For submission to:

Noranda Jamaica Bauxite Partners II (NJBP II)

Port Rhoades
Discovery Bay P.O.
St. Ann
Jamaica, W.I.

Environmental Impact Assessment

for the

Proposed Mining of Bauxite

in the

Special Mining Lease 173 (SML 173) Area

in the parishes of

St. Ann and Trelawny

Responses to Comments

from

The Forestry Department (FD) and The Water Resources Authority (WRA)

received from the

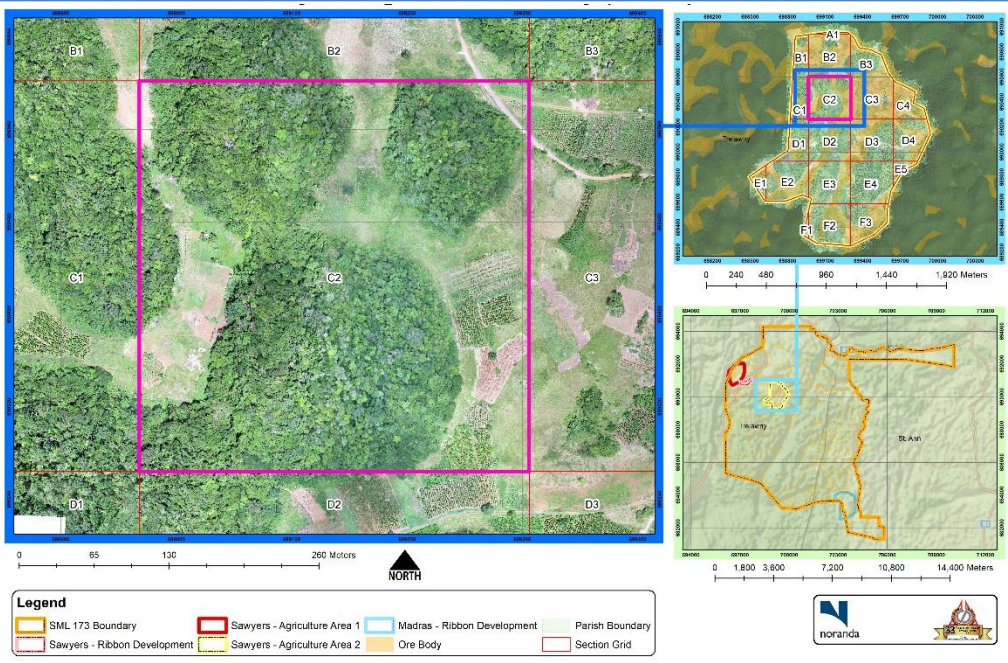
National Environment & Planning Agency

on

January 20, 2021

(Responses to Additional Comments from the GoJ Agencies)

February 3, 2021



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COVER CREDITS

From Aerial Surveys conducted by Conrad Douglas & Associates Limited in SML 173 area.

This shows mode of occurrence of bauxite deposit within SML 173 area. Elevated limestone hillocks with high biodiversity and low-lying deposits of bauxite supporting sparse grassland/shrub vegetation and agricultural activities.

PROPRIETARY RESTRICTION NOTICE

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1.0. Introduction

Following on submission of Volume I: Environmental Impact Assessment (EIA) Report and the following companion documents for the proposed mining of bauxite in Special Mining Lease 173 Area (SML 173) by Noranda Jamaica Bauxite Partners II (NJBP II), a mixed-virtual meeting of the Mandatory Public Meeting was convened on December 8, 2020 after receiving the necessary approvals from the National Environment & Planning Agency (NEPA) on November 6, 2020:

- ✓ Volume I: Environmental Impact Assessment (EIA) Report
- ✓ Volume II: Reports on Voluntary Stakeholder Consultations
- ✓ Volume III: Archaeological Impact Assessment
- ✓ Volume IV: Air Dispersion Modelling Report

Several comments and questions were sent to NEPA by members of the public after the mixed-virtual Mandatory Public Meeting and transmitted to Conrad Douglas & Associates Limited (CD&A) on January 5, 2021. CD&A provided responses to these comments and questions on January 20, 2021.

On January 20, 2021, NEPA also transmitted additional comments from the Forestry Department dated January 5, 2021 (See Appendix I) and the Water Resources Authority dated December 15, 2020 (See Appendix II) to Conrad Douglas & Associates Limited.

Our responses to these additional comments are provided in sections 3.0 and 4.0 below:

2.0. General Remarks

In general, we note that several of the points raised by the Forestry Department (FD) and the Water Resources Authority (WRA) are outside of the scope of the agreed Terms of Reference (ToR) for the EIA (See Appendix I of the EIA Report). The ToR was agreed after extensive multi-stakeholder consultations, including with the FD and WRA and visits to the field with these agencies. Consultations were also held with these agencies during the course of preparing the EIA.

Some of the questions and comments raised also fall within the remit of other regulatory agencies such as NEPA and the Mines & Geology Division.

Notwithstanding our general remarks, please see below our responses to the comments and questions received.

3.0. Responses to Comments Received from the Forestry Department

Table 1: Responses to Comments Received on January 20, 2021 from the National Environment & Planning Agency (NEPA)– Comments from The Forestry Department dated January 5, 2021

No	Ref.	Comment	CD&A/NJBP II Response
	1. Haul Roads		
1.	a.	*NJB must adhere to its commitment to reduce road width where possible and to actively implement dust suppression measures as outlined in the Environmental Impact Assessment (EIA)*	**Noted. This has been addressed in the EIA Report and the Mandatory Public Meeting of December 8, 2020 and previous correspondence with NEPA.** It was stated on page 8-3 of the EIA Report that: "*The physical and chemical characteristics of bauxite are unique to the material, with relatively high natural moisture content (25%) and a very high angle of repose (>45 degrees).* *Bauxite therefore has a less likely potential for fugitive dust formation and it can be transported and stockpiled without wetting or covering. Further, there is no stockpiling proposed in SML 173 and the transportation time from ore body to disposal site is a maximum of 30 minutes. This time would be insufficient for the bauxite to dry out and generate fugitive dust.* *There is a potential for dust generation from the road surface along the haul roads, especially during the dry seasons, as a result of movement of trucks. However, this will not significantly impact ambient air quality. A dust suppression regime will be maintained for all active haul roads. Dust fall monitoring will be a feature of the environmental management programme.*" In addition to using water, NJBP II also uses Dust Treat as part of their dust suppression programme. Please see Figure 1 below and Appendix VIII of the EIA Report, which provides the Material Safety Data Sheet (MSDS) for Dust Treat.

No	Ref.	Comment	CD&A/NJBP II Response
			 **Figure 1: Example of NJBP II's Impact Mitigation - Use of Water or Dust Treat for Dust Suppression (Please see slide 32 of the Mandatory Public Meeting presentation made on December 8, 2020)**
2.	b.	*The NJB must throughout the life of the mining activity exercise active management of the haul roads so as to prevent their use by unauthorized people in order to minimize the potential for their use to facilitate squatting and/or illegal exploitation of the forested areas for timber, forest products or wildlife and the further degradation of the remaining forests in these areas.*	Noted. This was stated in the EIA Report. In relation to the configuration of haul roads, the EIA Report (See page 5-8) stated that: "*As far as practical, existing pathways (bridle paths/roadways/footpaths) will be mainly converted to haul roads.*" It is also documented in the AIA (Volume III of the EIA Report) that the haul roads developed for accessing and transporting bauxite may be beneficial to the communities and community development. Among NJBP II best practice is to actively patrol the areas in which mining is taking place. With the exception of the haul roads that are authorized to remain open (agreement with the Parish Council and JNHT) for the benefit of the community, at the end

No	Ref.	Comment	CD&A/NJBP II Response
			of the mining process haul roads are eliminated and enables natural recolonization to take place. This was stated on page 5-63 of the EIA Report: "*At the end of use, access and use of the haul roads are eliminated by making the road redundant.*"
3.	c.	*Recognizing that the proposed mining activities will come in close proximity to the proposed area for protection of the cockpit country, the Agency recommends that at the end of the mining activity, the surface of the haul roads must be broken up to facilitate the sponateous (sic) re-generation and active re-forestation of the roadways. This will allow for the restoration of ecological corridors between the hillocks of the mined areas (reduced fragmentation), the reduction of the degradation potential and an increase in areas available for restorative planting of tree species.*	**Noted. This has been addressed in the EIA Report and the Mandatory Public Meeting of December 8, 2020 and previous correspondence with NEPA.** It should be also noted that the JNHT has recommended in the AIA Report (Volume III of the EIA Report) that haul roads developed for accessing and transporting bauxite may be beneficial to the communities and community development (Please see AIA Report page 117). It was stated on page 8-5 of the EIA Report that*: "NJBP II will not be engaged in any substantial fragmentation. The area is already naturally fragmented by the nature of the topography and activities in the area. NJBP II operations will temporarily impact on less than 15% of the total area inclusive of construction of haul roads. Haul roads constructed will be at a maximum width of 35 feet. This will be the distance of separation for those specific areas for which the haul roads traverse. This does not prevent any plant species that reproduces itself by any method of sexual reproduction to constrain propagation through pollen and seed dispersal."* Further, the mobility of animals will not be constrained. It was also stated in Section 7.2. Impacts to Biological Resources, on page 7-11 that the mitigation proposed for potential impact to the biological resources included: "*Vegetation should only be removed within the design and operating footprints. Existing roadways and degraded areas will be utilized for use as haul roads. Sensitive species of plants identified will be removed and relocated to areas that will not be affected by the operations or at NJBP II's greenhouses.*"
4.	d.	*Where it has been determined that haul roads must be left open at the end of mining, active and appropriate measures must be put in place to limit any ensuing access to the remaining forested areas.*	Noted. This was stated in "*Section 3.2.19. Parochial Roads Act*" of the EIA Report, which provided that: "*Parish Council shall have the exclusive care, management, control and superintendence*" of parochial roads. NJBP II practice is that in the event that the Parish Council has agreed to leave a haul road open, then the road would be ultimately handed over to the Parish Council.
5.	e.	*It is critical that every effort is made by the relevant Authorities (JBI and NEPA) to mandate and ensure that NJB is held accountable for the road closure at the end of mining.*	Noted. The EIA Report sets out the established and accepted practice for bauxite mining and its associated infrastructure, including haul roads. Note also that on page 8-5 of the EIA Report: *"the recommendation in the Archaeological Impact Assessment (AIA) states that haul roads may be beneficial to facilitate community development. This can be done through agreement, provided the Local Authority formally and legally accepts responsibility for the future operations and maintenance of the haul roads."*
	2. Bauxite Deposits		

No	Ref.	Comment	CD&A/NJBP II Response
6.		*The Government has guaranteed that there will be no exploitation of any deposits found within the protected areas (forest reserves, and JNHT sites), as such it is anticipated that there will be a need to improve/enhance the capacity of the Agency to conduct additional monitoring of the mining activities undertaken by NJB to ensure that they do not infringe on the forest reserves. To support this additional monitoring activity, the Agency recommends that a special admistrative* (sic) *charge should be applied to the NJB permit and this should be deployed to support the Agencies so affetcted* (sic)	Noted. This was not a part of the Terms of Reference (ToR) for the EIA (See ToR at Appendix 1 of Volume I: EIA Report). It has been stated that there will be no mining in the Forest Reserves or the hillocks, which contain the forest cover and the highest levels of biodiversity in SML 173. The Forestry Department was consulted during the EIA and permitting process and provided the consultants with the Jamaica Gazettes for the estates in the SML 173, which illustrate the boundaries of the Forest Reserves (See Appendix III, page XCIII of the EIA Report). **By law, the Forest Reserves are excluded from mining activities**. Through salaries, wages, taxes, royalties, and local purchases, NJBP II contributes some US$80 million (approximately J$11.52 billion) into the Jamaican economy annually. The company represents a huge investment and is one of the largest earners of foreign exchange for Jamaica. Commerce, trade, service and manufacturing activities are bolstered by the effects of NJBP II's local purchases and employment. NJBP II accounted for 6% of Jamaica's total domestic exports for 2019 and 7.6% for the period January to July 2020 (Source: STATIN). The company currently provides: • 400 direct employment jobs • 400 indirect contractor jobs (mining operations) • 2,500 (est.) indirect job opportunities through contractor services and temporary jobs.
	3. No Net Loss Policy		
7.		*The Agency takes this opportunity to strenuously remind all concerned that every effort muts* (sic) *be made to adhere to the "No Net Loss" of forest cover outlined in the Forest Policy for Jamaica (2017). Consequently, there is to be a requirement that NJB must reforest an equivalent area of forest cover lost due to the entire mining and rehabilitation process. This must be subject to the following:* *1. A thorough assessment of the amount of forest cover to be impacted and hence the percentage loss (forest) to the country.*	The National Environment & Planning Agency (NEPA) is the key agency responsible for the development of ecological guidelines, pursuant to the NRCA Act which binds the Crown. It must be stressed that there will be no mining in the Forest Reserves or the hillocks, which contains the forest cover and the highest levels of biodiversity in SML 173. The lands to be mined are a mix of land uses, including grassland cover which forms habitats for various fauna, agriculture and scattered residential. The bio-geo-stratigraphy in the region and the subject SML 173 area is naturally defined. It shows mainly grasslands on the depressions and the high biodiversity on the hillocks. See Figure 2 to Figure 4 below. The hillocks will not be mined. Regardless of the above, NJBP II contributes to the Jamaica's reforestation programme and has committed to contribute to the planting of 200,000 trees in any suitable location within its mining operations. This is supported in the Climate Change Impact Mitigation section, page 8-3 of the EIA Report, which states that: "*There will be a net positive increase in climate change mitigation, as the carbon sequestration capacity of the rehabilitated mined out areas will be increased. This will take place through*

