. 01

GRANTEE

Broward County
115 S. Andrews Ave., Rm 329H
Fort Lauderdale, FL 33301

DEP Agreement No. **R1918** as entered into on the 23rd day of September 2019, is hereby revised as follows:

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

PROJECT TIMELINE

Task No.	Task Title	Deliverable Due Date	Funding Amount
1	Assessment of Avoided Losses	04/30/2020	$25,000
2	Analysis of Economic Benefits	04/30/2020	$15,000
3	Projection of Indirect Economic Benefits	04/30/2020	$10,000
4	Recommendations for Economic Resilience Strategy	04/30/2020	$10,000
5	Public Outreach & Engagement	04/30/2020	$15,000
Total			**$75,000**

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

BROWARD COUNTY

Jennifer Jurado

Digitally signed by Jennifer Jurado
Date: 2020.03.17 09:56:49 -04'00'

Jennifer Jurado, Grantee Grant Manager

Date: 3/17/20

STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Whitney Gray

Whitney Gray, DEP Grant Manager

Date: 4/3/2020

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
GRANT WORK PLAN
DEP AGREEMENT NO.: R1918

ATTACHMENT 3

Project Title: Business Case for Resilience in Southeast Florida

Grantee Contact Information:

Organization Name: Broward County

Authorized Signer for the Organization: Bertha W. Henry

Title: County Administrator

Address: 115 S Andrews Ave, Room 409

City: Fort Lauderdale

Zip Code: 33301

Area Code and Telephone Number: 954-357-7000

E-mail Address: bhenry@broward.org

Grant Manager Contact Information:

Organization Name: Broward County

Name: Jason Liechty, Senior Environmental Project Coordinator, Environmental Planning and Community Resilience Division

Address: 115 S. Andrews Ave, Room 329H

City: Fort Lauderdale

Zip Code: 33301

Area Code and Telephone Number: 954-519-0310

E-mail Address: jliechty@broward.org

Fiscal Agent Contact Information:

Organization Name: Broward County

Name: Jason Liechty, Senior Environmental Project Coordinator, Environmental Planning and Community Resilience Division

Address: 115 S. Andrews Ave, Room 329H

City: Fort Lauderdale

Zip Code: 33301

Area Code and Telephone Number: 954-519-0310

E-mail Address: jliechty@broward.org

FEID No.: 59-6000531

DUNS No.: 066938358

PROJECT LOCATION: The Project Location is Fort Lauderdale, Florida, the seat of the applicant, Broward County Government. (Latitude 26° 7' 15.4986"N, Longitude 80° 8' 37.9608"W.)

The project will examine the footprint of the four counties that are part of the Southeast Florida Regional Climate Change Compact ("Compact"): Palm Beach, Broward, Miami-Dade, and Monroe Counties and addresses the Grant Priority: Regional Collaboration Efforts.

This project will be coordinated by Broward County under the auspices of the Economic Resilience Work Group of the Compact, which was formed in 2017. Under the Working Group are the members of both the public and private sector who have come together under the Regional Economic Resilience tenet of the Compact, an identified focal area in the Compact's Regional Climate Action Plan (RCAP 2.0). The business community has taken an active role in partnering to to advance Regional Economic Resilience, as evidenced with formal execution of a Joint Statement on Economic Resilience, a deliverable of the Compact's 9th Annual Summit in 2017, which launched this initiative. Signatories include:

- Greater Miami Chamber of Commerce
- Greater Fort Lauderdale Chamber of Commerce
- Chamber of Commerce of the Palm Beaches
- Broward Workshop
- Greater Fort Lauderdale Alliance
- Greater Hollywood Chamber of Commerce
- Treasure Coast Regional Planning Council

WORK PLAN

1. **Project Summary:**

The economics of rising seas and resilience are an essential component of encouraging continued regional action to address the challenges facing our community. Beyond the physical implications of rising seas, the economic case is an essential tool, as part of technical analyses and in communications. To further establish the business case for resilience, the project will explore the (1) economic risks of flooding and augmentation of that risk due to rising seas; (2) economic benefits of resilience action as a function of risk reduction; (3) economic opportunities associated with resiliency investments; (4) recommended strategies to incentivize and improve community resilience; and (5) public outreach and engagement.

