



**Review of the Environmental Impact Assessment (EIA) for
Proposed Beach Nourishment and Installation of Six (6) Groynes at
Sandals Negril, Norman Manley Boulevard, Hanover**

**EIA done by:
Environmental Solutions Limited**

Review prepared by:

Jamaica Environment Trust
123 Constant Spring Road, Unit 5
Kingston 8

**With technical assistance from the
Environmental Law Alliance Worldwide**
Eugene, Oregon
USA

December 2019

This document contains the professional opinion of the Jamaica Environment Trust (JET). In arriving at our opinion, we made every reasonable attempt to ensure that our resource persons are informed and reliable and experts in the area in which their comment and analysis is sought. JET encourages readers to apply their own critical analysis to the information provided in this document and by others, particularly where JET's opinion differs from those others.

With technical assistance from the Environmental Law Alliance Worldwide (ELAW) in Eugene, Oregon, the Jamaica Environment Trust (JET) reviewed the Environmental Impact Assessment (EIA) for proposed beach nourishment and installation of six (6) groynes at Sandals Negril, Norman Manley Boulevard, Hanover by Environmental Solutions Limited (ESL).

Our review of the EIA is outlined below:

General Comment

The first line of page 1 of the EIA states:

*“Environmental Solutions Limited (ESL) was contracted by Sandals Negril Limited (SNG) to undertake an Environmental Impact Assessment (EIA) **in support** of an environmental permit for a proposed beach nourishment and groyne installation project at the Sandals property in Negril, Hanover.”*

As a matter of principle EIA’s should be impartial and assess the environmental risks of a project and possible alternatives. EIA consultants should not be stated to be “in support” of anything, but instead should present a balanced view of the potential impacts of a proposal. **JET finds it extremely worrying that this type of language is being used to describe ESL’s assessment of the Sandals project.**

Additionally, there are four main concerns regarding the proposed project:

1. The impacts of the project on other sections of the Negril coastline have not been adequately assessed, and it is not in line with the Wider Negril Beach Restoration (WNBR) Project

Page 117 of the EIA states:

“Based on the analysis of alternatives that was conducted, it was concluded that the “Do Nothing” alternative would result in further loss of the SNG coastline which would have far reaching economic implications for the hotel.”

The EIA assesses only the benefit of the project in addressing the coastal erosion at the Sandals Negril property, rather than the entire beach ecosystem.

As stated on page 3:

“...the issue of the eroding coastline has increasingly become a concern for many hoteliers, as well as the government, since Negril is a major contributor to Jamaica’s tourism industry”

The EIA has failed to state why the proposed approach by Sandals Negril should be prioritized at this time, or in the context of the well documented accelerated coastal erosion along the entire stretch of Negril coastline. While vaguely mentioned and illustrated in the sections of the report which look at historical features of the area and the beach, the EIA fails to underscore that part of the reason that the section of Long Bay, where Sandals Negril is situated, is facing such significant coastal erosion has to do with where it is located - at the northern most part of Long Bay, in the lee of the Rutland

Point and artificial headland, updrift of natural sediment flows. This section of the bay historically has had a comparatively narrow beach width, and little barrier or dune system to support landside beach replenishment. In contrast, there are other sections of Long Bay where sand accretion takes place. Any effort to combat coastal erosion in Negril must consider the entire beach ecosystem; however little consideration has been given in the EIA to the impact the proposed project will have on sections of the coastline outside of the study area. **Insufficient evidence has been provided to assess the potential negative impact installation of the groynes will have on sediment accretion along adjacent sections of the Negril coastline.**

Additionally, the use of hard structures to combat coastal erosion, like the groynes being proposed, is not in alignment with the overall intentions of the Wider Negril Beach Restoration (WNBR) project (Appendix 12.10 of the EIA), which calls for only nourishment as the initial intervention on the beach.

2. The groynes are unlikely to work as portrayed and may exacerbate erosion downstream

Figure 5-3 on page 31 of the EIA illustrates the projected scenario for the project:



Figure 5-3: Proposed plan with beach nourishment and six groynes (Olsen, 2019)

The groynes are unlikely to work as illustrated above, as this projection is inaccurate in two critical ways:

- i. *It does not portray the uneven pattern of sand accretion and starvation that inevitably arises around structures that extend out perpendicular from a beach.*

In their 2014 book *The Last Beach*, Andrew Cooper and Dr. Orrin Pilkey – one of the world’s foremost experts on coastal geology and the impacts of development on beach ecosystems – describe groynes as follows:

“Groins, usually made of concrete, wood, stones, or steel, are as widely used as seawalls. Built perpendicular to the shoreline, these structures trap sand flowing along the beach and widen the beach on the updrift side of the structure, but they reduce the sand flow to adjacent downdrift beaches.