No	Ref.	Comment	CD&A/NJBP II Response
		2. *Clear plans and active phased replacement of the lost tree cover by NJB within a requirement for total replacement within a stipulated timeline.* 3. *The responsibility for this replanting will lie solely with NJB, though the Agency will monitor and assess the activity overtime.* 4. *The satisfactory achievement of the "no net loss" as stipulated by policy will be at the sole discretion of the Agency.*	*an increase in the size of the grasslands plus the planting of several trees in the vicinity and a major tree planting programme of 200,000 trees.".*  **Figure 2: Aerial image showing the low lying bauxite deposits (highlighted in purple) in between the hillocks in SML 173 (See page 5-128 of the EIA Report)**

			 **Figure 3: Photograph showing the low lying bauxite deposits (foreground) in between the hillocks (background) in SML 173 (See *page 5-128 of the EIA Report*)**

No	Ref.	Comment	CD&A/NJBP II Response
			 **Figure 4: Photograph showing the low lying bauxite deposits (midground) in between the hillocks (background) in SML 173 (See Slide 10 of the presentation made at the Mandatory Public Meeting)**
	5. Biodiversity of the Area (Flora)		
8.		*While the endemic trees/bromeliads and vines identified in SML 173 are not locally endemic, the NEPA and NJB are encouraged to conserve and use these species in the restoration programme. Specifically, it is recommended that as many as possible of the native trees identified be included in these restoration efforts and that NJB be required to use a modem* (sic) *and progressive restoration approach in the*	Noted. This has been addressed in the EIA Report and the Mandatory Public Meeting of December 8, 2020 and previous correspondence with NEPA. The careful collection, relocation, storage, nurturing and replanting of floral species has been carried out by NJBP II as a best practice in the industry. This approach also forms a part of NJBP II's regulatory requirement.

No	Ref.	Comment	CD&A/NJBP II Response
		decommissioning of mined-out pits from simply grassed areas to a state where trees/forests can be re-established.	As illustrated in the response to question 7 above, the SML 173 area shows mainly grasslands on the depressions and the high biodiversity on the hillocks. In SML 173, the grassland depression generally does not support the growth of large trees. Bauxite mining will only be carried out in the depressions.
	6. Forest cover establishment		
9.	a.	*Recognizing the significant impact on total national forest cover that mining activites* (sic) *can have, the establishment of tree cover at the end of the project must be mandated to include areas that may have been flat grassed areas (not under forest cover) at the beginning of the mining activity.*	NJBP II is responsible for the impacts of its bauxite mining operations. NJBP II is obliged by way of the Mining Act and established best practices to rehabilitate mined out areas in compliance with the regulations and standards of the Mining Act.
10.	b.	*Recognizing the inherent challenges with the reclamation/rehabilitation of the mined out pits, its is recommended that where possible the rehabilitation is to include reforestation with a portion being done within the pits and a portion in more suitable areas, where available, to increase the survivability and hence impact on national forest cover statistics.*	NJBP II is responsible for the impacts of its bauxite mining operations. NJBP II is obliged by way of the Mining Act and established best practices to rehabilitate mined out areas in compliance with the regulations and standards of the Mining Act. Additionally, NJBP II contributes to Jamaica's reforestation programme and has committed to contribute to the planting of 200,000 trees in any suitable location within its mining operations.
11.	c.	*The Agency challenges the veracity of the claim that trees do not grow in the areas with bauxite deposits as the land has "aluminum iron toxicity" and requests any evidence that could support such a statement. The inherent fallacy of this statement is however recognized as any observation/assessment of any undisturbed section of bauxite bearing areas e.g. Cockpit Country demonstrates that this statement has no merit.*	The statement '*aluminium iron toxicity*' was not referred to in the EIA Report. The observation that '*bauxite deposits do not support the growth of forests*' has been made for several decades and is a definitive characteristic of the mode of occurrence of Jamaican bauxite to the extent that it has been used as an indicator in exploration aimed at identifying bauxite deposits. It should be further noted that the infertility of bauxitic soil and the fact that it does not support the growth of forest was among the reasons which piqued the curiosity of Sir. Alfred DaCosta and led to the discovery of bauxite soils in Jamaica in the first place (please see page 2-4 of the EIA Report). Mr. James Lee was among the distinguished geologists who pioneered the use of this method of remote sensing for bauxite exploration in Jamaica. Please see *Lee, J.W., Exploration & Development Drilling for Bauxite in Jamaica, The Journal of the Geological Society of Jamaica Bauxite/Alumina Symposium, 1971*, referenced in the EIA Report on page 5-18. The mode of occurrence of Jamaican bauxite and the fact that bauxite deposits do not support the growth of forests has also been proven by several national and international experts through a number of independent surveys carried out in Jamaica. Included among the institutions that have been involved in these surveys are: the Jamaica Bauxite Institute (JBI), Mines &

No	Ref.	Comment	CD&A/NJBP II Response
			Geology Division, ALCAN, Alumina Partners of Jamaica (ALPART), Kaiser Bauxite, Alcoa and the US Geological Survey Department. The bio-geo-stratigraphy in the region and the subject SML 173 area is naturally defined. It shows mainly grasslands on the depressions and the high biodiversity on the hillocks. See Figure 5 to Figure 7 below.  **Figure 5: Aerial image showing the low lying bauxite deposits (highlighted in purple) in between the hillocks in SML 173 (See page 5-128 of the EIA Report)**

			 **Figure 6: Photograph showing the low lying bauxite deposits (foreground) in between the hillocks (background) in SML 173 (See *page 5-128 of the EIA Report*)**

No	Ref.	Comment	CD&A/NJBP II Response
			 Figure 7: Photograph showing the low lying bauxite deposits (midground) in between the hillocks (background) in SML 173 (See Slide 10 of the presentation made at the Mandatory Public Meeting)
12.	d.	*It is imperative that the permit issued mandates not only that replanting be done, but also a clear requirement that they be maintained as needed to ensure that there is survival of the seedlings up to 5 years after planting*	The condition and matters concerning the viability of seedlings is not a requirement of the TOR for the EIA (See ToR at Appendix 1 of Volume I: EIA Report). Note, however, that NJBP II has successfully engaged in the production of several types of food and orchard crops and the implementation of greenhouse projects on rehabilitated lands. (See Figure 8 below).

No	Ref.	Comment	CD&A/NJBP II Response
			 **Figure 8: Citrus Orchard growing on rehabilitated lands (Source: NJBP II)**
	7. Reshaping of pits and the impact on forested hillocks. ***NEPA must also ensure that any permit granted*****:**		
13.	a.	*Establishes clear standards for a maximum amount of land that can be shaved off the adjoining hillocks in order to rehabilitate/restore the mined-out areas as well as to ensure the stability of slopes created thereby reducing the likelihood of land slippage in future.*	The Mines & Geology Division establishes the standards for the shaping of slopes and haul roads. This is a required part of all Mining Plans, which must be submitted to the Mines & Geology Division for their review and approval. NJBP II is required to comply with the requirements of the Mining Act.
14.	b.	*Ensure that tree establishment activites* (sic) *are included among the measures for achieving certification of the mined-out pits.*	The Mines & Geology Division certifies the rehabilitation of mined-out pits. NJBP II is required to comply with the requirements of the Mining Act.
15.	c.	*Facilitate the inclusion of the FD in the process from the onset of the mining activity in support of the needed research to guide mining operations in the future*	This was not a part of the Terms of Reference (ToR) for the EIA (See ToR at Appendix 1 of Volume I: EIA Report). The mining process is well established, actively and efficiently regulated, monitored and enforced by the Mines & Geology Division, NEPA and the Portfolio Ministry.

No	Ref.	Comment	CD&A/NJBP II Response
	8. Concluding Statement		
16.		*Recognizing that the removal of high value species/areas with replanting in other areas and attempts to re-establish forest cover does not guarantee the quality or integrity of any resultant reforested area, the Agency can not in principle support any activity that holds the potential to adversely impact the no net loss policy. The Agency therefore encourages that every effort be made to maintain the connectivity and the ecology of the impacted areas, so as to reduce the impacts of fragmentation and degradation of those areas and that all of the recommendations outline herein are incorporated and adhered to in a bid to minimize the longterm impact on total national forest cover.*	The relevant responses to comments received from the FD on June 8, 2020 are repeated below: "*The area to be impacted represents approximately 15% of the entire SML 173 inclusive of the haul roads. Prior to any mining activity, all sensitive species of flora is removed and relocated to nearby hillocks or for temporary storage in a greenhouse. Upon completion of rehabilitation, the floral species which are stored in greenhouses are relocated to the area.* *The bauxite ore bodies do not support the growth of forest cover and will not be impacted by the implementation of this project.* *The shape and depth of each bauxite deposit is variable. Of necessity, in keeping with the requirements of the Mining Act during the rehabilitation process, the mined bauxite pits must be reshaped.* *This is followed by replacement of the 18" – 24" of topsoil that was removed and placed in storage as the final cover for the purpose of rehabilitation.* *The process does not involve deforestation of the hillocks. To the extent that trees on the periphery are marginally impacted during the grading process, this will be regenerated in the due course of time through natural recolonization.* Further, please note, most of the bauxite orebodies in SML 173 have already been impacted on by anthropogenic activities. The optimal use will be made of the lands, which have been rehabilitated. All mined out orebodies will be rehabilitated in compliance with the requirements of regulatory framework. In some instances rehabilitated lands may also be used for social and economic activities as may be agreed with the relevant authorities, Community Councils and residents.

4.0. Responses to Comments Received from the Water Resources Authority

Table 2: Responses to Comments Received on January 20, 2021 from the National Environment & Planning Agency (NEPA)– Comments from The Water Resources Authority dated December 15, 2021

No	Ref:	Comment	CD&A/NJBP II Response
1.	*Page 1-7:*	*"…ground water resources are at significant depths (more than 100 m) below the surface of SML 173."* *The WRA believes that this should not be used as a metric to minimize the risk of contamination. The aquifer beneath SML 173 is karstified and significantly faulted, and these conditions increase the permeability of the aquifer which increases the risks of contamination to groundwater.*	It would appear that the reviewer has made the assumption that the limestone leading to the aquifer beneath SML 173 is highly permeable. However, permeability (P) and hydraulic conductivity (HC) may vary and depend on the inherent nature of the limestone. Permeability may decrease with both depth and the circulation of water in the aquifer. Conduit permeability is not continuous and does not follow a straight line leading to the aquifer. The variation in both HC and P with depth were noted in the modelling of the Essex Valley limestone aquifer by Schlumberger (formerly Waterloo University). In bauxite mining the volume of material (moisture) that is available for transport into the saturated zone through the thick unsaturated zone is relatively small and will require a large volume of water to reach the water table. The main and only possible pollutant is particulate material, which may result in increased turbidity. It is correct to say that high permeability increases the pollution risk, in this case soil particles, but this cannot be applied *carte blanche* across the aquifer for all types of probable contaminants. Bauxite mining does not involve the use of materials such as caustic soda (NaOH) or any other type of material, which could pollute ground water resources. The Water Quality Atlas 2019 report published by the WRA showed that there was no evidence of water pollution linked to bauxite mining.
2.	*Page 1-7:*	*"Nationally, the baseline associated with ground water quality and quantity 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. It is highly improbable that the water resources will be impacted by the mining of bauxite in areas of similar karstic geomorphology. This is supported by evidence gathered from monitoring wells in St. Elizabeth, Manchester, St. Ann and Clarendon."* *The WRA re-affirms its comments from the August 30, 2019 letter in that this assertion is not yet definitively proven, and the purported evidence was not presented to support the assertion. The Retreat well is a stated example of pollution impacting groundwater in the region,*	The Retreat Well is not located in SML 173. It is an established fact, across Jamaica for the past 60 years since bauxite mining began, that bauxite mining has not resulted in the pollution of groundwater resources. This was arrived at from actual measurements and observations. There is no evidence to disprove this fact. For example in flood prone areas such as Porus/Harmons, Mile Gully and Clapham/Moneague where active mining was in place before and after heavy rains which flooded the mines, it is known that the WRA monitored the outflow of water from each of these areas on a regular basis and found no contamination. The floodwater from Porus/Harmons went to Alligator Hole River and springs along Canoe Valley. The floodwaters from Mile Gully went to St Toolies/St Jago Springs and the floodwaters from Clapham/Moneague went to the White River above the National Water Commission (NWC) treatment plant at Labyrinth. At none of the monitoring points was any discoloured or turbid water seen and recorded by WRA's Technical Staff. In all instances the water from the flows was "*crystal clear*" and did not interfere with the NWC's operations along the White River or the NIC's

