WOODS HOLE GROUP FOR EARTH, FROM SPACE
A CLS COMPANY

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Marc Yaggi, President
Waterkeeper Alliance
180 Maiden Ln #603
New York, NY 10038

Review of Lighthouse Point Environmental Impact Assessment

Dear Mr. Yaggi:

Woods Hole Group reviewed the Environmental Impact Assessment – Lighthouse Point, Eleuthera, The Bahamas (the EIA) prepared March 2021 for DCL Island Development, Ltd. Our review of the EIA for the proposed development of a cruise port and entertainment destination at Lighthouse Point (the Project) focused on coastal processes and engineering, coastal hazards related to climate change, water quality, and project-related greenhouse gas emissions modeling. This letter summarizes Woods Hole Group's comments on the EIA with respect to these subject areas. These comments were developed based on our experience in these subject areas, professional judgement, knowledge of the state of the practice, and expectations for the development of a complete environmental impact assessment.

Woods Hole Group is an international environmental services and products organization headquartered in Massachusetts, and with USA offices in Delaware, Maryland, and Texas. Woods Hole Group offers a range of Coastal, Ecological, and Oceanographic consulting services, along with products for collecting ocean measurements, ocean forecasting, tracking wildlife with satellite communications, and vessel monitoring systems for fisheries management. Woods Hole Group's Environment & Climate Business Unit provides consulting expertise in coastal science, modeling, engineering, and planning, and regularly develops state and federal environmental impact statements for projects in the coastal zone. Our team is comprised of leading experts in coastal processes, sea level rise and storm surge modeling, resilient design and nature-based solutions, water quality modeling, and greenhouse gas assessment. We have deep experience in the engineering design of coastal infrastructure, dredging and beneficial reuse, beach and dune renourishment, as well as in environmental monitoring and sampling, and seafloor characterization.

Woods Hole Group's review of the Lighthouse Point EIA identified the need for additional information, analysis and/or clarification with regard to coastal processes, sea level rise, storm surge, resilient design, water quality and greenhouse gas emissions. As detailed below, it is our view that the impact assessments for these subject areas are not sufficiently detailed or site-specific. Sound decision making for a major development project such as the one proposed for Lighthouse Point should be based on a complete and robust assessment of project alternative impacts.

Coastal Processes

The EIA's review of existing coastal processes states "Baseline information is founded mostly on historical aerial photographs and verbal conversations with local residents familiar with the area." A more comprehensive study of littoral transport and shoreline evolution would typically be performed to inform existing conditions and the evaluation of proposed shoreline enhancement/management alternatives.

The proposed beach area enhancements include "Coastal stabilization structures…limited to upland areas only above the mean high water (MHW) line to contain the beach areas and minimize erosion." Further clarification on the need for these structures should be provided as it is stated "All these areas are relatively stable sand beach areas that naturally hold and accrete sand." The use of rock groin structures poses additional impacts in loss of beach habitat. A comprehensive study of coastal processes should be undertaken to inform the need for coastal stabilization structures above MHW in areas of beach expansion. Estimates of longshore sediment transport rates and beach change with and without the proposed structures would help determine the need for and potential influences to adjacent shorelines.

The location of the two bottom-mounted acoustic Doppler current profiler (ADCP) instruments is needed to better understand/interpret the wave and current data presented in the EIA.

In presenting impacts to beach enhancement areas, the EIA states "The expansion of beaches could have secondary impacts on some nearshore hardbottom, corals and submerged aquatic vegetation if subsequent shoreline erosion takes place." A cross-shore sediment transport model or related analysis would typically be conducted to assess the footprint and thickness of sediment transported from the beach to the nearshore zone during storm conditions. This is needed to better quantify potential secondary impacts of beach fill spreading on nearshore hardbottom, corals and submerged aquatic vegetation habitats.

