



# WATER RESOURCES AUTHORITY

ESTABLISHED BY THE WATER RESOURCES ACT, 1995

HOPE GARDENS, P.O. BOX 91, KINGSTON 7, JAMAICA  
TEL: (876) 927-0077, 927-0189, 927-0302, 977-4194, 619-1297  
FAX: (876) 977-0179, 702-3937

REF: DR 8-26

August 30, 2019

Chief Executive Officer  
National Environment and Planning Agency  
10 Caledonia Avenue  
Kingston 5

**Attention: Mr. Anthony McKenzie**

Dear Sirs,

**Re: Comments on Environmental Impact Assessment (EIA) for SML 173, St. Ann/Trelawny by Noranda/New Day Bauxite Mining Limited.**

Please see below a summary of comments from the WRA regarding the submitted EIA. Quotations from the EIA are in *italics*.

**Page 26:** *"Maintaining the mining sector, in general and bauxite mining in particular, is more important than ever before for sustaining macro-economic performance and stability, and to continue the support and micro-economic development at the community level. There is no other sector of the Jamaican economy which can in the immediate and short term, provide the necessary level of export income to support the economy."*

The WRA believes that this comment reveals a bias that may be inappropriate for a supposedly objective Environmental Impact Assessment. Furthermore, the WRA does not think this comment is relevant to the main issue under discussion, i.e. the impact of mining in this particular area on the environment.

**Page 34, Section 1.5.3.2 "Hydrology":** *"Within the SML 173 area groundwater resources are at significant depths..."*

The EIA does not mention the eight known caves within the SML 173 boundary, or the 28 caves within 5 km of the site, or the fact that these caves indicate conduit flow and rapid transport of water to the groundwater below. Additionally, the nearest well to the area is the Retreat well (located 200 m north of the 'panhandle'), which is now a monitoring well with a depth of 951 feet/ 289.86 metres. It was formerly a domestic pumping well for Kaiser workers, but was abandoned due to pollution (see well record attached). Depth to groundwater in this region will not necessarily mitigate against pollution, based on this well's history.

**Page 34,** *"Nationally, the baseline associated with ground water quality in proximity to bauxite mining operations, for over 60 years, have shown that there has been no pollution of ground water caused by bauxite mining. This is supported by evidence gathered from monitoring wells in St. Elizabeth, Manchester, St. Ann and Clarendon."*

## Jamaica's Hydrologic Agency

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Board: Dr. Parris Lyew-Ayee Jr. (Chairman), Prof. Michael Taylor, Mr. Michael Brown, Miss Nadeen Spence,  
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This remains to be seen, and no data was provided to support the assertion. The Retreat well remains as an example of pollution, though it has not been determined what the source of pollution was/is.

**Page 47**, *“Corporate Social Responsibility #40: Provide potable water to communities”*:

Could Noranda provide more details on this aspect, which would then be corroborated by the WRA’s Permits and Licenses Unit?

**Page 93**, *“Figure 5.3 below represents potential sinkholes...”*

The EIA should at this point make reference to the eight known caves within the SML, along with the 25 caves located within 5 km of the SML boundaries. Those are known sinkholes and caves, not potential sinkholes.

**Page 97 and 106**, reference to Figures 5.2 and 5.7

In delineating the Rio Bueno watershed, the map does not account for the known underground contributions of the Quashie River, Lowe River, and Cave River. The watersheds for these rivers (generally accounted for in the WRA’s stated boundary for the Dry Harbour Mountains Hydrologic Basin) should be reflected as a part of the Rio Bueno watershed. The WRA would like to know the methodology used for this stated watershed delineation. Surface drainage alone in a karstic setting would not be a complete accounting of flow contributions.

**Page 109** Comments on 5.1.5.3.2. *“Surface Water”*

Dye trace investigations from the WRA confirmed the linkages between Lowe River and Rio Bueno as of 2018. Yankee River is actually a tributary of the Cave River (not Black River as stated in the EIA), flowing into Rio Bueno. The EIA should clearly note and state that the Rio Bueno rises at Dornoch Head, located less than 1 km north outside of the SML boundary.

**Page 110**: *“Use of Surface Water in the Rio Bueno...is limited to...”*

The WRA has not limited the use of this river at this time, and the word “limited” should not be used in this context as it may give a false impression. The current abstractions from the river can be stated simply, and the river has potential to be a source of domestic water. The WRA has completed a study on Inter-Basin Transfer from the Dry Harbour Mountain Basin to the Kingston and Rio Cobre Basins, and the Rio Bueno is the most significant potential source for this possible transfer of water.