No	Ref:	Comment	CD&A/NJBP II Response
		although it has not been determined what the source of that pollution was/is. The EIA should mention and address this particular matter of the Retreat well.	operations at Milk River/St. Toolies. In fact they shut down the six (6) wells along the fault zone, a highly permeable flow path, and used the spring flow for irrigation and domestic consumption. There has never been a report and/or recording of any pollution of ground and/or surface waters from bauxite mining. The Retreat well was not polluted by bauxite mining and it is wrong to intimate that bauxite mining is the cause of any contamination. The nature of the contaminant has never been determined. It is therefore ridiculous to now seek to put the onus on NJBP II to determine the level and type of contamination. This should be the task of the WRA in its management of the Jamaica's water resources.
3.	*Page 1-7:*	*"Most of the caves identified are elevated above the deposits and areas containing sinkholes will not be mined."* *The EIA should definitively state that there are no caves in or near the areas proposed for mining, if this is the actual situation. The quoted sentence gives the impression that there are some caves that are not elevated above the deposits. There should be a definitive investigation/ground truthing of the specific areas potentially slated for mining to confirm whether any unknown caves/sinkholes are within those areas. At least two sinkholes/caves were stated in the EIA as discovered by CD&A, so this illustrates the possibility that other unidentified sinkholes/caves may be in the region.* *Additionally, the EIA should state how the applicant proposes to treat with caves/sinkholes that are located in/near the potential mining areas/orebodies. It may be that the proximity to caves/sinkholes will sterilize the potential for mining at a given location.*	Field investigations have shown that the caves within SML 173 are at elevations above the areas proposed for mining. The areas proposed for mining are depressions that have the thickest deposits of bauxite. This has been proven by exploratory drilling by the Jamaica Bauxite Institute (JBI) and NJBP II. From the observations and available information, there are no known caves within these bauxite bearing depressions. It is important to note that in the event that an environmental permit is granted and mining proceeds, five year Mining Plans will be developed for the review and approval of the Mines & Geology Division. NJBP II is obligated to implement its activities in accordance with what is required by law. At that time, the regulators will specify any requirements for the management of sinkholes or caves. This comment indicates the need for a more thorough reading of the EIA. The EIA Report on page 5-12 states that: "*Table 5-1 (*of the EIA Report*) and Figure 5-8 (*of the EIA Report - See Figure 9 below*) represents potential sinkholes that have been identified based on depressions obtained from geospatial information provided by the WRA. Figure 5-6* (of the EIA Report - See Figure 10 below) *shows a sinkhole that was identified in SML 173 in proximity to Stewart Town. Other sinkholes or caves identified in SML 173 are shown in Figure 5-9* (of the EIA Report - See Figure 11 below). *The potential sinkholes represent depressions which do not overlap orebodies and have been categorized based on their proximity to SML 173 orebodies. Known caves identified in and within 5 km of SML 173 are shown in Table 5-1 and Figure 5-10 (*of the EIA Report*). The sinkholes identified in SML 173 are massive openings in the ground, which form cliffs at the edges*." <u>The EIA Report on page 5-13 further indicates that three (3) caves were visited and not two (2) as stated by the reviewer:</u> *"All caves were identified through remote sensing. However, during ground truthing not all caves identified were visited. It is important to note that the caves are protected by the heavy vegetation (See Figure 5-7* of the EIA Report*) of the hillocks in which they are formed. The vegetation and the caves' elevations on the hillocks form natural*

No	Ref:	Comment	CD&A/NJBP II Response
			barriers that make the caves, in general, extremely difficult to access or disturb. As a result, <u>three (3) caves</u> were visited based on the knowledge of community members."

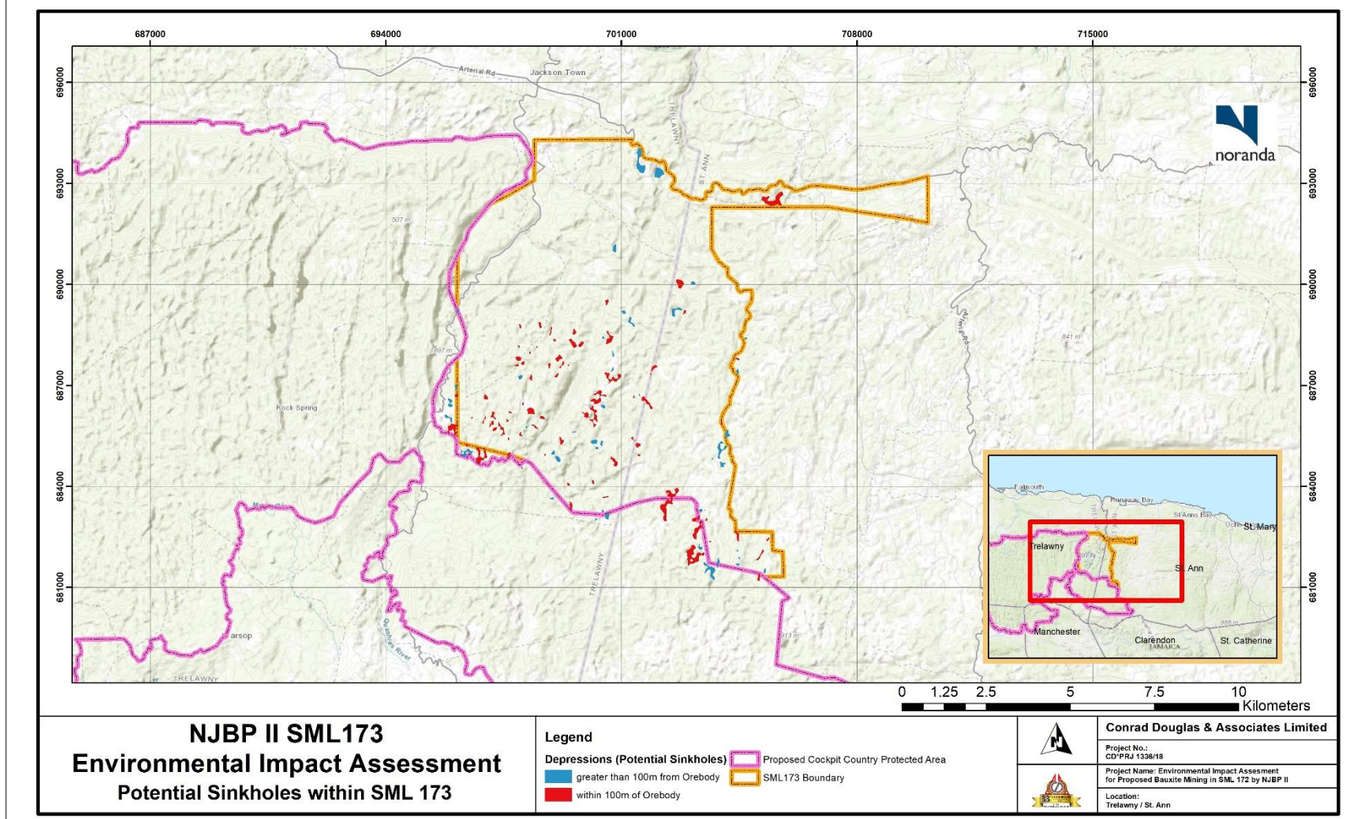


Figure 9: Potential Sinkholes within SML 173 (Source: *Page 5-14 of the EIA Report, derived from data supplied by the WRA in an email dated June 25, 2019*)

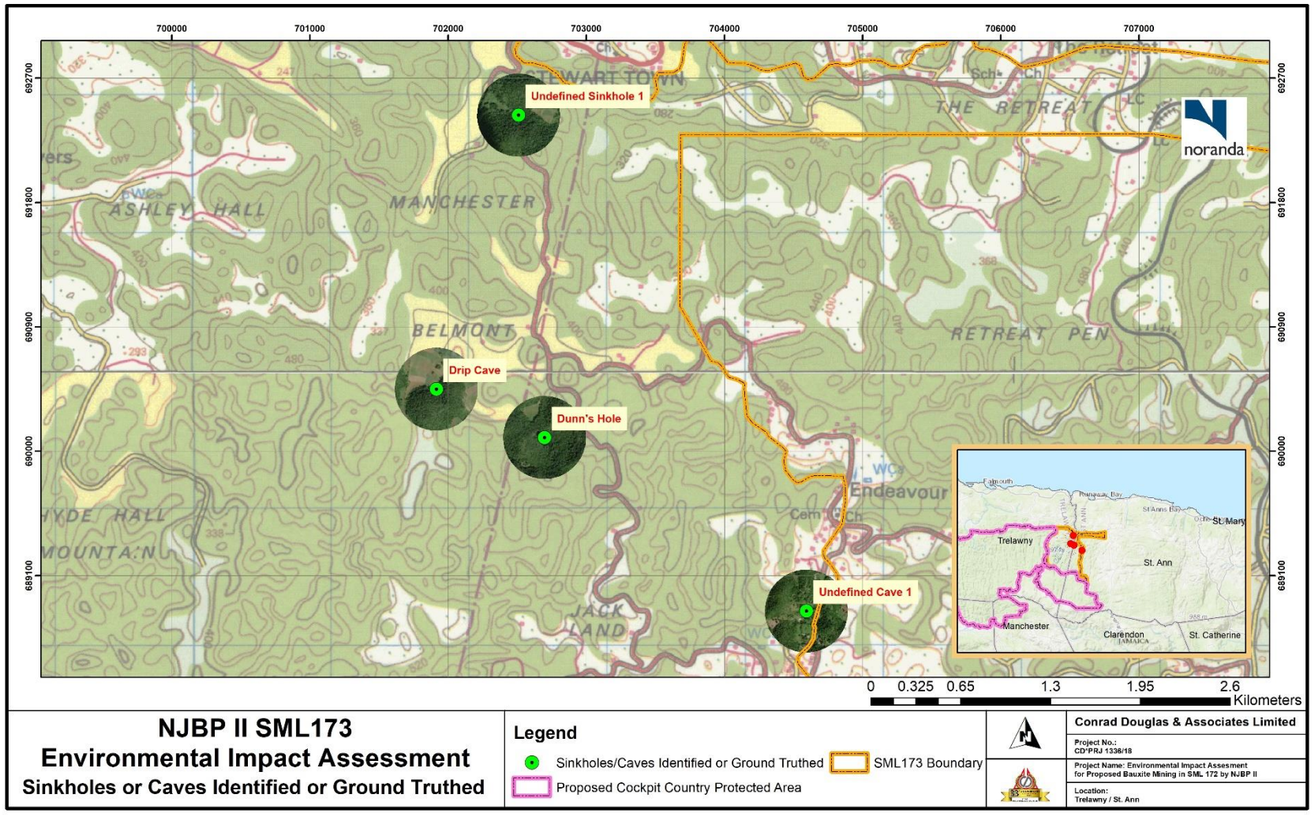
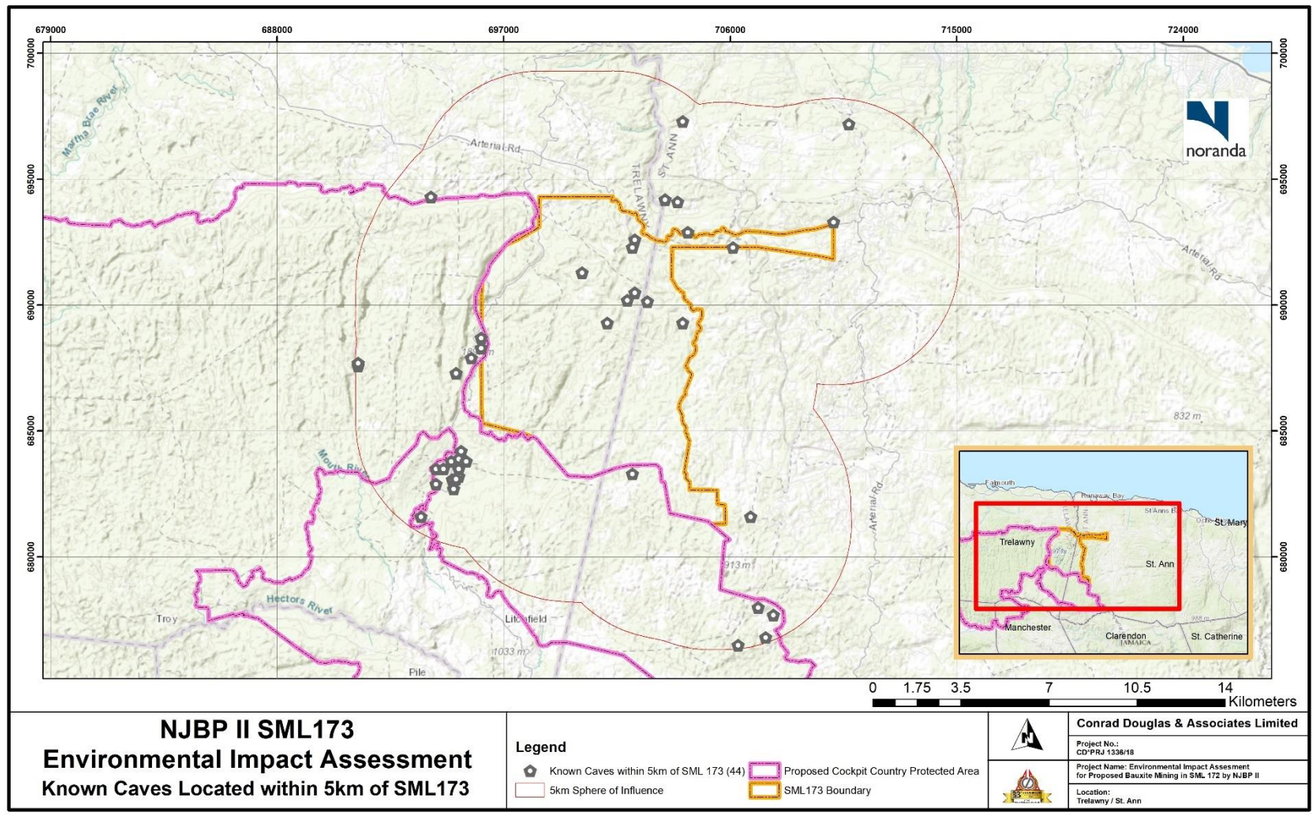