[...]

Because of the erosion caused by groins, adjacent property owners are often forced to install groins in self-defence, all of which eventually leads to large numbers of groins (a groin field) on a shoreline reach.

[...]

Groins create other problems for beaches besides downdrift erosion. Like seawalls, groins are ugly, at least relative to an un-engineered natural beach. And groins, like any coastal-engineering structure, need maintenance, an often-ignored fact. Lack of maintenance leads to a beach littered with fragments of wood, stone, or concrete scattered about that sometimes endanger swimmers. Groins present an obstacle to walking or jogging on beaches, and people require skills in rock climbing to move from one groin compartment to another.

[...]

During big storms, currents parallel to groins are strengthened by the weather conditions and tend to carry large amounts of sand out to sea, adding to the beach-erosion problem.”¹

O'Brien, P (2019) also describes the effect of groynes this way:

“Groynes cannot prevent the significant cross-shore erosion that typically occurs during storms. Nevertheless, they have an indirect effect in that by having trapped sand on their updrift side, they have created a wider beach and an enhanced erosion buffer on that section of foreshore. However, on the depleted downdrift side, the foreshore is more susceptible to storm erosion due to the depleted beach/buffer width.

Consequently, the construction of a groyne does not in itself resolve the erosion problem, but merely transfers it further along the beach.”²

The descriptions from these experts are depicted in these two photos of groynes in Australia and England³:



For groynes to work as portrayed in Figure 5-3 of the EIA it would mean constructing these unchanging structures in a dynamic system while expecting sand to suddenly stop moving along the coastline - which is illogical. In fact, it is very likely that the construction of the groynes will reduce the accretion of sand downstream, exacerbating coastal erosion in other parts of the coastline.

¹ Pilkey, O. H. and J. Andrew G. Cooper. 2014. *The Last Beach*. Duke University Press. 237 pp. pp. 55-57.

² O'Brien, P. 2019. *Groynes – for what purpose?* <http://www.coastengsol.com.au/groynes-for-what-purpose/> Accessed 28 November 2019.

³ *Ibid.*

- ii. It does not account for the sea level rise or larger return-period storms associated with climate change

In a 2018 study of climate change in the Caribbean using the tide gauge in Port Royal, Jamaica, researchers at Climate Central determined that even under the low emission scenario from the Intergovernmental Panel on Climate Change (RCP 2.6), sea levels are projected to rise nearly 0.3 metres over the next 30 years.⁴

The EIA includes a projection of sea level rise for 2025 in the area on page 93, stating:

“Negril is already highly susceptible to climate-related hazards (being affected by coastal erosion during normal conditions and hurricanes, and flooding) and therefore, it stands to reason that climate change will only exacerbate the current trends and their impacts on Negril’s coastal system.

The report [The State of the Jamaican Climate (2015)] also states that by 2100, a 25-year storm surge event is projected to reach elevations of 1.42 m, and a 100-year event could reach 1.64 m. This will more than likely result in inundation of coastal hotels as well as lands in the Great Morass.”

A map illustrating this point (Figure 7-2) is also included on page 94:

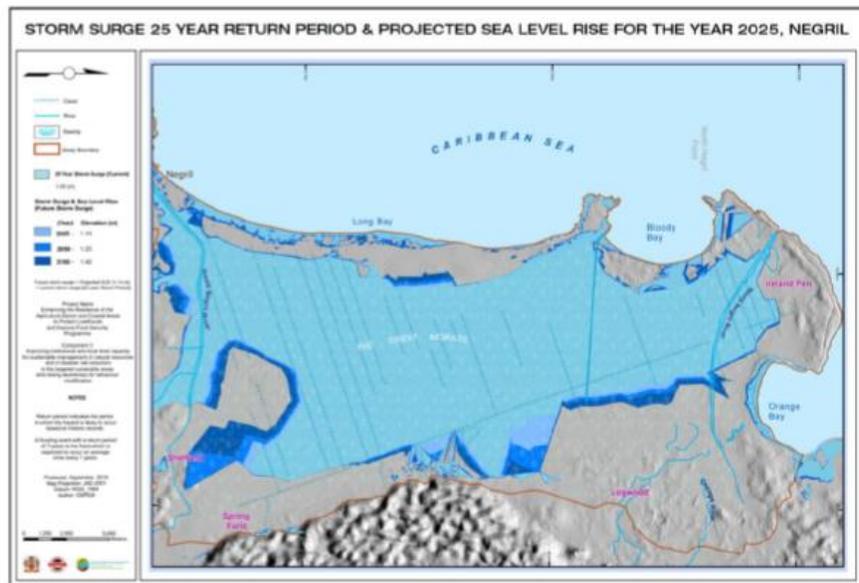


Figure 7-2: Map showing impacts of 25-year storm surge event (light blue) and future storm surge event under projected sea level rise for the year 2025, Negril. (Source: ODPEM 2015)