**Page 110**: *“An announcement in 2016 by the government stated that water from the Quashies River at Freemans Hall, Trelawny will be diverted for use for domestic purposes.”*

The WRA is not aware of any such announcement, nor have we been asked to provide any abstraction license or investigation on the Quashie River for this purpose.

**Page 110**: *“Increased utilization of these sources could lead to a decline in the flow of the perennial streams, especially the Rio Bueno River.”*

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Majority of flow discharge at Rio Bueno appears to be from groundwater storage. A comparative flow analysis of Quashie, Cave and Lowe Rivers would most likely show that their combined flow contribution is approximately less than half the total discharge of the Rio Bueno. We would have to verify this though.

**Page 111:** *“The trend line indicates a slight increase in flow despite the diversion of the Cave River and the mining of bauxite within the Rio Bueno Sub Basin by Kaiser Bauxite, and successive companies over the past 50 years.”*

The NWC abstracts water from Cave River at Moravia, but does not technically “divert” the river. Historical Mining Activities in the Rio Bueno sub-WMU would not have been in the watersheds that impacts the Rio Bueno (i.e. SML 173) so there can be no conclusion regarding the impact of bauxite mining on flow quantity **at this time, based on the Rio Bueno flow trends**. Mining activities in SML 165 would have been in the Laughlands Great River and Pear Tree Bottom River watersheds, as opposed to the Rio Bueno, based on historical traces of the Blue River Sink in Mason River to those two rivers. The WRA Dye Trace Test of 2018 monitored potential dye resurgence at the Rio Bueno, Pear Tree Bottom and Laughlands Great Rivers from injections at Quashie and Lowe Rivers. Dyes were traced to Rio Bueno, but no dye came at Pear Tree or Laughlands Great Rivers. It remains to be seen whether Cave River flows only to Rio Bueno, or possibly contributes to Pear Tree and Laughlands also. WRA intends to do a dye trace to examine this possibility.

**Page 113:** *“The mining of bauxite will not result in any increase in surface runoff but may increase infiltration to the limestone aquifer”.*

The EIA makes very little mention of historical water quality analysis or risks, and this is a glaring omission which needs to be rectified. Additionally, there is a potential risk of cadmium from the soil entering the groundwater, based on a study from ICENS (*Heavy Metals In Jamaica Part 3: The distribution of Cadmium in Jamaican Soils*, Lalor, Simpson, Voutchkov, 1998). This risk should be addressed/mentioned in the EIA.

Page 117: *“Hydrocarbon contamination of groundwater resources from bauxite mining operations has not been recorded in over 50 years of bauxite mining.”*

Hydrocarbon contamination of groundwater resources has not been monitored or sampled for in over 50 years of bauxite mining, to the best of the WRA’s knowledge.

*The vadose zone (above the water table) is so thick and devoid of oxygen (anaerobic conditions) that pathogens would not survive the travel time it takes to get to the groundwater table.*

This is speculative, and the pollution of the Retreat well appears to invalidate this statement. The Retreat well pollution requires an explanation and mitigation to prevent similar occurrences, and the EIA should investigate this in order to validate its assertions. The vadose zone explanation does not account for the karstic nature of the region, and that the retention time in the vadose zone is not long due to the karstic conduit flow (as opposed to Darcy flow in a permeable medium).

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*...there has not been any report of bauxite contamination of water from mining...*

Water Quality Data needs to be submitted to strengthen the claim that there have been no reports of contamination. To the best of our knowledge, there has not been a focused study to verify the contribution or lack thereof of bauxite mining to water quality.

*“Blockage of conduits by infiltrating material has never been reported. “*

Blockage of conduits in this region would be due to mining activities covering and dumping up sinkholes, as opposed to deposition from water.

**Page 118**, regarding the Spring Plain paragraph

Issues in SML 173 relate to water quality and stream discharge under natural hydraulic gradients. This example (Spring Plain pumping well) would not necessarily be comparable with the potential risks in the SML. Additionally, the Retreat well has been contaminated by pollution, so something is definitely different between the two regions.