Figure 10: Sinkholes or caves identified or ground-truthed in SML 173 (Source: *Page 5-15 of the EIA Report*)

No	Ref:	Comment	CD&A/NJBP II Response
			 Figure 11: Known Caves Located in and within 5km of SML 173 (Source: *Page 5-16 of the EIA Report*)
4.	*Page 1-7:*	*"Our investigations of the environmental baseline have identified degraded water quality of high nitrate and sulfate concentrations in the Ulster Spring Area…"* *This data and investigations details did not appear to be present in the EIA itself. The data and investigation details should be included in the EIA as evidence for the statement.*	The information on the Freemans Hall (Ulster Spring area) surface water quality was obtained from the Jamaica Water Resources Authority's Water Information System online hydrological map portal (See Figure 12 and Figure 13 below). The established standard for nitrate is provided in the Draft National Ambient Water Quality Standard, 2009 (See Figure 14 below). The latest data provided in the WRA's Water Quality Atlas, 2019 (See Figure 15 below) also confirms the exceedances in nitrate.

No	Ref:	Comment	CD&A/NJBP II Response
			This location is outside of SML 173. Furthermore, as stated in the EIA Report, the water quality is not related to bauxite mining. Nitrate, phosphate, and potassium (NPK), ammonium nitrate and wastewater may be the sources that could be impacting on water quality.

Map | Data — Search | Data Upload | Help | Logoff

Layer: Surface_Water_Sources
Object: Freemans Hall
Parameter: Surface Water Quality
Aggregat.: Monthly
Owner: WRA
Year From/To: 1975 / 1991
Parameter: Nitrate
Display As: Table
New Window
Display

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	An.Avg.
1975											121	108	115
1976	132	108	120	135	133	121	125	110	125	101	83.0		118
1977	132	136	154			112		96.0	112		120		123
1978	104	120		128			130		118	118	104		117
1979	114	126	96.0							120			114
1980			148				126						137
1981	140		141						136				139
1982			147			138							143
1983							144	132					138
1984													
1985													
1986													
1987													
1988													
1989													
1990													
1991	0.000								0.000				0.000
Min.	0.000	108	96.0	128	133	112	125	96.0	0.000	101	83.0	108	
Avg.	104	123	134	132	133	124	131	113	98.2	113	107	108	
Max.	140	136	154	135	133	138	144	132	136	120	121	108	
	Min. for period		0.000		Avg. for period		117		Max. for period		154		

Figure 12: Surface Water Quality for Nitrate from Freemans Hall located at Ulster Spring (Source: *WRA's Water Information System,* accessed: February 1, 2021)

Map | Data — Search | Data Upload | Help | Logoff

Layer: Surface_Water_Sources
Object: Freemans Hall
Parameter: Surface Water Quality
Aggregat.: Monthly
Owner: WRA
Year From/To: 1975 / 1991
Parameter: Sulphate
Display As: Table
New Window
Display

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	An.Avg.
1975											20.0	4.00	12.0
1976	8.00	7.00	7.00	15.0	12.0	10.0	7.00	4.00	13.0	6.00	2.00		8.27
1977	14.0	15.0	15.0			11.0		10.7	17.0		14.0		13.8
1978	11.0	12.0		13.0			12.0		13.0	9.50	11.2		11.7
1979	15.4	0.000	6.00							15.7			9.28
1980			21.0				18.0						19.5
1981	13.5		14.0						17.0				14.8
1982			18.0			13.0							15.5
1983							13.3	14.8					14.1
1984													
1985													
1986													
1987													
1988													
1989													
1990													
1991	0.000								0.000				0.000
Min.	0.000	0.000	6.00	13.0	12.0	10.0	7.00	4.00	0.000	6.00	2.00	4.00	
Avg.	10.3	8.50	13.5	14.0	12.0	11.3	12.6	9.83	12.0	10.4	11.8	4.00	
Max.	15.4	15.0	21.0	15.0	12.0	13.0	18.0	14.8	17.0	15.7	20.0	4.00	
	Min. for period		0.000		Avg. for period		11.3		Max. for period		21.0		

Figure 13: Surface Water Quality for Sulphate from Freemans Hall located at Ulster Spring (Source: *WRA's Water Information System,* accessed: February 1, 2021)

Draft Jamaica National Ambient Water Quality Standard
–Freshwater, 2009

Parameter	Measured as	Standard Range	Unit
Calcium	(Ca)	40.0-101.0	mg/L
Chloride	(Cl^-)	5.0- 20.0	mg/L
Magnesium	(Mg^{2+})	3.6- 27.0	mg/L
Nitrate	(NO_3^-)	0.1- 7.5	mg/L
Phosphate	(PO_4^{3-})	0.01 - 0.8	mg/L
Potassium	(K^+)	0.74- 5.0	mg/L
Silica	(SiO_2)	5.0- 39.0	mg/L
Sodium	(Na^+)	4.5- 12.0	mg/L
Sulfate	(SO_4^{2-})	3.0- 10.0	mg/L
Hardness	($CaCO_3$)	127.0-381.0	mg/L (as $CaCO_3$
Biochemical Oxygen Demand	(O)	0.8- 1.7	mg/L
Total Dissolved Solids		120.0-300	mg/L
pH		7.00- 8.40	
Conductivity		150.0-600	µS/cm

Figure 14: Draft National Ambient Water Quality Standard, 2009

No	Ref:	Comment	CD&A/NJBP II Response

WRA
WATER RESOURCES AUTHORITY

Dry Harbour Mountain Hydrologic Basin Nitrate Levels in Surface Water

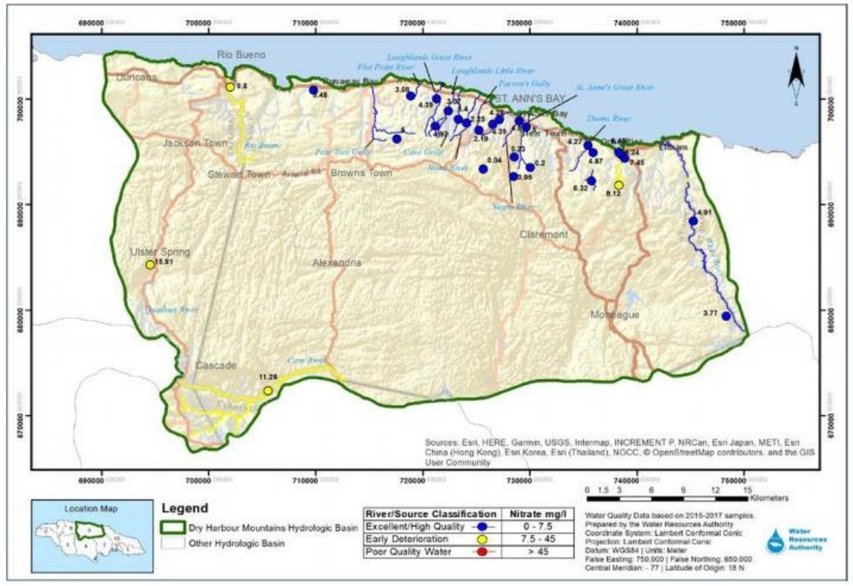
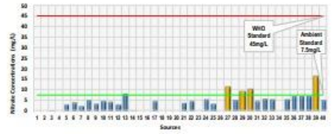


Figure 133: Dry Harbour Mountain Hydrologic Basin Nitrate Levels in Surface Water

DRY HARBOUR MOUNTAIN HYDROLOGIC BASIN NITRATE LEVELS IN SURFACE WATER



Graph 86: Dry Harbour Mountain Basin Nitrate Levels in Surface water

As shown in Figure 133 and Graph 86, the surface water sources within the Dry Harbour Brae basin predominantly indicated excellent water quality for nitrate. Fifty-eight percent (58%) of the sources sampled indicated nitrate quality within the National Ambient Water Quality Standard of 7.5mg/L. Ten percent (10%) indicated nitrate levels in excess of the National Ambient Water Quality Standard of 7.5mg/L

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Figure 15: Dry Harbour Mountain Hydrological Basin Nitrate Levels in Surface Water (Source: WRA's Water Atlas, 2019)

No	Ref:	Comment	CD&A/NJBP II Response
5.	*Page 5-14:*	*"Map of Potential Sinkholes within SML 173"* *The WRA posits that a superimposition of mapped orebodies unto mapped depressions may prove informative.*	Noted. Assuming the granting of an environmental permit, maps will be developed in accordance with the five (5) year Mining Plan and submitted to the regulatory authority.
6.	*Page 5-17:*	*"…there is a general misconception that bauxite occurs under forested areas and hence the belief that bauxite mining impacts watershed quality."* *A watershed is an area of land that drains water into a specific waterbody (USGS). Bauxite mining removes vegetation and soil cover, creates fugitive dust and alters flow regime by changing the landscape, all of which absolutely do impact the watershed by changing the air quality and destroying the flora which forces the fauna to adapt or depart. Rainfall will combine with fugitive dust to create runoff which can possibly lead to contamination (turbidity through increased solids) of the aquifer via infiltration through the now denuded strata. Increased anthropogenic activity in the watershed (such as bauxite mining) will further degrade the watershed. The EIA seems to overlook the fact that much of SML 173 encompasses forest reserves, and the statement about bauxite occurring under grassland cover appears at odds with the statements about bauxite reserves in the heavily forested Cockpit Country Protected Area. At any rate, the watershed's current degradation status of Least Degraded should lead to concerted efforts to maintain this status.*	The EIA Report has stated that there will be no mining in the Forest Reserves or the hillocks, which contain the forest cover and the highest levels of biodiversity in SML 173. Bauxite deposits do not support the growth of a forest cover. While occasionally there may be trees overhanging bauxite deposits there has never been the need for widescale clearing of forests for bauxite mining. This is certainly the case in SML 173. As previously stated, this is the basis for remote sensing being used as a reliable method in the exploration of bauxite deposits. The observation that '*bauxite deposits do not support the growth of forests*' has been made for several decades and is a definitive characteristic of the mode of occurrence of Jamaican bauxite to the extent that it has been used as an indicator in exploration aimed at identifying bauxite deposits. It should be further noted that the infertility of bauxitic soil and the fact that it does not support the growth of forest was among the reasons which piqued the curiosity of Sir. Alfred DaCosta and led to the discovery of bauxite soils in Jamaica in the first place (please see page 2-4 of the EIA Report). Mr. James Lee was among the distinguished geologists who pioneered the use of this method of remote sensing for bauxite exploration in Jamaica. Please see *Lee, J.W., Exploration & Development Drilling for Bauxite in Jamaica, The Journal of the Geological Society of Jamaica Bauxite/Alumina Symposium, 1971*, referenced in the EIA Report on page 5-18. The mode of occurrence of Jamaican bauxite and the fact that bauxite deposits do not support the growth of forests has also been proven by several national and international experts through a number of independent surveys carried out in Jamaica. Included among the institutions that have been involved in these surveys are: the Jamaica Bauxite Institute (JBI), Mines & Geology Division, ALCAN, Alumina Partners of Jamaica (ALPART), Kaiser Bauxite, Alcoa and the US Geological Survey Department. The bio-geo-stratigraphy in the region and the subject 173 area is naturally defined. It shows mainly grasslands on the depressions and the high biodiversity on the hillocks (several of which have been disturbed by human activities). See Figure 16 to Figure 18 below.