2. **Project Description:**

Southeast Florida is ground zero for sea level rise, and a recognized world-leader in regional cooperation and action via the model of the Southeast Florida Regional Climate Change Compact, a four-county collaborative formed in 2009, focused on addressing regional challenges of climate resilience and sea level rise. In 2017, the economic development and business groups of Southeast Florida engaged with the Compact staff to develop "Economic Resilience" as new focal area within the Compact's Regional Climate Action Plan Update (RCAP 2.0). This support led to expansion of the resilience conversation with a broader audience at the 2017 Compact Summit, entitled "The Business of Resilience." Subsequently, and with formalization of the "Joint Statement on Collaboration" (Joint Statement) the regional Economic Resilience Work Group was formed to better support the Southeast Florida Regional Climate Change Compact,

Throughout 2018, there has been a pronounced expansion of private-sector engagement and leadership in the resilience conversation and the call for regional action and investment to address flood risk and the resilience of the Southeast Florida economy. Our shared challenge of rising seas further underscores the interconnectedness of the region, our communities, and economy.

The Economic Resilience Work Group (comprising Compact Counties and signatories to the Joint Statement) has developed and advocated for strategic priorities, including Restudy of the Central &

South Florida Flood Control Project, while utilizing its broader association of professional forums to convene business leadership in the resilience discussion with industry experts from the fields of insurance, risk modeling and data analytics, economics, and finance as well as leading scientists and government officials.

These conversations have raised key questions and revealed significant gaps in our regional evaluation of risk and exposure, fundamental to the collective argument for organized action. As a result, the Economic Resilience Work Group was tasked with organizing a scope of work to quantify in numeric and narrative form the “Business Case for Resilience” through an economic analysis of risk and the return on investment and opportunity to be derived with regional investment in resilience.

We will engage a consultant (the Urban Land Institute) for the project, which will use the REMI economic model to analyze existing state demographic and economic data and estimate the potential avoided losses and direct and indirect economic benefits of resilience investments. In addition, the project will develop recommendations and a road map for a resilience strategy involving built and natural infrastructure adaptation. The recommendations for action are likely to support designation of new Adaptation Action Areas in southeast Florida and address Peril of Flood statutory requirements. Project results will be summarized in a final report and will be communicated to stakeholders and the general public through at least two public meetings, presentation at the annual Compact Summit, and online publication.

This project is inspired by an economic study of Dania Beach (FDEP Grant CM 736), which piloted the use of the REMI model to test adaptation strategies in the face of sea level rise. The success of this pilot, in combination with the proven approach of the Urban Land Institute expert panels and our longstanding collaboration with the South Florida Regional Planning Council, and the broader involvement of partners in the Compact, will ensure that we complete all tasks and deliverables and efficiently expend the budgeted resources within the grant period.

3. Project Need and Benefit:
Conversations among members of the Economic Resilience Work Group and the Southeast Florida Climate Change Compact Counties identified significant unanswered questions about the risks to economic activity in southeast Florida from climate change, sea level rise, and flooding. A better evaluation of these risks, as well as the return on investment and opportunity for economic development from adaptation, is urgently needed in order to make the business case for regional action and investment.

The economic benefits of adaptation investments include stability or enhancement of property values, insurance premium savings, and stability of the local tax base. These elements are interdependent considering unaffordable insurance or infrastructure failure would impact property values and the tax base. Conversely, raising taxes to afford and implement regional infrastructure improvements, thereby reducing risks in a vulnerable area, may positively affect property values and reduce insurance premiums.

Beyond avoided losses, there are additional economic benefits to adaptation, including more rapid recovery following a system shock or disruption, avoided losses from business disruption, and reduction of the response required by government, utilities and others. In addition, infrastructure improvement projects will create jobs and pump money into the local economy.

