

EXHIBIT F

DEP AGREEMENT NO. 1910

Climate Vulnerability Assessment

City of Naples

Final Project Report



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Executive Summary

The coastal City of Naples is at high risk from threats associated with sea level rise and climate change. Delaying action is costlier than taking incremental actions now to mitigate and adapt for impacts. The City of Naples has developed a Climate Vulnerability Assessment, identifying the risks on public assets and critical infrastructure (built and natural). Understanding these risks will allow the City to develop a Climate Adaptation Plan for resources and assets most affected. Draft language was developed for the City's Coastal Management Element of its Comprehensive Plan to comply with the "Peril of Flood" statute.

To establish a detailed understanding of potential climate change impacts, historical climate data and projected conditions were summarized using the best available climate science for three time horizons (2030 and 2060 and 2100). In line with the City's priorities, the following stressors were analyzed for each planning time horizon: sea level rise, coastal flooding, precipitation flooding, and extreme heat.

A Climate Vulnerability Assessment Report was developed. This report consists of a climate change science review (modelling climate change, temperature, precipitation, coastal storms, and sea level rise, a chapter explaining the methodology used to map sea level rise projections for the City of Naples, a city-owned asset inventory (built and natural assets), vulnerability assessment of the inventoried assets, and conclusions and future work. Appendices to the report include seas level rise scenarios maps for the city, and tables containing vulnerability and risk ratings for city assets. A working group consisting of representatives from each city department/division convened on several occasions to provide input and feedback to the process.

A Resiliency and Sustainability webpage was developed to house the Climate Vulnerability Assessment web information (<https://www.naplesgov.com/naturalresources/page/resiliency-and-sustainability>). The Naples Climate Change Resiliency and Mitigation Planning webpages were developed as a Story Map that interactively walks the viewer through basic climate science information, impacts of climate change on the city (including interactive sea level rise projection maps of the city), actions the city is taking to prepare for climate change, and ways the public can get involved.

Methodology

Climate Vulnerability Assessment

The Climate Vulnerability Assessment provides a brief background into current climate change science with context for projected trends for Naples, sea level rise inundation maps for four scenarios: 2030 (8.6 inches), 2060 (21.2 inches), 2100 (45.2 inches), and 2100 (100.4 inches), and climate vulnerability profiles for public assets. Future sea levels were evaluated under two tide conditions: 1) daily high tide; and 2) extreme storm tide. Those assets identified as having a high vulnerability through the mid-century planning horizon year (2060) were used to establish priorities for future climate change adaptation planning. The coastal flood exposure mapping effort leveraged existing sea level rise layers prepared as a part of the University of Florida's Sea Level Rise Sketch Planning Tool (SLR Sketch Planning Tool) (University of Florida GeoPlan Center, 2019). Inundation mapping layers corresponding to the closest selected sea level rise projections for 2030, 2060, and 2100 were retrieved from the SLR Sketch Planning Tool database and to create the inundation maps used for the climate vulnerability assessment. The SLR Sketch Planning Tool output mapping layers were used as input for spatial analysis in the Geographic Information System (GIS) to estimate the exposure of City built and natural assets, including City-owned utilities, facilities, community assets, airport assets, and natural habitats. Sea level rise layers were overlaid on site feature locations to evaluate for overlap, indicating potential flood exposure.

A Climate Working Group consisting of representatives from each City department was assembled to identify public assets with a potential risk to climate change. The Working Group members identified critical public assets and reviewed and provided feedback and input to the Assessment. The inventory was developed using City-maintained geospatial data for asset locations. Public assets were reviewed and prioritized based on their sensitivity to hazards (flooding and heat) and capacity to adapt (i.e. vulnerability) and to inform strategies to provide a consistent level of protection through time.