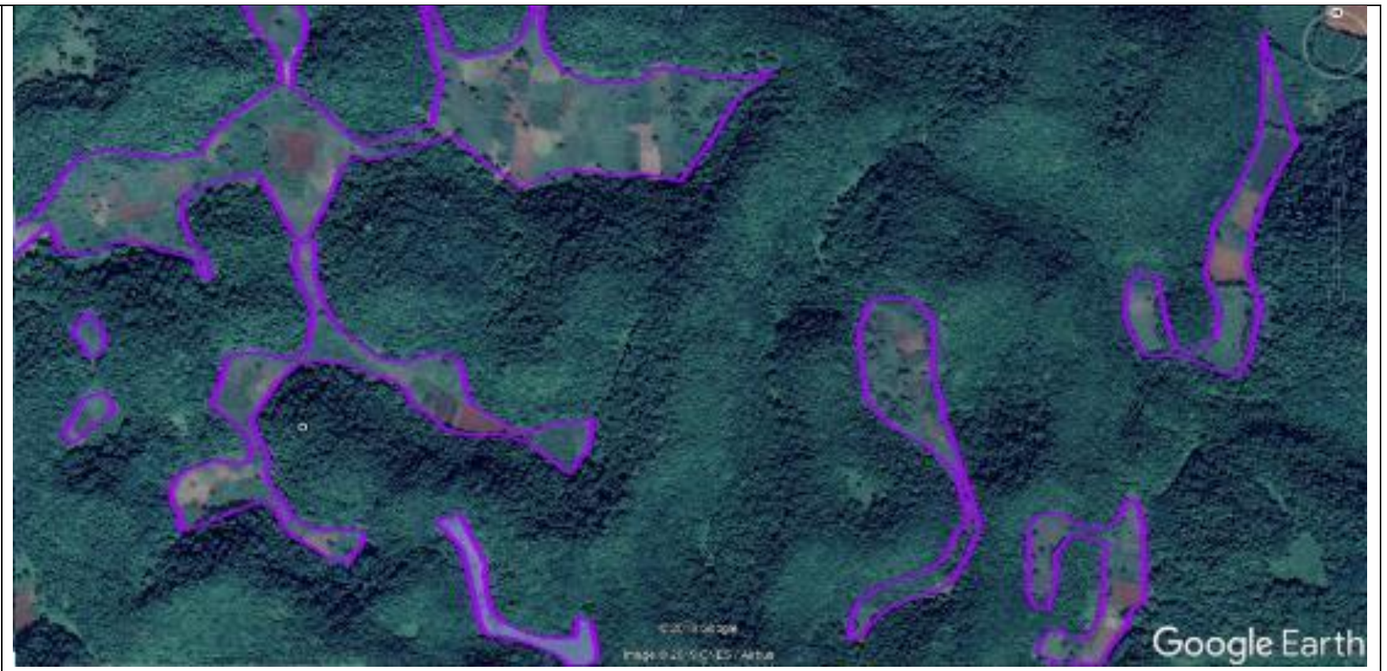
			 **Figure 16: Aerial image showing the low lying bauxite deposits (highlighted in purple) in between the hillocks in SML 173 (See page 5-128 of the EIA Report)**

			 **Figure 17: Photograph showing the low lying bauxite deposits (foreground) in between the hillocks (background) in SML 173 (See *page 5-128 of the EIA Report*)**

Figure 18: Photograph showing the low lying bauxite deposits (midground) in between the hillocks (background) in SML 173 (See Slide 10 of the presentation made at the Mandatory Public Meeting)

It has been stated that there will be no mining in the Forest Reserves or the hillocks, which contain the forest cover and the highest levels of biodiversity in SML 173. The Forestry Department was consulted during the EIA and permitting process and provided the consultants with the Jamaica Gazettes for the estates in the SML 173, which illustrate the boundaries of the Forest Reserves (See Appendix III, page XCIII of the EIA Report).

By law, the Forest Reserves are excluded from mining activities.

As stated in the EIA Report (See page 1-1) the area, which may be impacted on from the proposed bauxite mining in SML 173 represents approximately 15% of the area of SML 173, inclusive of the haul roads. Upon rehabilitation, for example, the planting

No	Ref:	Comment	CD&A/NJBP II Response
			of Napier grass or crops on rehabilitated lands, will provide greater carbon sequestration and climate change mitigation, which is superior to the existing grass cover in the depressions. The Napier grass will also provide a greater air cleansing function. Figure 19 below illustrates examples of the following in NJBP II's current mining lease: A. grassland vegetation that existed before mining, B. mining in progress, C. rehabilitated lands planted with Napier grass

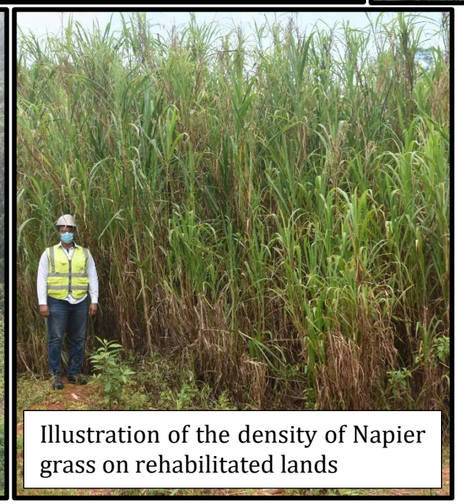
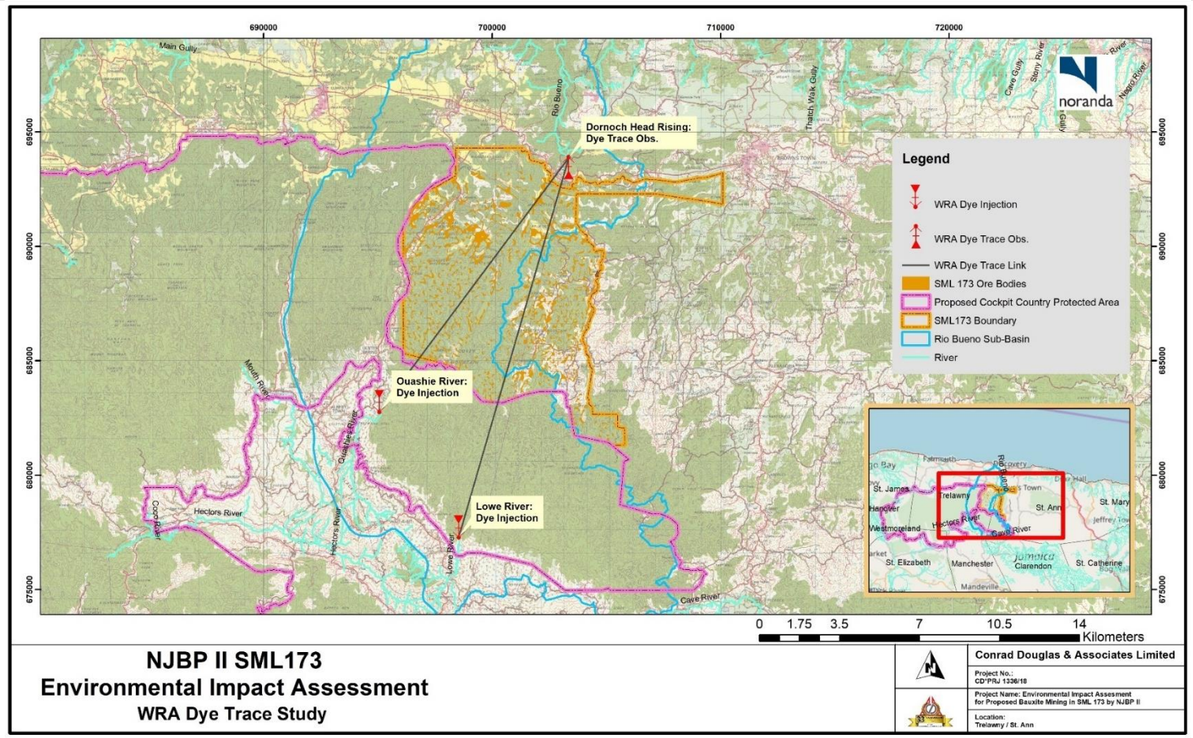


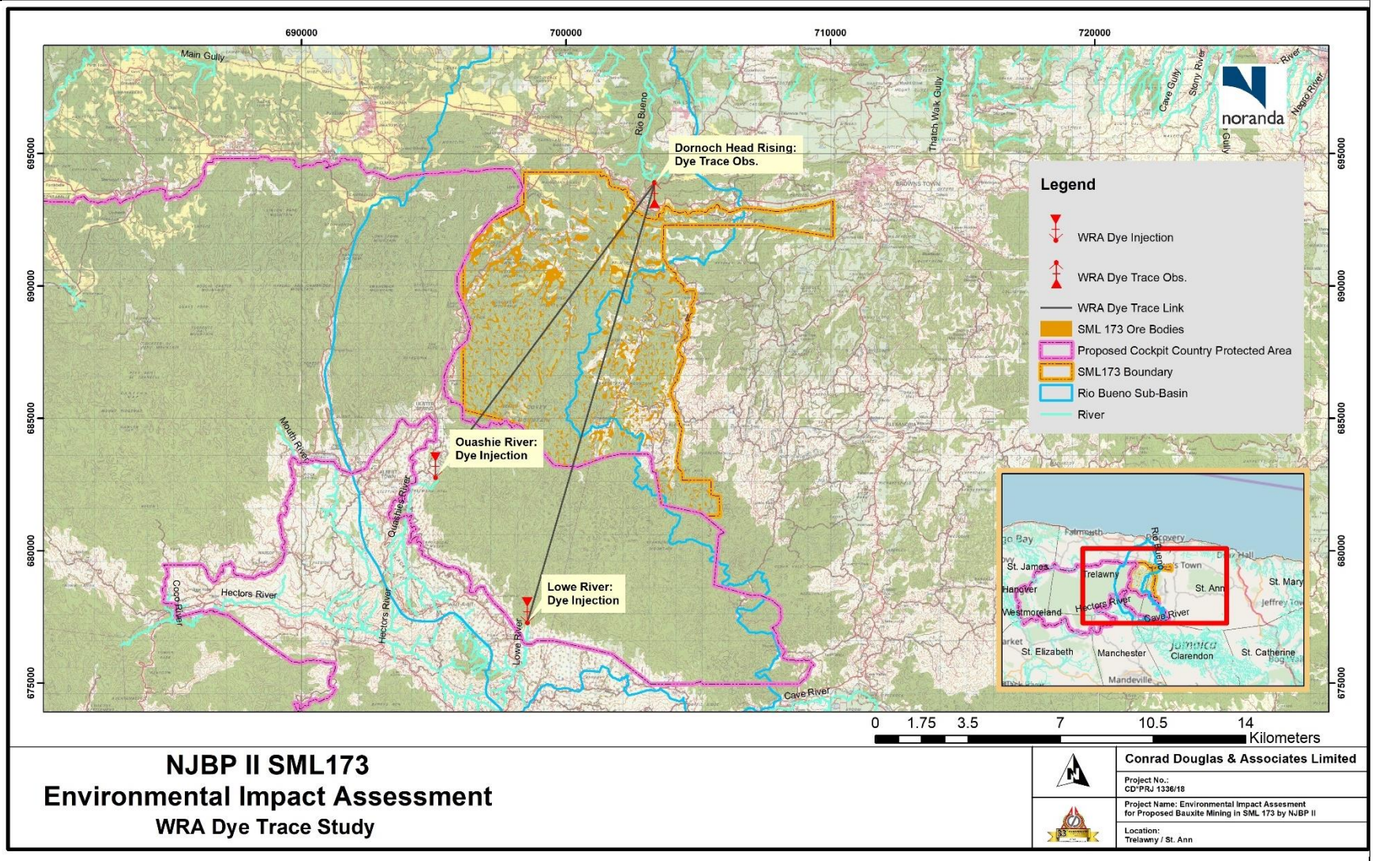
Figure 19: Images illustrating the various stages of mining – Pre-Mining, Mining and Rehabilitation

"Rainfall will combine with fugitive dust to create runoff which can possibly lead to contamination (turbidity through increased solids) of the aquifer via infiltration through the now denuded strata." **Is the reviewer implying that rainfall will combine with fugitive dust resulting in bauxite slurry falling from the sky? We are not aware of any such possibility and remind of the bauxite mining processes and the physico-chemical characteristics of bauxite (See section 2.4 of the EIA Report).**

"Increased anthropogenic activity in the watershed (such as bauxite mining) will further degrade the watershed. The EIA seems to overlook the fact that much of SML 173 encompasses forest reserves, and the statement about bauxite occurring under grassland cover appears at odds with the statements about bauxite reserves in the heavily forested Cockpit Country Protected Area. At any

No	Ref:	Comment	CD&A/NJBP II Response
			rate, the watershed's current degradation status of Least Degraded should lead to concerted efforts to maintain this status." **This is incorrect. There will be no mining in the Declared Cockpit Country Protected Area as stated by the Most Honourable Andrew Holness, Prime Minister, in Parliament on November 21, 2017 (See Appendix IV of the EIA Report). The reviewer has not clearly reviewed or appreciate the contents of the EIA. Again, we stressed that bauxite mining will take place in 15% of the total SML 173 area, which represents mainly grassland cover. This SML 173 area is outside of the declared Cockpit Country Protected Area (CCPA). In addition, no mining will take place in the Forest Reserves or on the hillocks, which contains the highest levels of biodiversity in SML 173.**
7.	**Page 5-17, Page 5-19, 5-23:**	Various maps of the study area designating a boundary for the *'Rio Bueno sub- basin'* The WRA did **not** provide the *Rio Bueno sub-basin* boundary indicated on these maps. The boundary appears to be a generated watershed based on the topography of the region around the Dornoch Spring; however, it ignores the contributing flows of the Cave, Lowe and Quashie Rivers and their watersheds. The EIA should state clearly the origin of the "*Rio Bueno sub-basin*" boundary, and not attribute it to the WRA.	The boundary maps were obtained from the WRA's records. If the maps have been updated, then such updates would be appreciated. All reasonable efforts were made to obtain all relevant data from the WRA by conducting research and consultations. This does not detract from the contents of the EIA. The WRA general question appears to be subjective. It would be useful to the process if the WRA being the Authority on the management of Jamaica's water resources, provide any additional information of which the Agency may be aware. In previous communications, the WRA insisted that the flows beneath SML 173, are included in the EIA. This has been done (See Figure 20 below).