A better qualitative and quantitative understanding of the economic risks to the region from climate change, sea level rise, and flooding, and the potential economic benefit of infrastructure investments and other resiliency measures will be of enormous value to policymakers and the business community in making decisions about the nature, size, timing, and location of needed infrastructure projects and in demonstrating the region's financial viability to credit rating agencies, insurers and reinsurers, banks, and other financial entities.

"Regional collaboration efforts" is one of the four Priority Areas of the Resilience Planning Grant funding. This project is not only a collaboration of the four counties involved in the Compact, but also of the regional business community. This report will significantly advance the argument for collective action and continued collaboration on sea level rise and resilience.

Since much of the data to be examined already exists, and this project seeks to compile such information and perform analyses on the data, completion by June 19, 2020 is very feasible. The Urban Land Institute and South Florida Regional Planning Council have worked with the REMI economic model in the past and have participated in similar projects, and the relevant stakeholders have existing relationships, including their participation in the Economic Resilience Work Group.

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

FIXED PRICE	**Grant Amount Awarded**
AGREEMENT TOTAL	**$75,000**

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	Assessment of Avoided Losses	03/10/2020	$25,000
2	Analysis of Economic Benefits	03/10/2020	$15,000
3	Projection of Indirect Economic Benefits	03/10/2020	$10,000
4	Recommendations for Economic Resilience Strategy	03/10/2020	$10,000
5	Public Outreach & Engagement	04/30/2020	$15,000
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:** Assessment of Avoided Losses

B. **Description:**
   The consultant will assess risks by examining the current and future regional landscape in Southeast Florida and the effects of sea level rise driven tidal flooding and amplified high-frequency storm surge events on public infrastructure (e.g., schools, roads, hospitals), property tax revenue, jobs (through both commute interruptions and job losses), and damage losses through catastrophic risk modeling or similar analysis. Future conditions will be evaluated for years 2045 and 2070. The analysis will also evaluate the impacts of specific adaptation options that could reduce economic losses. Examples of actions include raised roads, seawall enhancements, beach restoration, changes in Base Flood Elevation or raising of minimum Finished Floor Elevation, and improvements in major infrastructure assets. Economic benefits yielded from adaptation investments may include stability or enhancement of property values, insurance premium savings and stability of the local tax base. These elements are interdependent considering unaffordable insurance or infrastructure failure would impact property values and the tax base. Conversely, raising taxes to afford and implement regional infrastructure improvements, thereby reducing risks in a vulnerable area, may positively affect property values and reduce insurance premiums. The economic impacts of the modeled adaptation options will be summarized and visualized in the deliverable.

   Additionally, through a series of interviews and data collection from the regional business forum partners, the consultant will generate a cross-walk analysis of the main revenue sources for the County and drivers of vulnerabilities of those sectors. One of the vulnerabilities highlighted by sector would be the jobs at risk by zip code (similar methodology was used for the 2018 “Mid-Atlantic Regional Resilience: Linking Coastal Ocean Information to Enhance Economic, Social and Ecological Resilience” project funded by the National Oceanic and Atmospheric Administration through a Regional Coastal Resilience Grant (Award No. NA16NOS4730014). For use in this task and future studies, estimates of the daily revenues from operations would be compiled by section for use in improving business disruption analyses or generating loss curves by sector for future modeling efforts.

C. **Deliverable:** Graphical and table summary of output, the base case and benefit of adaptation options. Summary report of methodology and salient results.