Comprehensive Plan Coastal Element

A draft revision to the City of Naples Coastal Element of its Comprehensive Plan was developed. This provided an update of the Comprehensive Plan Coastal Management Element required by Florida Statutes Section 163.3177(6)(g). This update included separation of the City's Conservation Element from the Coastal Management Element, a reorganization of the Coastal Management Element to track the requirements of Florida Statutes Sections 163.3177 and 163.3178 to ease the identification of any future legislative changes to the Community Planning Act requirements of Florida Statutes Chapter 163, and compliance with the requirements of Florida Statutes Section 163.3178(2)(f), which codify the "Peril of Flood" legislation adopted by the Florida Legislature in 2015. The Goals, Objectives, and Policies (GOPs) related to coastal management were separated out into the Coastal Management Element, a crosswalk was developed providing new GOPs numbering placeholders, reorganized GOPs and revised language to address the "Peril of Flood" legislation, and references to both statutory requirements and current Plan GOP numbering to allow for the tracking of changes.

Outcome

A draft revision to the City of Naples Coastal Element of its Comprehensive Plan was developed. This provided an update of the Comprehensive Plan Coastal Management Element required by Florida Statutes Section 163.3177(6)(g).

A Climate Vulnerability Assessment was developed which reviewed City of Naples public assets and prioritized them based on their sensitivity to hazards and capacity to adapt (i.e. vulnerability) and to inform strategies to provide a consistent level of protection through time. The Assessment report provides a brief background into current climate change science with context for projected trends for Naples, sea level rise inundation maps for four scenarios: 2030 (8.6 inches), 2060 (21.2 inches), 2100 (45.2 inches), and 2100 (100.4 inches), and climate vulnerability profiles for public assets. Those assets identified as having a high vulnerability through the mid-century planning horizon year (2060) will be used to establish priorities for future climate change adaptation planning.

Key findings from the Assessment include:

Combined Coastal and Precipitation Flood Risk: Low-lying areas with an existing precipitation flood risk and drainage issues will be among the first and most severely affected regions of the City. As low-lying stormwater outfalls become partially or completely inundated by rising water levels, drainage of stormwater can be impeded, resulting in inland flooding during storms.

Decline or Loss of Shoreline, Parks, and Natural Areas: Open space, parks, and natural areas add to the City's quality of life and generate economic activity through increased tourism and appeal for seasonal residents. Many of these areas are vulnerable to changes in future climate conditions and face being narrowed or eventually being "squeezed out" by rising sea levels or highly stressed by an increase in average temperatures and extreme heat days. Natural and open space areas provide unique recreational opportunities that cannot be easily replaced once lost.

Local and Regional Transportation Impacts: Flood impacts to the street network pose severe impacts to emergency response, access to neighborhoods and businesses, and the overall vitality of the City. To maintain uninterrupted access, the City will need to consider the climate influence on future flood risk in roadway design and coordinate with state, regional, and federal transportation partners to protect and enhance the transportation network.

Impacts of Extreme Heat on Health: Negative health impacts due to extreme heat are well understood and can include direct loss of life, increases in respiratory and cardiovascular disease, and challenges to mental health. Increasing temperatures can also contribute to air pollution levels and vector-borne diseases. Outdoor workers are particularly susceptible to heat impacts to health. The well-being of many of the City's natural habitats is also at risk. Many natural areas are limited to a narrow range of conditions for survival and are easily stressed when temperatures exceed their normal conditions.

Development and Revitalization of Waterfront Neighborhoods: Many of the City's key development and revitalization neighborhoods are in close proximity to the shoreline and are vulnerable to future flooding. These areas represent an opportunity to incorporate area-scale flood adaptation strategies in their planning and design to protect entire neighborhoods of the City.

Further Recommendations

The Climate Vulnerability Assessment Final Report concludes with the recommendation to develop a Climate Adaptation and Mitigation Action Plan. This Plan would make recommendations for strategies to protect assets identified in the Vulnerability Assessment as being most at risk to climate change impacts. This Plan would also make recommendations for programs to reduce carbon emissions in order to lower the future rate of climate change.

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