No	Ref:	Comment	CD&A/NJBP II Response
			 **Figure 20:** WRA Dye Trace Study (Source: *WRA*) (See Page 5-25 of the EIA Report)
8.	Page 5-25:	The historical Cave River dye trace connection should be included. The WRA has repeated the Cave River trace and re-confirmed the results. The WRA has also confirmed that flows from the Cave River appear to go only to the Rio Bueno, and do not flow to either the Pear Tree Bottom River or the Laughland Great River.	The dye trace study by Bristol University (Smith and Smart) linking the Quashie River and Lowe River sinks to the Rio Bueno Head were illustrated on a map in the EIA Report (See Figure 21 below). All reasonable efforts were made to obtain all relevant data from the WRA by conducting research and through consultations. This does not detract from the contents of the EIA. We would be grateful if the WRA could provide the information containing the connections between the Cave River and the head waters of the Rio Bueno, including the date of the most recent study. Cave River will not be impacted by the proposed bauxite mining activity in SML 173. We maintain that the groundwater resources beneath SML 173 will not be impacted by bauxite mining.

No	Ref:	Comment	CD&A/NJBP II Response
			 **Figure 21:** WRA Dye Trace Study (See figure 5-15 on 5-25 of the EIA Report)
9.	Page 5-28:	*"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…over the past 50 years"* *Mining activities over the past 60 years appear to have been focused in areas that may not contribute significant flow to the Rio Bueno. The EIA made the accurate observation that the flows from Cave, Lowe and Quashie Rivers all go to the Rio Bueno and nowhere else; however, past mining in SML 165 (centered on Alexandria) would most likely*	The research on "*comparisons of flows and water quality for the Pear Tree Bottom River and Laughland Great River, among others*" is beyond the scope of the EIA. Additionally, the Water Quality Atlas 2019 report published by the WRA showed that there was no evidence of water pollution linked to bauxite mining.

No	Ref:	Comment	CD&A/NJBP II Response
		not have had much impact on the Rio Bueno based on its location. More research would be needed to validate the EIA's assertion, and it would require comparisons of flows and water quality for the Pear Tree Bottom River and Laughland Great River, among others. See figure 1 at the end of this response.	
10.	Page 5-29:	*The document states that surface runoff will be increased due to construction of haul roads. The applicant needs to state the mitigation strategies proposed to deal with same.*	The mitigation actions for potential impacts on surface drainage has been discussed in the EIA Report. See Section 7.1. Impacts to Physical Resources (pages 7-6 to 7-7 of the EIA Report) and Section 8.1.3. Water Quality, Surface Water Hydrology and Groundwater (pages 8-2 - 8-3 of the EIA Report). In any event, this would be a temporary increase. The relevant designs will be developed during the preparation of the five (5) year Mining Plans. As stated in the EIA Report (See page 1-1) the total area to be impacted represents approximately 15% of the area of SML 173 inclusive of the haul roads.
11.	**Page 5-29:**	*The increase in turbidity and discolouration that is expected, may affect users of the water resources in the basin. The applicant should discuss these expectations with the stakeholders and propose mitigation methods should this disruption occur.*	As stated in the response to comment No 2, this is not expected and has never been reported or recorded in areas with extensive bauxite mining, high rainfall or flooding. This is not expected to change with the proposed mining of bauxite in SML 173. In any event, in keeping with NJBP II's policies and protocols, NJBP II consults with all stakeholders during all phases of the mining process.
12.	**Page 5-30**:	*The WRA reiterates its previous comment regarding the depth to groundwater as a non-determinant of how susceptible the aquifer is to contamination.*	It would appear that the reviewer has made the assumption that the limestone leading to the aquifer beneath SML 173 is highly permeable. However, permeability (P) and hydraulic conductivity (HC) may vary and depend on the inherent nature of the limestone. Permeability may decrease with both depth and the circulation of water in the aquifer. Conduit permeability is not continuous and does not follow a straight line leading to the aquifer. The variation in both HC and P with depth were noted in the modelling of the Essex Valley limestone aquifer by Schlumberger (formerly Waterloo University). In bauxite mining the volume of material (moisture) that is available for transport into the saturated zone through the thick unsaturated zone is relatively small and will require a large volume of water to reach the water table. The main and only possible pollutant is particulate material, which may result in increased turbidity. It is correct to say that high permeability increases the pollution risk, in this case soil particles, but this cannot be applied *carte blanche* across the aquifer for all types of probable contaminants.

No	Ref:	Comment	CD&A/NJBP II Response
			Bauxite mining does not involve the use of materials such as caustic soda (NaOH) or any other type of material, which could pollute ground water resources. The Water Quality Atlas 2019 report published by the WRA showed that there was no evidence of water pollution linked to bauxite mining.
13.	Page 5-30:	"*The ore bodies to be mined are shown on figure 5-11*" Figure 5-11 shows all ore bodies within SML 173, with no regard for locations near sinkholes, locations in forest reserves, or other stated limitations of mining activities. The EIA should prepare a map that presents the actual proposed areas for mining as limited by the various sterilization factors, not a map that presents all orebodies as proposed mining sites.	The assertion that there was: "*no regard for locations near sinkholes, locations in forest reserves, or other stated limitations of mining activities*" is an extreme and incorrect statement. A series of maps in the EIA Report clearly shows the distribution of bauxite orebodies in relation to other important features in SML 173 and these maps readily allow for the deduction of spatial relationships. Additionally, as stated in the EIA, mining is done in accordance with a five (5) year Mining Plan approved by the Mines & Geology Division. The orebodies to be mined will be clearly outlined in the Mining Plan. It has been stated in the EIA Report that there will be no mining in the Forest Reserves or the hillocks, which contain the forest cover and the highest levels of biodiversity in SML 173. The Forestry Department was consulted during the EIA and permitting process and provided the consultants with the Jamaica Gazettes for the estates in the SML 173, which illustrate the boundaries of the Forest Reserves (See Appendix III, page XCIII of the EIA Report). **By law, the Forest Reserves are excluded from mining activities**. **NJBP II is obliged to comply with the requirements of the JNHT Act and any other relevant legislation.**
14.	**Page 5-35:**	*Though the 30 year mean annual rainfall has been cited, an emerging trend of a westward shift in rainfall has been noted by the Meteorological Service of Jamaica. This may have an impact on expected rainfall amounts and projected runoff.*	The Climate Studies Group at the Physics Department of The University of the West Indies (UWI) has modelled the rainfall and the results indicate a 45% decline in rainfall up to 2080. Therefore, run-off is likely to decrease. However, if the rainfall is of shorter duration and greater intensity to cause an impact on the volume and rate of run-off, appropriate mitigation measures will be implemented to address same.
15.	**Page 5-59**:	*The drought statement as presented is misleading. Drought is defined by low water availability, either from a meteorological, hydrological, or agricultural perspective. The word "drainage" in the EIA would be more accurately substituted by "infiltration", and that would not in and of itself be a precursor to drought.*	Please note that the subject matter concerns **vulnerability** to potential impacts from drought and not the causation of drought.
16.	**Page 7-7**:	*The design of the drainage works should be submitted to the National Works Agency for review.*	This is a comment for NEPA. The design of drainage works will be done in accordance with applicable protocols.

No	Ref:	Comment	CD&A/NJBP II Response
17.	Page 7-8:	*Item WQ1 "The impacts on groundwater of this project, if any, will be negligible as there are no chemicals, waste streams or disposal activities associated with the development that stand to affect groundwater".* *This statement remains unproven. Introduction of particles into an aquifer is considered a type of contamination, and there is precedent for polluted groundwater in this region as previously indicated by the Retreat well. The potential risks to groundwater should not be downplayed or minimized.*	It would appear that the reviewer has made the assumption that the limestone leading to the aquifer beneath SML 173 is highly permeable. However, permeability (P) and hydraulic conductivity (HC) may vary and depend on the inherent nature of the limestone. Permeability may decrease with both depth and the circulation of water in the aquifer. Conduit permeability is not continuous and does not follow a straight line leading to the aquifer. The variation in both HC and P with depth were noted in the modelling of the Essex Valley limestone aquifer by Schlumberger (formerly Waterloo University). In bauxite mining the volume of material (moisture) that is available for transport into the saturated zone through the thick unsaturated zone is relatively small and will require a large volume of water to reach the water table. The main and only possible pollutant is particulate material, which may result in increased turbidity. It is correct to say that high permeability increases the pollution risk, in this case soil particles, but this cannot be applied *carte blanche* across the aquifer for all types of probable contaminants. Bauxite mining does not involve the use of materials such as caustic soda (NaOH) or any other type of material, which could pollute ground water resources. The Water Quality Atlas 2019 report published by the WRA showed that there was no evidence of water pollution linked to bauxite mining. The Retreat well was not polluted by bauxite mining and it is wrong to intimate that this is the cause of any contamination. The nature of the contaminant has never been determined. It is therefore not reasonable to request that the source of contamination be determined under the scope of this EIA. This should be the task of the WRA in its management of the island's water resources. The mining of bauxite has not and will not result in the exceedance of parameters in ground water pollution. The section on hydrology states that there will be a temporary increase in turbidity. However, the system will return to stability. It is an established fact across Jamaica for the past 60 years since bauxite mining began that bauxite mining has not resulted in the pollution of groundwater resources. This was arrived at from actual measurements and observations. There is no evidence to disprove this fact. Please see the examples provided in the response to comment No. 2 above. The potential risks to groundwater from bauxite mining has been analyzed in the Impact Identification and Impact Mitigation sections. See Section 7.1. Impacts to Physical Resources (page 7-8 of the EIA Report), Section 7.5.5. Risk to Water Resources (page 7-23 - 7-25 of the EIA Report) and Section 8.1.3. Water Quality, Surface Water Hydrology and Groundwater (page 8-2 to 8-3 of the EIA Report).

No	Ref:	Comment	CD&A/NJBP II Response
18.	Pages 7-23 – 7-25	*Risk to Water Resources* *The WRA believes that this section of the EIA is not objectively presented, seeks to minimize and otherwise "spin" the interpretation of the data currently available, and makes significant conclusions based on the absence of data as opposed to the presence of data. The potential impacts of mining on water resources (along with all other potential impacts and concerns in other spheres) requires that decisions be made on the best data available, not on the absence of data or the projection of data. In the absence of data, then the most conservative approach should be taken, and data should be gathered to guide the best decision possible. Any decision made to mine bauxite in SML 173 should not be based on exaggerated optimism, subjective/biased analysis, or a dismissal of the concerns of stakeholders. For example, the section mentions the noted turbidity observed in Sherwood Content and Lluidas Vale NWC well, but then goes to say "it is highly unlikely that this would occur in the Rio Bueno catchment" IF certain ore bodies are not mined. This observation should not be dismissed or downplayed. At minimum, the EIA should present a fulsome analysis of the available data to buttress the assertions made in this section, and the EIA should also determine what, if any, observed historical impacts may or may not be attributable to bauxite activities.*	The turbidity at Sherwood Content and Lluidas Vale #6 well is due to the deforestation and the subsequent erosion of soil into sinkholes that are directly connected to the spring and well source and is not related to bauxite mining. In bauxite mining areas this has never been reported or recorded. Several consultations were convened with the WRA. Additionally, the draft EIA was shared with the WRA and the comments generated were submitted through NEPA to CD&A. Responses to these comments were provided by CD&A. These belated comments from the WRA were never made. *"The WRA believes that this section of the EIA is not objectively presented, seeks to minimize and otherwise "spin" the interpretation of the data currently available, and makes significant conclusions based on the absence of data as opposed to the presence of data."* It is a most unfortunate and unprofessional comment, which is below the standard expected from an Authority. "*Exaggerated optimism*" – There is none. Further, the responses to comments No. 1 and 2 above still stands: It is an established fact, across Jamaica for the past 60 years since bauxite mining began, that bauxite mining has not resulted in the pollution of groundwater resources. This was arrived at from actual measurements and observations. There is no evidence to disprove this fact. For example, in flood prone areas such as Porus/Harmons, Mile Gully and Clapham/Moneague where active mining was in place before and after heavy rains which flooded the mines, it is known that the WRA monitored the outflow of water from each of these areas on a regular basis and found no contamination. The floodwater from Porus/Harmons went to Alligator Hole River and springs along Canoe Valley. The floodwaters from Mile Gully went to St Toolies/St Jago Springs and the floodwaters from Clapham/Moneague went to the White River above the National Water Commission (NWC) treatment plant at Labyrinth. At none of the monitoring points was any discoloured or turbid water seen and recorded by WRA's Technical Staff. In all instances the water from the flows was "*crystal clear*" and did not interfere with the NWC's operations along the White River or the NIC's operations at Milk River/St. Toolies. In fact they shut down the six (6) wells along the fault zone, a highly permeable flow path, and used the spring flow for irrigation and domestic consumption. There has never been a report and/or recording of any pollution of ground and/or surface waters from bauxite mining.

