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COASTAL VULNERABILITY ASSESSMENTS AND RESILIENT SOLUTIONS

Owners and investors in coastal properties damaged by recent hurricanes need to rebuild. Most need to avoid long recovery times that impact revenues, branding, and client loyalty. Rebuilding in ways that reduce future risks, minimize losses and insurance costs is a must for those in storm-prone zones. To avoid putting themselves back in harms way, owners need to know their real exposure, vulnerabilities and their optimal solutions to rebuilding. The questions and challenges can be overwhelming. This is where we can help.

Deborah Brosnan & Associates brings together a consortium of scientists, engineers, regulatory and finance experts who are skilled in identifying and minimizing storm risks and in rebuilding for resilience. We offer 30 years experience and expertise working throughout the Caribbean and Florida in disaster risk reduction, environmental, and engineering solutions. As long-term residents, we know the region intimately and understand the problems that worry our clients. We are professionals with a stellar reputation for helping our clients solve problems.

We integrate environmental science and engineering with sound decision-making principles to develop realistic local solutions. Our priority is to assist our clients in improving their coastal resiliency both in the short- and long-term. We work closely with clients to understand their unique issues and to develop solutions that are practical and cost-effective. When needed, our financial analysts can help clients evaluate among different solutions options to determine the best one for them. Our solutions are designed to work with regulatory frameworks and to address insurance needs. We can help communities develop storm survival and mitigation measures to prevent large scale impacts and resume operations as quickly as possible following a storm. We are able to work with clients' architects, landscapers and engineers to facilitate rebuilding that is robust, secure and addresses insurance needs. We work with private clients, investors, commercial entities, communities and governments. Deborah Brosnan & Associates offer bespoke services to meet unique needs of each client, delivered with personal care and to highest professional standards.

Service Categories:

- Comprehensive exposure assessments and vulnerability analysis.
- Sea level rise and storm surge risk assessments, and mitigation solutions
- Calculation of wave and flood loads, and elevations for at-risk infrastructure
- Identification of flood-prone areas, buildings and critical infrastructure.
- Environmental risk analysis
- Post storm damage assessments
- Resilience planning
- Environmental and engineering adaptations based on risk profiles and tolerances
- Functional and constructible stormwater infrastructure improvements, including green-gray (environmental + engineering) infrastructure to reduce flooding and storm-surge damage and protect water quality
- Disaster Risk Reduction Recovery and Remediation
- Regulatory including permitting assessments and assistance
- Financial analysis for solutions, returns on investment and optimal financial structuring
- Community and government relations

Smart Solutions to Environmental Risks

Examples illustrating the scope of our experience and expertise.

1. Caribbean Islands of St Barthelemy, St Kitts and Nevis, Turks and Caicos. Florida. Our team has conducted



comprehensive risk analysis assessment and designed and permitted solutions for scores of private and commercial (hotel) clients dealing with beach erosion, storm-surge risks and post-hurricane damage. We have designed solutions tailored to the unique areas and issues (no cookie-cutter options). These have included nature-based habitat restoration as well as combining engineering with habitat maintenance to ensure property protection and availability of beaches and reefs for guests and family. In St. Barths we conducted storm surge analysis, beach erosion causation, and ultimately recommended a major dune restoration to the client, designing the process, securing permitting and overseeing the work. This solution protected the client's property from storm surge and flooding through 4 major storms and even Hurricane Irma. In addition we saved the client over a half-million euros that would have been otherwise spent in wall construction and additional thousands of dollars in maintenance.

2. Post-Hurricane Rebuilding. Post-Irma and Maria, we have been working with coastal hotel owners, investors, and their architects to identify risks and advise them on secure ways to re-envision their hotels and their resorts to avoid future damage while maintaining the brand. As these designs are often new to government we are assisting with education and permitting efforts. Hotel /resort property sizes range from 5 acres to 1,450 acres

3. Casey Key Geotextile Container System. Our team developed, designed and permitted an 800 foot long sloped geotextile container system with beach fill placement and re-vegetation to provide a semi-soft erosion control solution to protect upland property from storm damage. This system was the first installed under the State of Florida's new rule 62B-56, FAC.

4. Florida. Our team designed and permitted a 500-foot vertical oceanfront steel sheet pile seawall to protect three private, upland properties from storm damage. The team provided construction administration and oversight services. Due to very limited site access and close proximity of residential structures to the seawall, a non-percussive hydraulic press-in system was used to install the 40ft steel sheet piles



5. Grace Bay Turks and Caicos. Our team successfully implemented a beach restoration program consisting of five rock T-head groin structures to stabilize a one-mile beach nourishment project on an Atlantic fronting shoreline. The project's design maximized project longevity and economic benefits to the upland properties while minimizing adverse impacts to biological resources. The structure provide storm-surge protection through two major hurricanes that struck the Island



6. Eastern Seaboard USA. Our team conducted risk assessment and developed GIS-based tools for NASA and Nature Conservancy. We evaluated the potential impacts of storm surge and flooding risks using hydrodynamic modeling and under different sea level rise scenarios. Our work identified assets and services at high risk including critical services and emergency responses likely to be cut off during more sever and future storms and provided design solutions to the community.

7. Secure and Sustainable Caribbean Resorts. We have assisted developers envision and implement luxury resort designs in the Caribbean developed on a fully sustainable basis and to be hurricane secure, and on three separate Islands. Developments have included a marina, hotel, residential villas, golf course, clubhouse, nature preserves, ancillary facilities and infrastructure. Project property size has ranged from 1,500 acres to 11 sq. miles.