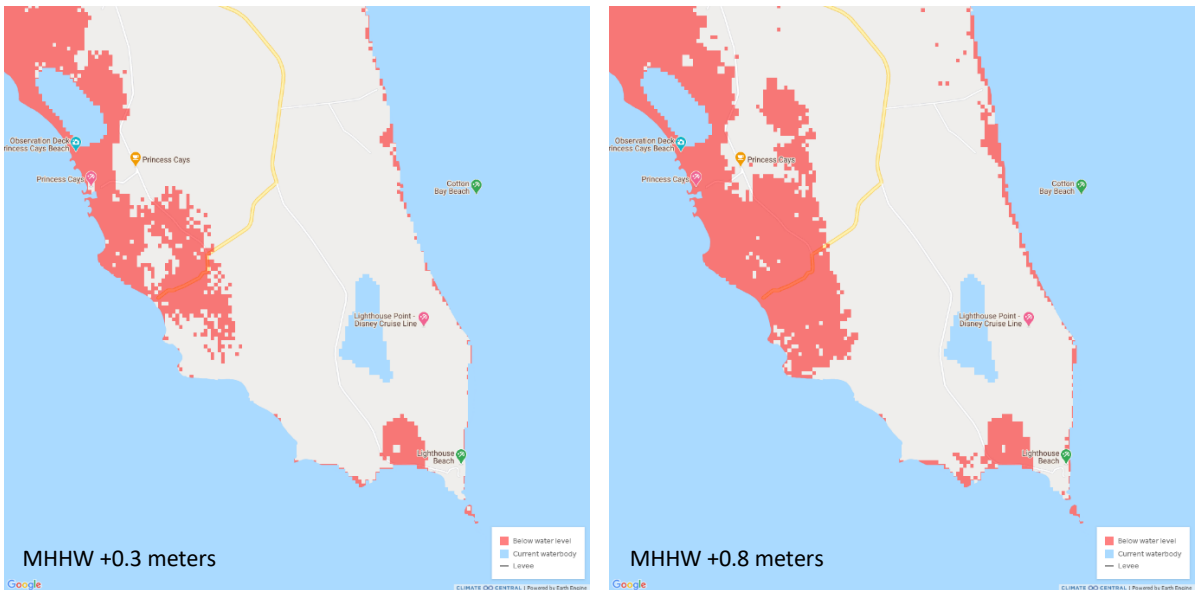
Sea Level Rise, Storm Surge and Climate Resilient Design

It is appropriate to assess the impacts of climate-related hazards over the design life of the project. Increasingly, states are requiring these types of assessments in environmental review for projects, and the Council on Environmental Quality recently re-released "2016 Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews" signaling broader commitment to incorporating these impacts into project decision-making.

Since the project has a stated design life of 50 years, the planning horizon for assessment should be approximately 2070 (2080 if construction is anticipated through 2030). The EIA uses a sea level rise projection of 1.0 foot relative to 2017 levels over the 50-year design life of the Project. Although this projection aligns with the projections presented in the 2014 Bahamas Second National Communication to the UNFCCC, it is not consistent with the current state of the practice in sea level rise planning.

Current best practice is to develop local sea level rise projections using the "K14" (Kopp et al., 2014) approach which provides conditional probability distributions for different greenhouse gas emissions trajectories and enables integration of these probabilistic projection into different scenarios to support asset planning and decision-making. This is the approach applied in the Fourth National Climate Assessment (Sweet et al., 2017) for the United States, adopted by multiple states for climate planning (including Massachusetts, California and New Jersey), and also used by Climate Central to develop projections for the Caribbean (Strauss and Kulp, 2018).

For example, the Climate Central probabilistic sea-level projections for Settlement Point, Bahamas are 0.28 to 0.32 meters above the baseline (year 2000 mean sea level) for the range of 2050 emission scenarios and 0.54 to 0.83 meters above the baseline for the range of 2100 emission scenarios. Thus, the 1.0 foot relative to 2017 used in the EIA is likely on the low end of possible sea level rise projections over the stated design life even when not accounting for contributions from ice sheet melt. The EIA should present the range of potential sea level rise scenarios over the project design life overlayed with the development plan in order to visualize the potential impacts. For instance, the following figures show areas of inundation 0.3 meters and 0.8 meters above the present local mean higher high water (MHHW). Review of these maps suggests that the proposed South Family Beach area south of Shad Pond and White Pond is particularly vulnerable to future tidal inundation over the stated life of the development.