No	Ref:	Comment	CD&A/NJBP II Response
19.	Page 11-4:	*In addition to the bi-monthly monitoring proposed, the WRA recommends additional monitoring be conducted after significant rain events, with the threshold of significance to be determined.*	Noted.
20.	**Page 11-6:**	*"There are no wells close to the Cockpit Country of the SML 173 area that can be monitored for either groundwater level or groundwater quality."* *The EIA continues after this statement to mention the Barnstaple NWC well, which is located less than 1 km north of the SML 173 boundary. The Brown's Town-Minards wells (NWC) are both located 1.7 km north of the SML 173 'panhandle', and the Retreat Well is located less than 500 metres from the 'panhandle.' The WRA reiterates that the Retreat well was abandoned due to pollution issues, and the EIA does not reference this fact even though it was pointed out in the August 30, 2019 letter. At minimum, these three wells should be monitored for water quality and water level. In addition, the Swanswick-Clarkes Town well is now in operation by Organic Growth Holdings, and could also be utilized as a WQ sample point.*	The law mandates the monitoring of wells by the holders of abstraction licences in accordance with the conditions of the licences prescribed by the WRA. NJBP II is not a holder of an abstraction licences for any of the listed wells. Additionally, these wells are out of the flow path of SML 173. The results of any quality and quantity changes may therefore not be related to mining activities but to events outside the boundary of SML 173. The areas are subjected to anthropogenic activities, which may impact on water quality.
21.		The Cave Valley well information does not include the actual rate for the stated yield test.	The well yield data for Cave Valley (Source: WRA) is provided below: • **Static Water Level (SWL):** 14.55 metres below ground level (mbgl) • **Pumping rate:** 191 cubic metres per day • **Pumping water level (PWL):** 35.89 mbgl • **Drawdown:** PWL-SWL = 21.34m • **The specific capacity**: the wells performance was 8.95 m^3d/m (cubic metres per day per metre of drawdown)
22.		The dye tracing statement does not account for the previous recognition in the current EIA of the dye trace work conducted by the WRA in 2018-present.	The recognition of the WRA dye tracing work were made on page 5-24 of the EIA Report. The statement made in the EIA is as follows: "*Dye tracing by the WRA in 2018 proved the Lowe River connection. No linkage with the Martha Brae River or any other surface system in either the Martha Brae River or Dry Harbour Mountain Hydrologic Basins has been proven.*"

No	Ref:	Comment	CD&A/NJBP II Response
23.		Finally, the WRA refers to a comment we made in the August 30, 2019 letter that there appeared to be a bias in the EIA that may be inappropriate for a supposedly objective Environmental Impact Assessment. This revised EIA appears to maintain a significant lack of objectivity throughout the document, and this lack of objectivity does not provide the EIA with the credibility required to make an accurate assessment of the potential impacts of mining in SML 173. An objective assessment should present all of the facts available, state the gaps in the available data, and make a recommendation based on those facts and data. The assessment should not be based on economic exigencies or predetermined outcomes. The significance and public profile of this particular issue demands an objective analysis that can withstand scrutiny from all stakeholders, and the WRA strongly recommends that NEPA ensure the development and presentation of an objective EIA analysis, even if it means selecting an assessor that is not engaged by the applicant or by opposing stakeholders.	We strongly disagree and are deeply disappointed with the unfortunate and unprofessional comments made, which is an unmerited attack on the long standing credibility and objectivity of Conrad Douglas & Associates Limited (CD&A). CD&A is the pioneering multi-disciplinary environmental management consultancy firm in Jamaica and the English-speaking Caribbean. The company has **over 35 years of experience** in Environmental Impact Assessments, project planning, sustainable development, project management, engineering and environmental management. CD&A reminds that the project team comprises leading professionals and experts in their respective disciplines, including but not limited to: hydrology, geology, ecology, air quality, legal framework, urban and regional planning, sociology, environmental engineering, environmental science and environmental management (Please see Appendix II: Team Composition of the EIA Report). It is also noteworthy that the Project Director for the EIA, Dr. Conrad Douglas, the Executive Chairman & Principal Consultant of CD&A was a Consultant to the United Nations Environment Programme (UNEP), Industry and Environment Office, Paris, France. In Paris, Dr. Douglas prepared and presented four (4) major UNEP Industry & Environment Office publications (in English, French and Russian) on the Bauxite and Alumina Industries and the Environment as a highly objective and exhaustive process involving all public sector, private sector and Non-Governmental Agencies (NGOs) concerned with the industries throughout the world. Dr. Douglas also on behalf of the IDB/GoJ, as Team Leader developed detailed management plans for the institutional strengthening of the Natural Resources Conservation Authority (NRCA) of Jamaica and prepared Jamaica's first "*Guidelines for Conducting Environmental Impact Assessments (EIAs)*". He also served as the Chairman of the Technical Advisory Committee of the Board of the Water Resources Authority and the Chairman of the National Irrigation Commission. He was also Chairman of the Scientific Research Council and the Chairman of Jamaica's first Climate Change Advisory Board. Dr. Douglas also consulted to UNESCO on the establishment of a Climate Change and Environmental Clearing House and Knowledge Hub for the Caribbean, among several other projects in conducting his nationally and internationally recognized work throughout Africa, Asia, the Caribbean Region, North, Central & South America and Europe. Dr. Douglas was also a visiting Professor of Applied Chemistry at The UWI. Mr. Basil Fernandez, Team Leader for the hydrology and hydrogeology components of this EIA, has over 48 years of experience in hydrology and hydrogeology, working in Jamaica and internationally. He is one of Jamaica's leading hydrologist/hydrogeologists. In 1982, Mr. Fernandez produced Jamaica's first comprehensive report on the pollution of the island's water resources. He also produced the first draft National Water Policy in 1994 and was a Member of the team that completed the National Water Policy that was approved by Cabinet in 1999. Mr. Fernandez has raised the professionalism and

No	Ref:	Comment	CD&A/NJBP II Response
			work output of WRA to be the Premier Hydrologic Agency in the English Speaking Caribbean. He is a recipient of National Honours, Order of Distinction Commander Class (CD). He is also the recipient of the RJRGLEANER Honour Awards 2019 for Science & Technology for Hydrology. Not surprisingly, the reviewer has not provided any credible or scientific evidence to support the unfounded assertions. CD&A is also not satisfied that the review has been given the required objectivity. It has also been noted that in many instances, information that was actually presented in the EIA were said to have been omitted. It may therefore, be reasonably concluded that the WRA did not thoroughly review or inform itself on the contents of the EIA. It can only be assumed that the assertion of bias is due to the recommendation of CD&A that a environmental permit be granted for the project. It should be noted, however, that CD&A's considered recommendation was based on a number of factors, including, but not limited to: • The potential negative impacts of mining of bauxite in SML 173 will in most instances be of short duration or reversible. • NJBP II will be obliged to rehabilitate the mined orebodies using best practices and in compliance with the requirements of the regulatory framework. • It is possible to mitigate most of the potential negative impacts by engaging in suitable or appropriate measures as detailed in the EIA. • NJBP II will not conduct mining in the Forest Reserves or on the elevated hillocks, which hosts the highest levels of biodiversity • NJBP II will be obliged to protect caves, sinkholes and declared historical heritage sites. • Mining of bauxite and the construction of haul roads will be limited to 15% of the entire 8,335 hectares comprising the SML 173 area. • The project will yield macro and micro economic benefits to communities within the SML 173 area and Jamaica, in general The recommendation of CD&A is that there should be a '*clawed back area'* within which there will be no bauxite mining thereby further reducing the footprint of the project.

Appendix I: Comments received from the Forestry Department

Forestry Department
Protecting our Forests, Sustaining Lives

Please reply to the CEO and Conservator of Forests

Forestry Department

Ref # ASO/0305-01

January 5, 2021

Mr. Peter Knight, CD, JP
Chief Executive Officer /Government Town Planner
National Environment & Planning Agency
10 Caledonia Avenue
Kingston 5

Dear Mr. Knight

Re: Universal Application # 2018-07017-EIA00196
Type: Environmental Impact Assessment
Application concerning Noranda Jamaica Bauxite Partners II

The Forestry Department (the Agency) acknowledges receipt of your correspondence dated November 19, 2020 along with the attachments relating to the Special Mining Lease application from Noranda Jamaica Bauxite Partners (NJB). Having reviewed the EIA the Agency offers the following comments relating to the captioned matter:

1. ***Haul Roads***
   a. NJB must adhere to its commitment to reduce road width where possible and to actively implement dust suppression measures as outlined in the Environmental Impact Assessment (EIA).
   b. The NJB must throughout the life of the mining activity exercise active management of the haul roads so as to prevent their use by unauthorized people in order to minimize the potential for their use to facilitate squatting and/or illegal exploitation of the forested areas for timber, forest products or wildlife and the further degradation of the remaining forests in these areas.
   c. Recognizing that the proposed mining activities will come in close proximity to the proposed area for protection of the cockpit country, the Agency recommends that at the end of the mining activity, the surface of the haul roads must be broken up to facilitate the sponateous re-generation and active re-forestation of the roadways. This will allow for the restoration of ecological corridors between the hillocks of the mined areas (reduced fragmentation), the reduction of the degradation potential and an increase in areas available for restorative planting of tree species.

173 Constant Spring Road, Kingston 8, Jamaica (West Indies); Telephone: (876) 924-2667/2667/2668; Fax: (876) 924-2626
www.forestry.gov.jm; email: fdinfo@forestry.gov.jm; www.facebook.com/forestrydepartment
FOREST OFFENCES HOTLINE: 1888-FORESTS (1888-367-3787)

d. Where it has been determined that haul roads must be left open at the end of mining, active and appropriate measures must be put in place to limit any ensuing access to the remaining forested areas.

e. It is critical that every effort is made by the relevant Authorities (JBI and NEPA) to mandate and ensure that NJB is held accountable for the road closure at the end of mining.

2. ***Bauxite Deposits***

The Government has guaranteed that there will be no exploitation of any deposits found within the protected areas (forest reserves, and JNHT sites), as such it is anticipated that there will be a need to improve/enhance the capacity of the Agency to conduct additional monitoring of the mining activities undertaken by NJB to ensure that they do not infringe on the forest reserves. To support this additional monitoring activity, the Agency recommends that a special admistrative charge should be applied to the NJB permit and this should be deployed to support the Agencies so affetcted.

3. ***No Net Loss Policy***

The Agency takes this opportunity to strenuously remind all concerned that every effort muts be made to adhere to the ***"No Net Loss"*** of forest cover outlined in the Forest Policy for Jamaica (2017). Consequently, there is to be a requirement that NJB must reforest an equivalent area of forest cover lost due to the entire mining and rehabilitation process. This must be subject to the following: -

1. A thorough assessment of the amount of forest cover to be impacted and hence the percentage loss (forest) to the country.
2. Clear plans and active phased replacement of the lost tree cover by NJB within a requirement for total replacement within a stipulated timeline.
3. The responsibility for this replanting will lie solely with NJB, though the Agency will monitor and assess the activity overtime.
4. The satisfactory achievement of the "no net loss" as stipulated by policy will be at the sole discretion of the Agency.

5. ***Biodiversity of the Area (Flora)***

While the endemic trees/bromeliads and vines identified in SML 173 are not locally endemic, the NEPA and NJB are encouraged to conserve and use these species in the restoration programme. Specifically, it is recommended that as many as possible of the native trees identified be included in these restoration efforts and that NJB be required to use a modern and progressive restoration approach in the decommissioning of mined-out pits from simply grassed areas to a state where trees/forests can be re-established.

6. ***Forest cover establishment***

a. Recognizing the significant impact on total national forest cover that mining activites can have, the establishment of tree cover at the end of the project must be mandated to include areas that may have been flat grassed areas (not under forest cover) at the beginning of the mining activity.

b. Recognizing the inherent challenges with the reclamation/rehabilitation of the mined out pits, its is recommended that where possible the rehabilitation is to include reforestation with a portion being done within the pits and a portion in more suitable areas, where available, to increase the survivability and hence impact on national forest cover statistics.
c. The Agency challenges the veracity of the claim that trees do not grow in the areas with bauxite deposits as the land has "aluminum iron toxicity" and requests any evidence that could support such a statement. The inherent fallacy of this statement is however recognized as any observation/assessment of any undisturbed section of bauxite bearing areas e.g. Cockpit Country demonstrates that this statement has no merit.
d. It is imperative that the permit issued mandates not only that replanting be done, but also a clear requirement that they be maintained as needed to ensure that there is survival of the seedlings up to 5 years after planting

7. ***Reshaping of pits and the impact on forested hillocks.***
NEPA must also ensure that any permit granted:
a. Establishes clear standards for a maximum amount of land that can be shaved off the adjoining hillocks in order to rehabilitate/restore the mined-out areas as well as to ensure the stability of slopes created thereby reducing the likelihood of land slippage in future.
b. Ensure that tree establishment activites are included among the measures for achieving certification of the mined-out pits.
c. Facilitate the inclusion of the FD in the process from the onset of the mining activity in support of the needed research to guide mining operations in the future.