The conclusion that coastal hotels in the project area will be inundated within a reasonable planning timeframe is straightforward; however, the EIA stops short of addressing how this predicted sea level rise will affect the success of the proposed groyne and beach nourishment project. It is also unclear why, given this prediction, the proponents would invest in this project,

⁴ Strauss, B. and S. Kulp. 2018. *Sea-Level Rise Threats in the Caribbean: Data, tools, and analysis for a more resilient future*. Climate Central, Princeton, NJ, USA. 25 pp. <https://sealevel.climatecentral.org/uploads/ssrf/Sea-level-rise-threats-in-the-Caribbean.pdf> Accessed 4 December 2019.

as it seems almost doomed to failure in the medium term. Scientists are now advising coastal communities to begin an organized retreat from the coast,⁵ and this project runs contrary to that wisdom.

The EIA then goes on to recommend mitigation responses to predicted sea level rise on page 94:

“Mitigation – SNG/ Long Bay area

As outlined above, climate change is likely to impact the entire Negril coastline including the project area. As such, the following mitigation measures suggested are to increase the resilience of the project area to climate change:

- *Maintain and, where possible, enhance the beach system and its capacity to reduce loss of sediment from the beach area, and hence, reduce the rate and amount of erosion. In this context, the impacts of the proposed interventions in Long Bay are positive;*
- *Ensure seagrass meadows, in which most of Negril’s beach sand is created, are not impacted. Where seagrasses are affected, ensure that, at a minimum, the same area of functional seagrass is created in the nearshore area, by relocation and/or planting, along with the relocation of associated fauna and other organisms. The proposed concept is not expected to result in significant losses of seagrass.”*

The EIA’s claim that the proposed interventions will produce positive results run counter to logic if one closely examines Figure 7-2 (previous page). The spit of land that runs between Long Bay and the Great Morass appears extremely vulnerable to coastal inundation under the 2025 scenario, with threats apparent on both sides. **It is unclear how the groyne and beach nourishment project could ever hope to counter the projected sea level rise or any storm surge event in the study area.**

Additionally, the EIA does not include modelling which considers larger return-period storms as are now expected with climate change; page 21 states:

“[modelling] does not include the likely response if tropical storms occur”

As a result, the impact that more frequent storms of greater intensity might have on the effectiveness of the proposed project versus a beach nourishment only alternative has not been assessed.

3. The groynes are likely to cause substantial problems, including negatively impacting seagrass beds and exacerbating existing water quality issues in bathing areas

i. Seagrass

Loss of seagrass coverage in Negril has been found to be one of the main factors contributing to a reduction of carbonate sediment production which has accelerated coastal erosion in the area.

Page 39 of the EIA states:

“Mitchell et al. (2000) analysed Negril beach sediment (collected in 1990 and 1999) composition. The following was noted:

⁵ Siders, A. R., M. Hino and K. J. Mach. 2019. The case for strategic and managed climate retreat. *Science* 365(6455): 761-763. DOI: 10.1126/science.aax8346

- *The non-skeletal components are dominated by amorphous and crystalline grains;*
- *The skeletal grains are characterised by abundant foraminifera with smaller amounts of red algae, bivalves and Halimeda (green algae). Grains derived from corals were absent;*
- *The skeletal grains indicated that the carbonate sediment was produced primarily in the shallow water inner shelf, which is characterised by extensive Thalassia seagrass meadows and carbonate sand substrates.*

Khan and Robinson (quoted in SWIL, 2007) also concluded that carbonate sediment production in Negril is predominantly a result of the green algae Halimeda; foraminifera (typically Archaia), and epibionts generated in Thalassia seagrass meadows.

Mitchell et al. (2000) also noted that with the increase in development in the Negril area, there has been an increase in nutrient influx to the marine system that has resulted in the decline in the coral reefs. Similarly, there has been a decline in the Thalassia meadows with the replacement of Thalassia by fleshy algae due to nutrient influx and removal and/or damage by the tourism industry...