*The reasons not to mine bauxite in the Rio Bueno Catchment/sub-basin are neither based on scientific information nor on the experience of bauxite mining in Jamaica and indicate a clear misunderstanding of bauxite-limestone relationship and limestone geology and processes.*

Up to this point, the EIA report has not gone into detail on water quality data trends, or flow trends in the Pear Tree Bottom and Laughlands Great Rivers (which would have more significance regarding possible impacts of existing bauxite mining on streamflow volume) as opposed to Rio Bueno, nor has it referred to the existing caves or the pollution of the Retreat Well (all of which is readily available data). These gaps in reporting should be examined before this hydrological conclusion is accepted.

**Page 125-126**

Rainfall data for Lowe River, Sawyers and Ulster Spring seem very low for annual rainfall. The graphs may have been included by accident.

**Page 302:** A repeat of previous hydrogeological statements; all WRA comments remain in force.

**Page 327:** *“There are no wells close to the Cockpit Country or SML 173 that can be monitored for either groundwater levels or water quality.”*

Retreat Well is located near the property. According to the WRA records, the following wells are located within 5 km of SML 173's boundary:

Retreat,  
Barnstaple  
Reynolds 5 - Lyndale - Brown's Town  
Brown's Town - Minard 1  
Brown's Town - Minard 2  
Swanswick - Clarkes Town  
Hampshire  
Huntley - Brown's Town

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Dumbarton - Orange Valley

These can all be monitored for water level and water quality changes.

Page 328: *"No further work has been done"*

The WRA undertook dye tracing of Quashie and Lowe River in 2017-2018. That report is available from the WRA which confirmed the flow contribution of the Lowe River to the Rio Bueno, and also confirmed that neither the Lowe nor Quashie Rivers contribute flow to Pear Tree or Laughlands Great Rivers.

In response to "Monitoring of Rio Bueno WQ", WRA states that WQ monitoring at the aforementioned wells (or representative sample of the wells) should also be implemented.

Page 329:

The WRA plans to implement an Isotope Hydrology study in conjunction with the IAEA beginning in 2020 to assess the flow dynamics in this WMU.

Sincerely,

**Water Resources Authority**



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Geoffrey Marshall (Mr)  
**Chief Hydrologist**  
For Managing Director