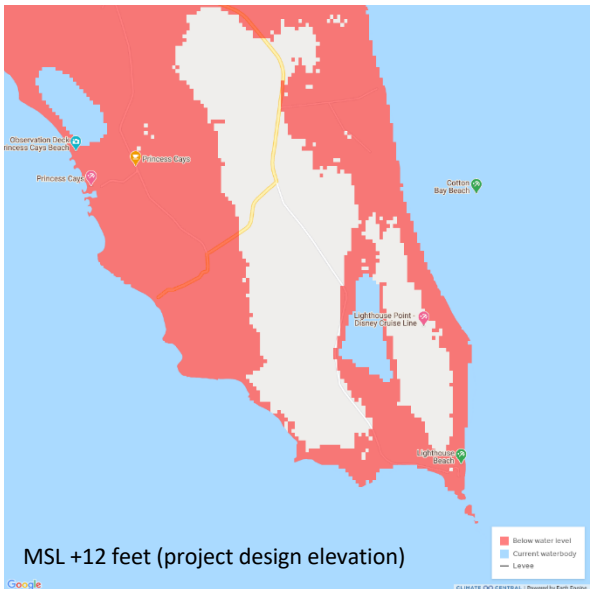
For regional context, the Southeast Florida Regional Climate Change Compact (the Compact) released updated Unified Sea Level Rise Projections in 2019. The Compact states that "by 2070, sea level is projected to rise 21 to 54 inches above 2000 mean sea level" (MSL) and recommends that projects with a planning horizon up to 2070 plan for sea level rise between the IPCC Median and NOAA Intermediate High scenarios (21 to 40 inches or ~0.5 to ~1.0 meter above 2000 MSL).

As noted in the EIA, storm surge is a significant vulnerability for Lighthouse Point, which experiences hurricane-related impacts once every 2.85 years and a direct hit once every 9.57 years, on average. The quantitative review of recent storm events in the EIA does not include Hurricane Dorian and its impacts on Eleuthera. Hurricane Dorian is noted as having a major impact in the Bahamas, but storm surge is not provided for comparison to other events. This would provide an additional (and recent) historical account of the potential flood risk at Lighthouse Point to better inform design criteria, siting of critical infrastructure, fuel and chemical storage areas.

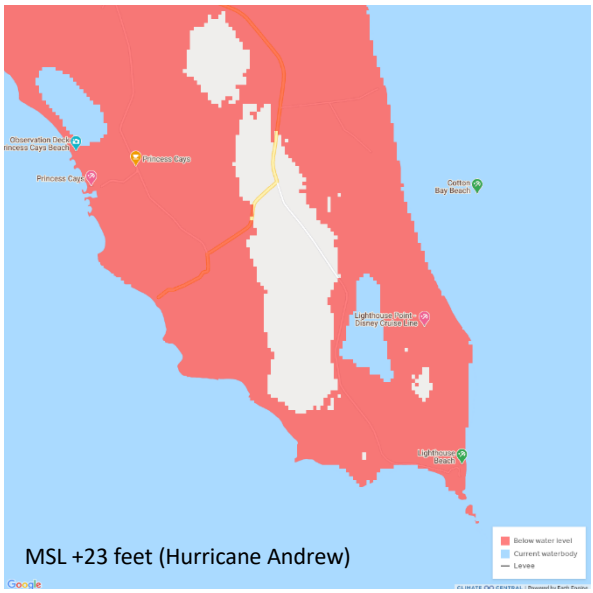
A map of potential storm surge with projected sea level rise over the 50-year design life of the project should be included in the EIA. Potential sources of probabilistic extreme storm water levels for the area include the recent US Army Corps of Engineers South Atlantic Coastal Study or FEMA's South Florida Study. Project elements overlayed on this map would help to determine the need for a more detailed vulnerability assessment.

The EIA states that the Project will be designed to "withstand any impacts due to climate change" but specifies only that structures will be elevated at or above elevation 12 ft MSL. According to the project site tidal datums reported in the EIA, 12 ft MSL correlates to approximately 10.5 ft above MHHW. This vulnerable area should be overlayed with project development plans to determine the vulnerability of project elements, and the return period of such a storm event should be stated in order to assess risk. Initial mapping suggests that, contrary to the EIA's statement regarding locating development above vulnerable areas, project related development is proposed within this vulnerable area at or below 12 ft MSL, as shown below.