... data suggest that Negril has a low sediment production rate. Therefore, coupled with increased erosion and loss in seagrass area, erosion of the coastline is likely to be greater than the accretion of the Negril coastline."

Page 41 then goes on to reference a 2007 Smith Warner International Limited study⁶ which found: *"The extensive seagrass beds in the nearshore areas [...] provide additional resistance from erosion compared to bare sand. Erosion in the model was prevented in seagrass areas, while deposition of sediments could still take place."*

Despite the EIA's recognition of the critical role seagrass plays in combating coastal erosion in Negril, the proposed project will potentially impact between 32m² and 76m² of seagrass and associated benthic organisms within the vicinity the groynes and beach area to be nourished.⁷

Page 90 of the EIA recommends relocation as a mitigation measure to address any seagrass removal; however, no relocation site has been selected, suitability study conducted, or funds allocated for this effort. Additionally, although relocation of seagrass can be done, success rates for this strategy are very low. A 2012 review of all the seagrass restoration projects conducted in Europe (~ 200) found that none of them were successful.⁸ A mitigation strategy which involves moving seagrass to another site is wholly inadequate. Seagrass relocation falls far short of ensuring its survival or restoring its function and the EIA provides only a superficial nod to any proposed

⁶ SWIL, 2007. *Preliminary engineering report for beach restoration works at Negril, western Jamaica. Smith Warner International Ltd for Negril Coral Reef Preservation Society*

⁷ EIA, page 90

⁸ Cunha, A. H., Marbá, N. N., van Katwijk, M. M., Pickerell, C. , Henriques, M. , Bernard, G. , Ferreira, M. A., Garcia, S. , Garmendia, J. M. and Manent, P. (2012), *Changing Paradigms in Seagrass Restoration. Restoration Ecology*, 20: 427-430. doi:10.1111/j.1526-100X.2012.00878.x

relocation effort. **The EIA therefore does not adequately assess the impact of the project on seagrass nor does it consider appropriate mitigation measures.**

Figure 3-5 on page 15 of the EIA illustrates where the location of the seagrass beds is in relation to the proposed groynes:

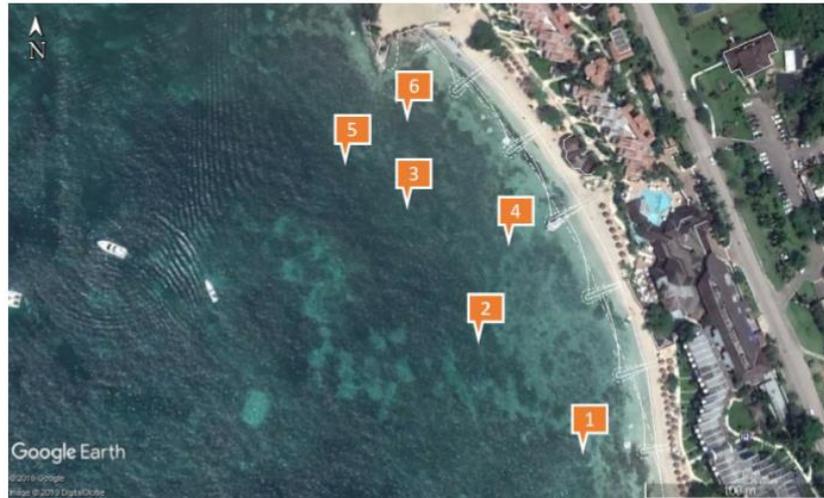


Figure 3-5: Locations of surveys for benthic seagrass assessments (Modified from Olsen, 2019)

The proximity of the seagrass beds to the proposed groynes calls into question the EIA's conclusion that the project will be low impact in this regard. There is also no guarantee that if the groynes fail, there will not be pressure to build them out further, affecting even more seagrass habitat.

The assertion by the EIA that there will be little impact to seagrass also runs contrary to comments made on page 97:

“7.3 Cumulative Impacts

[...]

Biological

[...]