**Jamaica's Hydrologic Agency**


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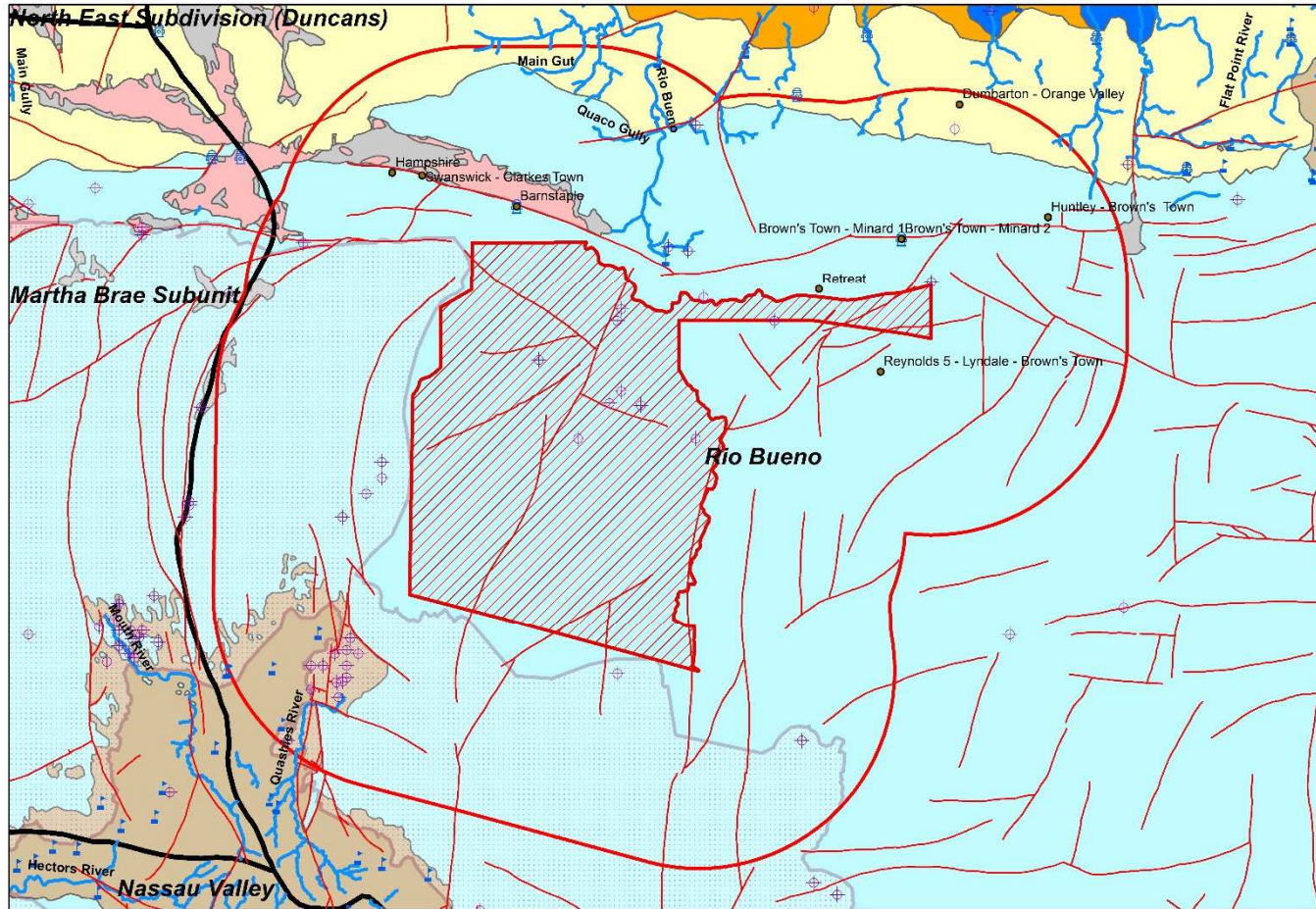
WATER RESOURCES AUTHORITY				WELL RECORD	
		IMPERIAL	GRID REFERENCE	METRIC	
<b>Location</b>	Retreat	<b>EASTING</b>	4093	<b>NORTHING</b>	192826
<b>Parish</b>	St. Ann	<b>NORTHING</b>	5405	<b>EASTING</b>	207118
<b>Owner</b>	Kaiser Bauxite Company	<b>Address</b>	Discovery Bay		
<b>Driller</b>			<b>Date of Completion</b>		
<b>Hole Size</b>	16 Inches To 573 Feet	<b>Type of rig used</b>	Percussion		<b>Depth of well</b>
	12 Inches To 951 Feet	<b>Water struck at</b>			951 Feet
			<b>Principal aquifer</b>		<b>Elevation of site</b>
			Limestone		1058.40 Feet
					<b>Rest water level on completion</b>
					645 Feet
<b>Casing</b>	<b>Type</b>	<b>Diameter (Inches)</b>	<b>Length (Feet)</b>	<b>From (Feet)</b>	<b>To (Feet)</b>
	Plain	16	576	+3	573
<b>Origin of data</b>			<b>Compiled by</b>	B.F.	
<b>Remarks</b> Site elevation = Top of casing Elevation of floor of foundation: 1057.30 feet at NE end.  Used for domestic purposes to supply Kaiser re-settlement families.  Abandoned due to pollution. Now an index well (CHC 2001)  Telelogged on April 30, 2002 Information on hole size, well construction, depth, and static water level (= rest water level) determined from telelog. Depth of well previously entered as 635 Feet.  <b>Verified 05/20/2008</b> <b>Status</b> - None Pumping Well <b>Use</b> - Monitoring Well			<b>Test Pumping</b>		
			<b>USGPM</b>	<b>WATER LEVEL</b>	<b>DRAWDOWN</b>

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# SML 173 Hydrostratigraphy



- Wells selection
  - ⊕ NWC Sources
  - ⊕ Spring
  - ⊕ Caves
  - Faults
  - Rivers
  - ▭ SML 173 5 km Buffer
  - ▭ Sub-WMUs
  - ▨ SML New Day Area
  - ▭ CCPA
- Hydrostratigraphy**
- HYDRO\_STRA**
- ▭ Alluvium Aquifer
  - ▭ Alluvium Aquiclude
  - ▭ Coastal Aquifer
  - ▭ Coastal Aquiclude
  - ▭ Limestone Aquiclude
  - ▭ Limestone Aquifer
  - ▭ Basal Aquiclude
  - ▭ Swamp/Marsh/Mangrove
  - ▭ Water Body

Prepared by the  
Water Resources Authority  
August 2018