Task # 2

A. **Title:** Analysis of Economic Benefits

B. **Description:**
Beyond avoided losses, there are additional economic benefits to adaptation. The consultant will assess and compare total real estate values and average values per square foot by land use in areas within the Southeast Florida region where improvements have been made to areas where limited or no improvements have been made, or alternatively redeveloped to non-redeveloped areas (see methodology, Stronge and Schultz (1997)). Estimates of the indirect benefits associated with maintained access to community resources to properties outside of the adaptation area may be used to derive the percent of property tax revenues derived from proximity to resilient corridors. Estimates of the benefits that protection of property values contribute to local taxing authorities may be applied to verify the assumption that the cost of local government services including infrastructure investment is less than the contribution that high value waterfront properties generate or the loss of revenue if those parcels were removed from the tax roll. In this task, insurance savings based on types of policies specific sectors hold and estimation of percentage of risk offset or coverage to value ratio by insurance would also be estimated and compiled for a well-rounded view of the benefits provided by adaptation to properties and the tax base.

Investment in resilient infrastructure should allow for more rapid recovery following a system shock or disruption, avoid losses from business disruption and reduce the response required by government, utilities and others. The costs to date of local hurricane response, losses associated with events or changing conditions and replacement infrastructure costs resulting from flooding may serve as the basis for an estimated amount that could be avoided if adaptation occurs (see methodology, NIBS (2018) and ULI (2015)). The benefits and avoided costs determined in this task and previous tasks along with several estimates of the principal amounts and debt service required for various investment programs could be entered into the National Institute of Standards and Technology (NIST) Economic Decision Guide Software (EDGe$) tool or equivalent to derive benefit-cost ratios and return-on-investment estimates.

Additionally, this task shall include drafting five local flooding scenarios and adaptation options based on the above analyses and their associated economic benefits for use during public outreach.

C. **Deliverable:** Summary report of the results of this task and details of the five specific case studies of flooding and/or adaptation stories.

Task # 3

A. **Title:** Projection of Indirect Economic Benefits

B. **Description:**
Beyond the direct benefit of infrastructure improvements, additional economic benefits will be derived from resilient action. The consultant will employ qualitative and quantitative analysis of indirect economic benefits. For example, estimates of new jobs created in response to infrastructure improvement projects by industry sector and lines of practice will be projected (see FIU (2017) methodology). Publicly-available state demographic and economic data will be referenced. The sectors of focus will include, but not necessarily be limited to, property and real estate, banking and financing, professional, scientific and technical services, engineering and construction, hospitality and tourism, education and health services, and trade, transportation, utilities and logistics. The potential for job creation and retention and resulting new capital and local spending will be estimated and compared to the existing economy and projections without adaptation investments, if feasible.

C. **Deliverable:** Summary report of the results of this task in a narrative form with specific quantitative results where appropriate.

Task # 4

A. **Title:** Recommendations for Economic Resilience Strategy

B. **Description:**
The consultant will use the data collected and analyses performed in previous tasks to surmise the potential for greater economic resilience given investment in adaptation within the Southeast Florida region. To support development of an economic resilience strategy, preliminary recommendations will be generated for the criteria for economic resilience at the regional and corridor scale, the incentives or partnerships necessary to reduce individual sector risk, stimulate investment in adaptation and compound the benefits yielded from investment across sectors and methods for tracking and verifying return on investment to the economy once projects are implemented. From these recommendations, decision makers can strategize and communicate the return on investment of adaptation more effectively and optimize the timeframes for investment. The recommendations will also be used to advance compliance with the Peril of Flood policies and designation of Adaptation Action Areas within the region.

C. **Deliverable:** A list of specific recommendations with details provide on each.

Task # 5

A. **Title:** Public Outreach and Engagement

B. **Description:**
Findings from the previous four tasks will be aggregated by the consultant into a final report. An executive summary and materials designed for public consumption will be created. The materials will be distributed widely using the existing business partners that take part in the Economic Resilience Work Group. Two public meetings will be held, one focused on the business community and a second focused on policymakers. Additionally, these materials will be shared as part of the annual Southeast Florida Regional Climate Leadership Summit in 2020 (to be held in Palm Beach County) and made publicly available on the Compact website. The individual counties will also distribute the materials through presentations to their respective climate change task forces or appropriate bodies.

C. **Deliverable:** A final report that consolidates the previous four tasks and materials designed for public consumption including an executive summary, and two public meetings, with agendas and sign-in sheets for each.