



**Review of the Environmental Impact Assessment (EIA) for the  
Whim Estates Housing Development  
Old Harbour, St Catherine, Jamaica**

**EIA done by:  
Environmental Solutions Limited**

**Review prepared by:**

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**With technical assistance from the  
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***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 the proposed Whim Estates Housing Development in Old Harbour, St. Catherine by Environmental Solutions Limited (ESL).

Our review of the EIA is outlined below and primarily focuses on the potential impact of discharged sewage effluent and other pollution from the proposed housing development on nearby Portland Bight Protected Area mangrove wetlands.

## **Description of the Biological Environment**

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Chapter 6 of the EIA pertains to the aquatic life which could potentially be impacted by the development, including aquatic flora:

### *“6.2.1 Flora*

*...4. Dry stream bed (Bower’s Gully) – The Bower’s Gully is an intermittent stream in the region of the project site but has permanent flows in its upper and lower reaches. The stream flow regularly returns during periods of heavy rains and can continue for a few days to a few weeks afterwards depending on the amount of rainfall and the height of the water table. The woodland along the banks of the stream was dominated by very large Guango trees which grow on either side of the stream beds and provides shade cover over much of the river. Thick clumps of common bamboo *Bambusa vulgaris* and giant reeds *Arundo donax* also grow in sections along the edge of the stream. Several species of vines and other grasses such as African star grass *Cynodon nlemfuensis* also grow in the southern parts of the stream bed. It should be noted that the northern section of the stream appears to have been recently widened and trained into a more straightened channel form (Figure 6.6). The middle portion also showed evidence of the use of heavy equipment, but this section had not been channelised, while some sections show evidence of removal of sand from the stream bed (Figure 6.7). The southern part of the stream is thickly overgrown with grasses and vines which suggest that this area receives inflows of water more often than the northern part of the riverbed. The eastern and southern sides of the entire site are bounded by a drainage channel. This channel contained running water (at the time of these surveys) and support additional aquatic vegetation which is not currently present in the Bower’s Gully such as Reedmace *Typha domingensis* and Water Pennyworts *Centella asiatica*.*

### *6.2.2.6 Fish*

*The aquatic vegetation growing in the drains along the eastern and southern side was very dense and would probably make it difficult for fish to survive, however, a small open area near a bridge provided space for a few Mosquitofish, *Gambusia* sp. and probably the endemic Black-bellied *Limnia melanogaster* as well. Additionally, in the south-western corner of the site, there was a bridge over the southern canal with a concrete weir with a plunge pool that appears to allow excess water from the drainage ditch to flow over the weir and into the Bower’s Gully. No standing water could be seen in the ditch or the gully at this point, however, the plunge pool contained water with fish occasionally turning at the surface. This could have contained several species of fish, however, the only species identified was the African Perch or *Tilapia Oreochromis mossambica* formerly known as *Tilapia mossambica*.*

### 6.2.3 The Portland Bight Protected Area

*This development is located within the boundaries of the Portland Bight Protected Area (PBPA) (Figure 6.8). It is Jamaica's largest protected area and has been in existence since April 1999. The management of Jamaica's proposed system of protected areas is the responsibility of the National Environment and Planning Agency (NEPA) and their policy is to delegate some of this responsibility to local non-governmental organisations (NGOs). The Caribbean Coastal Area Management (C-CAM) Foundation is a local environmental NGO that has been delegated some management responsibilities within the PBPA since 2003. The site of the Whim Estate is not located within or near to any area that is currently designated as highly ecologically sensitive or has been zoned for any sort of special protection under the PBPA management plan.*

The proposed site of the Whim Estates Housing Development is bounded to the west by the Bower's Gully. The Bower's Gully features heavily in the EIA; the development includes realignment of the gully and there is also a plan to discharge treated effluent from the Whim Estates wastewater treatment plant into the gully. Therefore, **the statement "Whim Estate is not located within or near to any area that is currently designated as highly ecologically sensitive or has been zoned for any sort of special protection under the PBPA management plan" is misleading. Bower's Gully will connect Whim Estates to ecologically sensitive areas with the PBPA, including mangrove wetlands where Bower's Gully meets the sea, as depicted in the satellite image below:**



## Water Quality in the Bower's Gully

The EIA presents limited information on surface water quality but does include some water quality data for Bower's Gully - from a site at the southern edge of the property (site WQ3), and another 2000 meters further downstream towards the sea (site WQ2). Some of this data is presented below:

Table 5.2: Water Quality Data for Whim Estates

| Parameters (units)                               | WQ1    | WQ2    | WQ3  | Draft Jamaica National Ambient Water Quality (WQ) Standard – Freshwater, 2009 |
|--|--------|--------|------|---|
| pH (pH units)                                    | 7.30   | 7.8    | 7.49 | 7.00-8.40   |
| Temperature (°C)                                 | 27.9   | 33.6   | 23.5 | -   |
| Dissolved Oxygen (mg O)                          | 1.85   | 5.88   | 0.66 | -   |
| Total Dissolved Solids (mg/L)                    | 923    | -      | 690  | 120 -300 mg/L   |
| Salinity (ppt)                                   | 0.71   | 38.7   | 0.66 | -   |
| Conductivity (µS/cm)                             | 1500   | -      | 1390 | 150.0-600 µS/cm   |
| Biochemical Oxygen Demand (mg O <sub>2</sub> /L) | 1.5    | <0.1   | 2.6  | 0.8-1.7mg/L   |
| Chemical Oxygen Demand (mg O <sub>2</sub> /L)    | 12     | -      | 6    | -   |
| Alkalinity (mg CaCO <sub>3</sub> /L)             | 354.67 | 162.67 | 267  | -   |
| Chloride (mg Cl <sup>-</sup> /L)                 | 338    | -      | 452  | 5.0-20.0mg/L  |
| Sulfate (mg SO <sub>4</sub> <sup>2-</sup> /L)    | 59     | 3000   | 38   | 3.0-10.0mg/L  |
| Nitrate (mg NO <sub>3</sub> <sup>-</sup> /L)     | 2.7    | <0.01  | 8    | 0.1 – 7.5mg/L   |
| Nitrate as Nitrogen (mg N/L)                     | 0.6    | 0.05   | -    | -   |
| Phosphate (mg PO <sub>4</sub> <sup>3-</sup> /L)  | <0.02  | 0.05   | 0.63 | 0.01-0.8mg/L  |

The dissolved oxygen content surface water at WQ2, which is closest to the sea, is already sub-optimal at only 5.88 mg/L, apparently affected by poorly oxygenated (0.66 mg/L) and nutrient rich (nitrate level of 8 mg/L) water from upstream.

Section 5.1.6 of the EIA summarizes the findings of the water quality testing:

*“...The concentrations of other parameters, such as nutrients and bacteria, suggest that the possible source of the organics may be sewage. The concentration of nitrates in a water body is used as an indicator of contamination by anthropogenic sources such as wastewater from sewage discharge and/or fertilisers from agricultural runoff. Phosphates are generally from similar sources as nitrates, but typically include trade effluent sources. Both nitrates and phosphates were highest in WQ3 water sample further suggesting possible sewage contamination;*

*Enterococci, Total and Faecal Coliform – Coliforms and enterococci bacteria levels were elevated in all samples, but greatest in WQ3. There is again a strong possibility that there is influence from a source of sewage at WQ3 as these microorganisms are indicative of recent faecal contamination;*

*...Dissolved Oxygen (DO) levels were highest at WQ2 (at 5.88mg/L).”*

**The Bower's Gully is already impaired by pollution, with limited capacity to assimilate additional loading of nutrients and organic matter. JET is concerned that additional load of effluent from the Whims Estate Housing Development will result in negative environmental impacts downstream, particularly in this section of the PBPA.**

## Wastewater Treatment and Mangrove Wetlands

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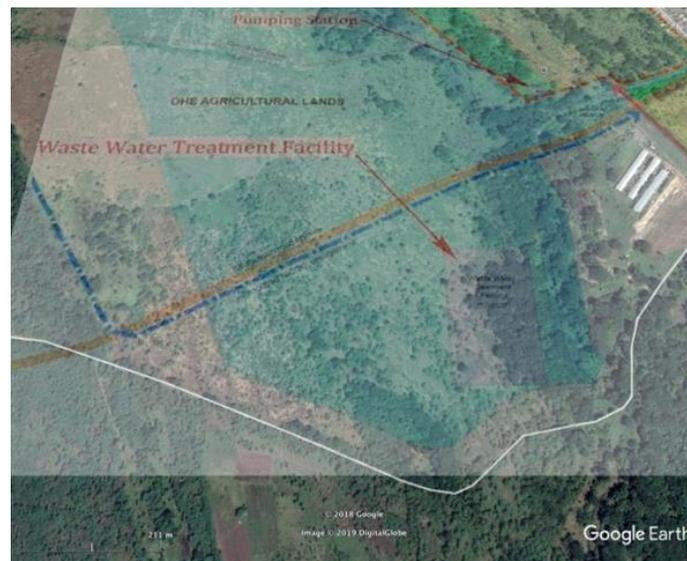
Section 4 of the EIA discusses components of the project that could impact aquatic life, including mangrove wetlands.