- *Continued loss of seagrass will exacerbate historical reduction in sediment productivity due to physical removal and increased nutrient load in seagrass meadows.*
- *Seagrass degradation also results in biodiversity loss and a loss of ecosystem services provided by seagrass, for example, carbon sequestration, and shoreline stabilisation.”*

This section of the EIA is accurate in suggesting that the continued loss of seagrass is serious and likely to happen. **Seagrass, which provides a critical habitat for juvenile fish and invertebrate species, buffers the local impacts of ocean acidification, sequesters carbon, and stabilizes the shoreline from erosion, is at risk of being destroyed by the boulders used to construct the groynes, or smothered by sand being transported offshore by currents created by the introduction of the groynes.** Incidentally, these impacts are not cumulative—they are a direct outcome of this project.

ii. Water Quality

The EIA outlines existing problems encountered with water quality in the study area on pages 58 and 59:

“6.1.5 Sources of existing Pollution

Extensive algal growth along the shoreline of Sandals was observed during the water sampling exercise indicating nutrient-rich (nitrates and phosphate) effluents are impacting this area. Enterococci, a bacteria found in the gut and whose presence in the environment indicates fecal contamination, was also detected in the water sample collected at sampling station WQ4 (Figure 3-1).

The storm drains may also be the source of the nutrients impacting the shoreline of the Sandals property. The consultants strongly suggest the client determine the sources of both the bacteria and nutrients. The characterisation of the effluents from the stormwater drain pipes should be the first step in determining if they are the source of both the enterococci and the nutrients impacting the sea.

The continued influence of nutrient-rich effluents will encourage the growth and proliferation of algae which will result in a deterioration water quality, affect coral growth and negatively impact the quality of the marine environment. There will also be an additional economic cost for the continued removal of algal growth from the water body. The presence of enterococci in the water (although low) should also be closely monitored. The presence of these microorganisms also suggests that other potentially more harmful microorganisms such as E coli may also be presence. Fecal contamination poses a serious public health risk.”

This water quality problem must be solved before the groyne construction project is approved, because the currents generated by the groynes can affect water circulation patterns, potentially trapping dangerously polluted water for longer periods of time in swimming areas. Incidentally, this polluted water, which is high in nutrients, can also generate harmful algal blooms that make swimming impossible. High nutrients that promote algal growth can also negatively impact seagrass beds and as a result, further exacerbate coastal erosion in the area.

It is also unclear what is meant by “wash water will need to be disposed of appropriately” on page 102 of the EIA, in reference to the sand to be used in the beach nourishment. The intended method and location of disposal of this wash water should be clearly stated.

4. The proposed beach nourishment raises additional concerns

As Pilkey and Cooper (2014) state:

“Beach replenishment, ironically, may be the single most important cause of beach loss in the future. Replenishment is a never-ending cycle of beach repair, which allows buildings to increase in size and height. Mom-and-pop beach cottages give way to high rise condos, and the monetary value and political clout of the community both increase. The idea of moving buildings back or demolishing them in order to preserve the beach is rarely even a consideration. Sooner or later, as the sea level rises or as sand supplies give out, seawalls arrive on the scene and eventually lead to the demise of the beach.

[...]

*Like hard engineered structures (see chapter 3), much of the design of replenished beaches and their environmental impacts are based on mathematical models. In numerous court cases, the failings of models and the uncertainties behind them have been pointed out to no avail. Judges are informed by agency or consulting engineers defending the projects that the models are sophisticated and state-of-the-art, and it's hard for a judge to get beyond that.*⁹

This project is likely to lock either the Jamaican government or the project proponent into an expensive, unending, ecologically damaging beach nourishment management programme

Conclusion

In summary, groynes and beach nourishment have been tried in many countries around the world, and the balance of the evidence suggests that the models are uncertain and the outcomes therefore highly unpredictable. In the case of the proposed beach nourishment and installation of six (6) groynes at Sandals Negril, the EIA and project proponents have not acknowledged the basic and well-known principles of beach and shoreline dynamics, most significantly that groynes cause a distinct accretion-erosion pattern, and that any beach nourishment efforts are going to require never-ending maintenance. Further, the risks of sea level rise have been downplayed, promoting a sense of false security, even though the EIA indicates that coastal hotels will be inundated within a fairly short time frame. Additionally, the substantial and significant threat from the proposed project to valuable and vulnerable seagrass beds have not been substantially addressed in the EIA.

Proposals to combat coastal erosion in Negril should not be considered by the National Environment and Planning Agency (NEPA) in isolation. The problem of accelerated coastal erosion in Negril can only be effectively addressed if approached in a programmatic way as part of a broader coastal zone management strategy. A piecemeal approach to addressing the problem is unlikely to achieve success and the proposed project is in fact likely to perpetuate the problem of coastal erosion by sending it downstream.

**Jamaica Environment Trust
December 5, 2019**

⁹ *Pilkey & Cooper, pp. 89-93.*