Recognizing that the removal of high value species/areas with replanting in other areas and attempts to re-establish forest cover does not guarantee the quality or integrity of any resultant reforested area, the Agency can not in principle support any activity that holds the potential to adversely impact the no net loss policy. The Agency therefore encourages that every effort be made to maintain the connectivity and the ecology of the impacted areas, so as to reduce the impacts of fragmentation and degradation of those areas and that all of the recommendations outline herein are incorporated and adhered to in a bid to minimize the longterm impact on total national forest cover.

Sincerely,

Ainsley A. Henry, JP
CEO & Conservator of Forests

Appendix II: Comments received from the Water Resources Authority

WATER RESOURCES AUTHORITY
ESTABLISHED BY THE WATER RESOURCES ACT, 1995
HOPE GARDENS, P.O. BOX 91, KINGSTON 7, JAMAICA
TEL: (876) 927-0077, 927-0293, 927-0189, 927-0302
FAX: (876) 977-0179, 702-3937

REF: DR 8-26 December 15, 2020

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

Attention: Mr. Peter Knight

Dear Sir,

Re: Mining Operations, Special Mining Lease 173 Area in St. Ann & Trelawny
Universal Application Number: 2018-07017-EIA00196

We are in receipt of your letter dated 19 November, 2020 (received November 24, 2020) regarding the captioned Environmental Impact Assessment.

The Water Resources Authority (WRA) previously made comments on the first submission of this EIA as stated in our letters to NEPA dated August 30, 2019 and March 19, 2020. These letters are attached to the current communication. The WRA comments on the submission received November 24, 2020 are as follows. Quotations from the EIA are in *italics*.

Page 1-7: *"...ground water resources are at significant depths (more than 100 m) below the surface of SML 173."*

The WRA believes that this should not be used as a metric to minimize the risk of contamination. The aquifer beneath SML 173 is karstified and significantly faulted, and these conditions increase the permeability of the aquifer which increases the risks of contamination to groundwater.

Page 1-7: *"Nationally, the baseline associated with ground water quality and quantity 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. It is highly improbable that the water resources will be impacted by the mining of bauxite in areas of similar karstic geomorphology. This is supported by evidence gathered from monitoring wells in St. Elizabeth, Manchester, St. Ann and Clarendon."*

The WRA re-affirms its comments from the August 30, 2019 letter in that this assertion is not yet definitively proven, and the purported evidence was not presented to support the assertion. The Retreat well is a stated example of pollution impacting groundwater in the region, although it has not been determined what the source of that pollution was/is. The EIA should mention and address this particular matter of the Retreat well.

Page 1-7: *"Most of the caves identified are elevated above the deposits and areas containing sinkholes will not be mined."*
The EIA should definitively state that there are no caves in or near the areas proposed for mining, if this is the actual situation. The quoted sentence gives the impression that there are some caves that are not elevated above the deposits. There should be a definitive investigation/ground truthing of the specific areas potentially slated for mining to confirm whether any unknown caves/sinkholes are within those areas. At least two sinkholes/caves were stated in the EIA as discovered by CD&A, so this illustrates the possibility that other unidentified sinkholes/caves may be in the region.

Additionally, the EIA should state how the applicant proposes to treat with caves/sinkholes that are located in/near the potential mining areas/orebodies. It may be that the proximity to caves/sinkholes will sterilize the potential for mining at a given location.

Page 1-7: *"Our investigations of the environmental baseline have identified degraded water quality of high nitrate and sulfate concentrations in the Ulster Spring Area…"*

This data and investigations details did not appear to be present in the EIA itself. The data and investigation details should be included in the EIA as evidence for the statement.

Page 5-14: *"Map of Potential Sinkholes within SML 173"*

The WRA posits that a superimposition of mapped orebodies unto mapped depressions may prove informative.

Page 5-17: *"…there is a general misconception that bauxite occurs under forested areas and hence the belief that bauxite mining impacts watershed quality."*

A watershed is an area of land that drains water into a specific waterbody (USGS). Bauxite mining removes vegetation and soil cover, creates fugitive dust and alters flow regime by changing the landscape, all of which **absolutely do impact the watershed** by changing the air quality and destroying the flora which forces the fauna to adapt or depart. Rainfall will combine with fugitive dust to create runoff which can possibly lead to contamination (turbidity through increased solids) of the aquifer via infiltration through the now denuded strata. Increased anthropogenic activity in the watershed (such as bauxite mining) will further degrade the watershed. The EIA seems to overlook the fact that much of SML 173 encompasses forest reserves, and the statement about bauxite occurring under grassland cover appears at odds with the statements about bauxite reserves in the heavily forested Cockpit Country Protected Area. At any rate, the watershed's current degradation status of Least Degraded should lead to concerted efforts to maintain this status.

Page 5-17, Page 5-19, 5-23: Various maps of the study area designating a boundary for the *'Rio Bueno sub-basin'*

The WRA did **not** provide the *Rio Bueno sub-basin* boundary indicated on these maps. The boundary appears to be a generated watershed based on the topography of the region around the Dornoch Spring; however, it ignores the contributing flows of the Cave, Lowe and Quashie Rivers and their watersheds. The EIA should state clearly the origin of the "*Rio Bueno sub-basin*" boundary, and not attribute it to the WRA.

Page 5-25: The historical Cave River dye trace connection should be included. The WRA has repeated the Cave River trace and re-confirmed the results. The WRA has also confirmed that flows from the Cave River appear to go only to the Rio Bueno, and do not flow to either the Pear Tree Bottom River or the Laughland Great River.

Page 5-28: *"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…over the past 50 years"*

Mining activities over the past 60 years appear to have been focused in areas that may not contribute significant flow to the Rio Bueno. The EIA made the accurate observation that the flows from Cave, Lowe and Quashie Rivers all go to the Rio Bueno and nowhere else; however, past mining in SML 165 (centered on Alexandria) would most likely not have had much impact on the Rio Bueno based on its location. More research would be needed to validate the EIA's assertion, and it would require comparisons of flows and water quality for the Pear Tree Bottom River and Laughland Great River, among others. See figure 1 at the end of this response.

Page 5-29: The document states that surface runoff will be increased due to construction of haul roads. The applicant needs to state the mitigation strategies proposed to deal with same.

Page 5-29: The increase in turbidity and discolouration that is expected, may affect users of the water resources in the basin. The applicant should discuss these expectations with the stakeholders and propose mitigation methods should this disruption occur.

Page 5-30: The WRA reiterates its previous comment regarding the depth to groundwater as a non-determinant of how susceptible the aquifer is to contamination.

Page 5-30: *"The ore bodies to be mined are shown on figure 5-11"*

Figure 5-11 shows **all** ore bodies within SML 173, with no regard for locations near sinkholes, locations in forest reserves, or other stated limitations of mining activities. The EIA should prepare a map that presents the actual proposed areas for mining as limited by the various sterilization factors, not a map that presents all orebodies as proposed mining sites.

Page 5-35: Though the 30 year mean annual rainfall has been cited, an emerging trend of a westward shift in rainfall has been noted by the Meteorological Service of Jamaica. This may have an impact on expected rainfall amounts and projected runoff.

Page 5-59: The drought statement as presented is misleading. Drought is defined by low water availability, either from a meteorological, hydrological, or agricultural perspective. The word "drainage" in the EIA would be more accurately substituted by "infiltration", and that would not in and of itself be a precursor to drought.

Page 7-7: The design of the drainage works should be submitted to the National Works Agency for review.

Page 7-8: Item WQ1 *"The impacts on groundwater of this project, if any, will be negligible as there are no chemicals, waste streams or disposal activities associated with the development that stand to affect groundwater".*

This statement remains unproven. Introduction of particles into an aquifer is considered a type of contamination, and there is precedent for polluted groundwater in this region as previously indicated by the Retreat well. The potential risks to groundwater should not be downplayed or minimized.

Pages 7-23 – 7-25, Risk to Water Resources

The WRA believes that this section of the EIA is not objectively presented, seeks to minimize and otherwise "spin" the interpretation of the data currently available, and makes significant conclusions based on the absence of data as opposed to the presence of data. The potential impacts of mining on water resources (along with all other potential impacts and concerns in other spheres) requires that decisions be made on the best data available, not on the absence of data or the projection of data. In the absence of data, then the most conservative approach should be taken, and data should be gathered to guide the best decision possible. Any decision made to mine bauxite in SML 173 should not be based on exaggerated optimism, subjective/biased analysis, or a dismissal of the concerns of stakeholders. For example, the section mentions the noted turbidity observed in Sherwood Content and Lluidas Vale NWC well, but then goes to say *"it is highly unlikely that this would occur in the Rio Bueno catchment"* **IF** certain ore bodies are not mined. This observation should not be dismissed or downplayed. At minimum, the EIA should present a fulsome analysis of the available data to buttress the assertions made in this section, and the EIA should also determine what, if any, observed historical impacts may or may not be attributable to bauxite activities.

Page 11-4: In addition to the bi-monthly monitoring proposed, the WRA recommends additional monitoring be conducted after significant rain events, with the threshold of significance to be determined.

Page 11-6: *"There are no wells close to the Cockpit Country of the SML 173 area that can be monitored for either groundwater level or groundwater quality."*

The EIA continues after this statement to mention the Barnstaple NWC well, which is located less than 1 km north of the SML 173 boundary. The Brown's Town-Minards wells (NWC) are both located 1.7 km north of the SML 173 'panhandle', and the Retreat Well is located less than 500 metres from the 'panhandle.' The WRA reiterates that the Retreat well was abandoned due to pollution issues, and the EIA does not reference this fact even though it was pointed out in the August 30, 2019 letter. At minimum, these three wells should be monitored for water quality and water level. In addition, the Swanswick-Clarkes Town well is now in operation by Organic Growth Holdings, and could also be utilized as a WQ sample point.

The Cave Valley well information does not include the actual rate for the stated yield test.

The dye tracing statement does not account for the previous recognition in the current EIA of the dye trace work conducted by the WRA in 2018-present.

Finally, the WRA refers to a comment we made in the August 30, 2019 letter that there appeared to be a bias in the EIA that may be inappropriate for a supposedly objective Environmental Impact Assessment. This revised EIA appears to maintain a significant lack of objectivity throughout the document, and this lack of objectivity does not provide the EIA with the credibility required to make an accurate assessment of the potential impacts of mining in SML 173. An objective assessment should present all of the facts available, state the gaps in the available data, and make a recommendation based on those facts and data. The assessment should not be based on economic exigencies or predetermined outcomes. The significance and public profile of this particular issue demands an objective analysis that can withstand scrutiny from all stakeholders, and the WRA strongly recommends that NEPA ensure the development and presentation of an **objective EIA analysis**, even if it means selecting an assessor that is not engaged by the applicant or by opposing stakeholders.

We trust that this review will prove informative and relevant to your deliberations, and we remain available for any future discussions on this matter.

Sincerely,
Water Resources Authority

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

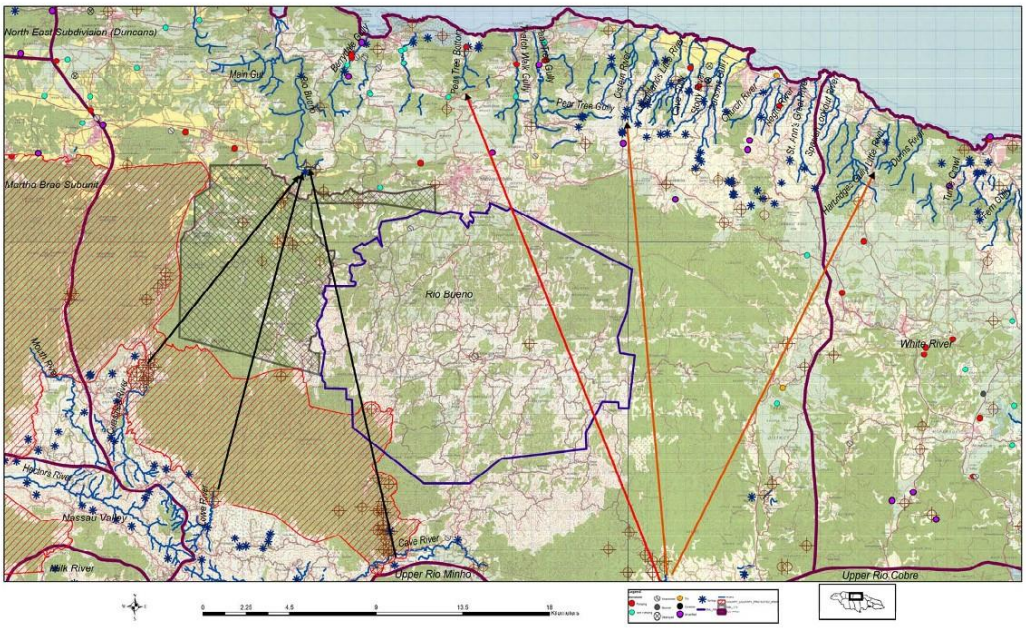


Figure 1: Rio Bueno Sub-WMU showing HISTORICAL dye trace results. WRA recently re-confirmed historical traces of Dornoch Head (black arrows) and Pear Tree Bottom/Laughlands Great River (orange/red arrows).