### *“4.6 Wastewater/Sewage Treatment*

*The wastewater treatment facility will be located on approximately 4 hectares of land to the southern section of the OHE, namely, Lot 3B (Figure 4.17). The wastewater from the development will be treated to the tertiary level by a series of waste stabilization ponds inclusive of anaerobic, facultative and maturation ponds with the final treatment step being a constructed wetland (Figure 4.18). The system is designed to meet specific requirements: firstly, a peak capacity of 788.65 m<sup>3</sup>/d; and secondly, NEPA’s sewage effluent standards.*

*“Primary treatment will occur at the head works located before the anaerobic treatment ponds. This will involve the use of 2 bar screens and grit channels to remove any solids. These screens will be cleaned manually, and the waste incinerated. Wastewater/sewage influent will be split into 2 anaerobic ponds (22.3m x 11.1m, 2.5m deep) each leading into a facultative pond (53m x 26m, 1.5m deep). From the facultative pond flows are sent through a series of 2 maturation ponds (57.5m x 28.8m, 1.5m deep). The flows are then combined from the second maturation ponds to lead into the constructed wetland (35mx11.7m- 0.8m deep). The system will also include an operator’s building and laboratory as well as parking facilities.”*

Figure 4.17 of the EIA shows the location of the Whim Estates Wastewater Treatment Facility, which has been overlain on Google Earth satellite imagery below:



#### “9.1.6 Sewage

*With regard to sewage generated during the construction phase, the developer and/or the contractor should ensure that waste from portable toilets and other temporary facilities is properly collected and disposed of.*

*Once the sewage treatment plant is constructed and operational, a monitoring programme is recommended for the treated effluent. The monitoring programme will allow the operators to assess the efficacy of the treatment systems and will allow for the detection of any abnormalities in the effluent quality.*

*In order to mitigate any adverse impacts from the sewage treatment and disposal system its location and design have been carefully chosen. The location of the system with its reserves, setback and landscaping will minimise any aesthetic impacts or odour nuisance.*

*The design of the system (anaerobic ponds and reed beds) will ensure a stable, conservative form of treatment that should consistently meet NEPA standards. The key to this is in its proper design, operation and maintenance. Monitoring of the plant and its effluent is also critical for early detection of any malfunction or decline in performance. Section 4.6 Wastewater/Sewage Treatment discusses the details of the facility.*

*The hydrology of the Bower's Gully into which the effluent will be discharged is stable except in times of very heavy rains. It is recommended to construct and maintain earthen berms around the wastewater treatment plant to prevent flooding, while not restricting effluent discharge.*

*The ecology of the Bower's Gully (water quality, flora and fauna) should not be adversely impacted by the effluent discharges. However, precaution should be taken by fencing the wastewater treatment plant to minimise access of any invasive species and animals.”*

**It is JET's opinion that the statement “*The ecology of the Bower's Gully (water quality, flora and fauna) should not be adversely impacted by the effluent discharges*” has not substantiated by information contained in the EIA.**

Aquatic life, including the mangrove wetlands such as those downstream of Bower's Gully and the Whim Estates, are sensitive to inputs of nutrients. In 2009 a group of marine scientists from three Australian Universities and the Smithsonian Environmental Research Center in the US published a study<sup>1</sup> showing how experimental application of additional nutrients (nitrogen and phosphorous) to mangroves at 12 locations around the world (including three sites in the Caribbean) caused mangrove mortalities, especially during periods of drought:

*“Nutrient enrichment of the coastal zone places intense pressure on marine communities. Previous studies have shown that growth of intertidal mangrove forests is accelerated with enhanced nutrient availability. However, nutrient enrichment favours growth of shoots relative to roots, thus enhancing growth rates but increasing vulnerability to environmental stresses that adversely affect plant water relations. Two such stresses are high salinity and low humidity, both of which require greater investment in roots to meet the demands for water by the shoots. Here we present data from a global network of sites that documents enhanced mortality of mangroves with experimental nutrient enrichment at sites where high sediment salinity was coincident with low rainfall and low humidity. Thus, the benefits of increased*

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<sup>1</sup> Lovelock, C. E., Ball, M. C., Martin, K. C., & Feller, I. C. (2009). Nutrient enrichment increases mortality of mangroves. *PLoS One*, 4(5), e5600. <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0005600>

*mangrove growth in response to coastal eutrophication is offset by the costs of decreased resilience due to mortality during drought, with mortality increasing with soil water salinity along climatic gradients.”*

The discharge into Bower’s Gully of treated effluent that complies with NEPA standards would still allow substantial quantities of nutrients to be discharged from the proposed project. The NEPA standards are shown below.