The stated design flood elevation of 12 ft MSL is also lower than stated historical storm surge levels. A complete assessment of storm surge vulnerability would include, at a minimum, a map of the inundation from the surge associated with the storm of record or the results of NOAA Sea, Lake and Overland Surges from Hurricanes (SLOSH) model results for the area. Based on the storm surge reported in the EIA from Hurricane Andrew (1992), a 23 ft storm surge at Lighthouse Point would overwhelm the project area as shown below. Careful consideration of storm-related vulnerabilities is critical to making planning and design decisions in areas that are exposed to hurricanes.



MSL +12 feet (project design elevation)



MSL +23 feet (Hurricane Andrew)

Since there is present risk of flooding and damage, which will be accentuated in the future with climate change, the impacts due to climate change should be estimated for the stated design flood elevation for the Project. We recommend appropriate design flood elevations for roadways, buildings and infrastructure be developed based on a review of the storm of record as well as an assessment of regional sea level rise, probabilistic extreme storm water levels, and extreme wave conditions. It was noted that extreme wave conditions were not quantified in the EIA. A review or study of expected extreme wave conditions is needed to ensure resiliency measures and structures will be designed to withstand wave forcing (in addition to wind and storm surge levels).

Water Quality

For the proposed Reverse Osmosis (RO) water treatment facility, the EIA states "Brine that is a by-product of the RO system will be discharged through groundwater injection or offshore, pending final Project design." Depending on the method selected for discharge, there will be impacts to groundwater resources and/or nearshore water quality. The EIA should clarify these potential impacts and, pending the selected design, the zone of influence or mixing zone should be determined in the receiving water to quantify the impacts and the potential need for mitigation measures, such as diffusers and/or locating the discharge to minimize resource impacts.

Greenhouse Gas Emissions

The EIA states that the Project will not have a "material impact" on climate change and estimates Project related greenhouse gas emissions at 3,100 metric tons CO_2 per year, but there is no detail provided to substantiate this estimate or put it into context to evaluate the materiality of the impact. It is unclear what emissions are included in this figure.

Standard guidance in many states requires project proponents to calculate the greenhouse gas emissions related to project operation (an in some cases from construction). The types of emissions typically quantified fall into two categories – Scope 1 and Scope 2. Scope 1 emissions are direct emissions that occur on site from sources that are owned or operated by the organization (e.g. fuel combustion for heating, from company owned vehicles, or gas-powered landscaping equipment). Scope 2 emissions are indirection emissions that are associated with the use of electricity or steam generated off-site.

Scope 3 emissions include those emissions not in Scope 1 or 2, not under the direct control of the organization but related to its operation (e.g. employee commuting, supply chain, visitor trips, solid waste management). Although Scope 3 emissions are generally not required in EIA greenhouse gas assessments, they can represent a large portion of overall project life cycle emissions depending on the nature of the project. At a minimum, the EIA should define the boundary of the emissions calculation, detail the assumptions used in the calculation of Scope 1 and 2 emissions, and address (at least qualitatively) Scope 3 and construction-related emissions.

The EIA states that the Project will reduce carbon emissions by incorporating sustainable design, building, and management practices. Aside from a commitment to 30% renewable energy, no project specific sustainability initiatives or certifications are noted. More detail on the Project's sustainability commitments should be provided. For instance, design and management choices may impact energy use, water use, material consumption and/or waste generation, and ultimately Project-related emissions.

Summary

In summary, based on the review of those EIA elements that align with Woods Hole Group's technical expertise and experience preparing similar environmental documents for state and federal applications in the United States, we conclude that more detailed and site-specific data and analyses are required to complete this EIA. Without this additional information, it is not possible to evaluate or substantiate the claims the proponent has made in the document as submitted March 2021. Woods Hole Group would welcome the opportunity to discuss these technical recommendations with the proponent.

Respectfully submitted,

Matthew Shultz, P.E.
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References

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