Table 2—Sewage Effluent Standards for Plants other than Existing Plants

| PARAMETER                       | EFFLUENT LIMIT   |
|---------------------------------|------------------|
| BOD <sub>5</sub>                | 20 mg/L          |
| TSS                             | 30 mg/L          |
| Total Nitrogen                  | 10 mg/L          |
| Phosphates (PO <sub>4</sub> -P) | 4 mg/L           |
| COD                             | 100 mg/L         |
| pH                              | 6-9 pH           |
| Faecal Coliform                 | 1000 MPN/100 ml. |
| Residual Chlorine               | 1.5 mg/L         |
| Floatables                      | not visible      |

Treated effluent from the proposed housing development could have total nitrogen levels of up to 10 mg/L; and phosphate levels of up to 4 mg/L. Water quality downstream of the development (at location WQ3) has relatively low levels of nutrients (nitrate and phosphate levels of 0.05 mg/L) that would be raised by treated effluent containing nutrients up to the levels of the NEPA standards.

**Discharging effluent containing these levels of nutrients into Bower’s Gully could have substantial deleterious impacts, especially considering that Bower’s Gully has low flows that could be dominated by treated effluent flows from the proposed housing development.**

**A wastewater treatment solution that would better protect aquatic life, including the PBPA mangrove wetlands downstream of the proposed Whim Estates, would be a commitment to a zero-discharge housing development rather than one that would discharge treated, nutrient-laden effluent into Bower’s Gully.**

JET also notes concerns raised by resident of Old Harbour Bay and Office of Disaster Preparedness and Emergency Management (ODPEM) Shelter Manager, Sandra Nembhard at the public presentation on the proposed Whim Estates Housing Development<sup>2</sup> about the impact of storm surge on Old Harbour Bay and surrounding areas:

*“Here (Old Harbour High) is where we host our shelter for the entire South Old Harbour Bay. Now we have New Harbour One, Two and Three and now we are going to have another development. So, it is going to be Four. This little tiny area cannot contain so many persons in case of an emergency... and the sea in Old Harbour Bay keep rising when there is a disaster*

<sup>2</sup> Verbatim Notes of the Public Presentation on the Proposed Whim Estates Housing Development [http://nepa.gov.jm/new/services\\_products/applications/eias/docs/StCatherine/Old%20Harbour/The\\_proposed\\_Whim\\_Estate\\_Stakeholder\\_Consultation\\_Verbatim\\_Report\\_23\\_A.pdf](http://nepa.gov.jm/new/services_products/applications/eias/docs/StCatherine/Old%20Harbour/The_proposed_Whim_Estate_Stakeholder_Consultation_Verbatim_Report_23_A.pdf)

*the sea rises, for those who are new, and the water will come in ashore... The Bower's Gully, next thing, when we had (Hurricane) Matthew, the Terminal area was devastated, all the water from New Harbour Four, that is the development going down by Hi-Pro, so that gully that they drill out, but in drilling out the gully I don't know technology, the word for it, they drill it out. But you know what they did, they drill it to take the water out of Four, Two and all of that, but they don't drill it directly into the sea. So, the water spread to Terminal and my God, the people suffer in Terminal. I am just saying, whenever this development is going to be done and anybody else, please take into consideration the water that comes from up here, needs to run off into the sea. And if you are doing the houses jam, jam, jam, and not doing the gullies and the drains, there is going to be trouble."*

JET shares the concerns expressed by Ms Nembhard. **JET strongly supports the position that any modifications made to the Bower's Gully and all other drainage work for Whim Estates must be the subject of a rigorous risk assessment. This risk assessment must consider downstream impacts of all Whim Estates drainage work, including the Bower's Gully modification, particularly in the face of sea level rise, unpredictable rainfall, and increased intensity of tropical storms and accompanying storm surge associated with Climate Change. If this assessment concludes the predictable risk of the proposed drainage work is at an unacceptable level, the Whim Estates developer must redesign the drainage works and implement any other necessary mitigative measures to reduce this risk to a minimal level.**

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**Jamaica Environment Trust  
May 13, 2019**