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Rujukan Kami: SAM/EIA/Pk/HP/RE/21/HK
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Ketua Pengarah
Jabatan Alam Sekitar Malaysia
Aras 2, Podium 3, Wisma Sumber Asli
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62574 PUTRAJAYA
(UP: Urusetia EIA, Bahagian Penilaian)

Puan/Tuan,

Ulasan EIA Proposed Mining and Benefication of Lanthanide Element Ion-Adsorption Deposit on a Total Area of About 5,339 Acres (2,161 Ha) in Mukim Kenering, Daerah Hulu Perak, Perak Darul Ridzuan

Dengan hormatnya merujuk kepada perkara tersebut di atas, bersama-sama ini kami sertakan ulasan kami ke atas laporan EIA tersebut. Pihak SAM juga telah mendapatkan ulasan daripada Environmental Law Alliance Worldwide (ELAW) dan bersama-sama ini kami sertakan ulasan Dr. Gilles Wendling, seorang pakar hydrogeologi, untuk turut dipertimbangkan sebagai ulasan daripada SAM.

Daripada penilaian yang dibuat, kami mendapati bahawa laporan EIA ini tidak harus diluluskan memandangkan kelemahan dalam laporan EIA serta kesan persekitaran dan sosial yang ketara jika cadangan projek ini diteruskan. Perlombongan yang dicadangkan akan memberi kesan negatif yang serius dan tidak harus dibenarkan di kawasan sensitif alam sekitar.

Kami berharap bahawa pihak JAS dan ahli panel pengulas akan memberi pertimbangan serius terhadap ulasan kami. Kerjasama dan tindakan wajar pihak JAS adalah amat diharapkan dan dihargai.

Sekian, terima kasih.

Yang benar,

Meenakshi Raman
Presiden
Sahabat Alam Malaysia

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) FOR

PROPOSED MINING AND BENEFICATION OF LANTHANIDE ELEMENT ION-ADSORPTION DEPOSIT ON A TOTAL AREA OF ABOUT 5,339 ACRES (2,161 HA) IN MUKIM KENERING, DAERAH HULU PERAK, PERAK DARUL RIDZUAN

Comments submitted by Sahabat Alam Malaysia (SAM)
to the Department of Environment, Putrajaya

3 August 2021

A. Project Background

The project is proposing in-situ leaching mining and beneficiation of ion-adsorption lanthanide deposit. The project site is made up of 11 parcels of land covering a total area of 2,161 hectares and located on a mix of agricultural land and forest land (part of the logged-out area of Kenderong Forest Reserve). The project is also located in CFS 1-Primary Linkage) PL8: Kenderong FR (Bintang Hijau)- Bintang Hijau (Hulu Perak) FR (Bintang Hijau) and categorized as Environmental Sensitive Area (ESA) Rank 1 area.

B. Summary of comments

The EIA should not be approved for the following reasons:

1. The proposed mining in Kenderong Forest Reserve contradicts the National Forestry Act 1984 (Act 313).

2. The proposed project is not in line with the management criteria for Environmental Sensitive Area Rank 1 and land use guidelines based on the Central Forest Spine Masterplan - Primary Linkages

3. The project will cause permanent habitat loss and total loss of salt licks for wildlife, which will lead to increase in human-wildlife conflicts and illegal poaching.

4. The potential of surface and groundwater contamination remain one of the main concerns for the proposed project. A senior hydrogeologist has commented that the water modelling contains several key weaknesses and the proposed pollution control measure and monitoring programme are deemed inadequate.

5. The EIA estimated a loss of RM 4,473,566 (at discount rate 3%) for the environmental and social impacts caused by the project and this cost has to be borne by the local community, the indigenous people and the society, which is unacceptable.

6. The impacts of climate change have not been described. This is particularly important for a region with high precipitation (approximately 1.9 m average annual precipitation).

C. <u>The details -</u>

1. **The proposed mining in Kenderong Forest Reserve contradicts the National Forestry Act 1984 (Act 313).**

   While we note from the EIA that the Majlis Daerah Gerik has indicated no requirement to re-zone the existing agriculture and forest area, the proposed mining in Kenderong Forest Reserve still contradicts the National Forestry Act 1984 (Act 313). Rare earth is not recognised as a forest product and mining activity should not be allowed within any forest reserve. This is also confirmed by the Perak Forestry Department in a letter dated 23 November 2020 in Appendix 1.2. As stated in the letter, the proposed Lanthanide mining is not in line with the directive from the Non-Radioactive Rare Earth Industry Development (NR-REE) Joint Committee Meeting between Ministry of Energy and Natural Resources and Perak state government on 16 October 2020.

2. **The proposed project is not in line with the management criteria for ESA Rank 1 and land use guidelines based on the Central Forest Spine Masterplan - Primary Linkages**

   Part of the project site is located in Kenderong Forest Reserve, surrounded by other Forest Reserves like Bukit Hijau and Belukar Semang. The project is located in CFS 1- Primary Linkage) PL8: Kenderong FR (Bintang Hijau)- Bintang Hijau (Hulu Perak) FR (Bintang Hijau) and is also Environmentally Sensitive Areas Rank 1.

   Primary linkages are crucial to re-establish forest connectivity in order to achieve the main Central Forest Spine link. According to the CFS1 Masterplan, there should be restricted development in the Primary linkages. The types of development that are permitted subject to the full compliance to the relevant guidelines stipulated within the primary corridor are:-

   - Facilities for forest and wildlife management;
   - Scientific research;
   - Infrastructure & utilities development; and
   - Selected agriculture development.

   Therefore, the proposed mining project does not meet the stipulated land use guidelines based on the CFS1 Masterplan. The main aim of the ecological corridors is to encourage and facilitate wildlife movement between fragmented forest complexes for biodiversity conservation; and at the same time, to reduce wildlife-human conflicts. The proposed mining at this area does not help but will affect the integrity of the ecological linkages.

   Further, the proposed project is categorized as ESA Rank 1, in which there should be no development, agriculture or logging permitted except for low-impact nature tourism activities, research and education purposes.

3. **The project will cause permanent habitat loss and total loss of salt licks for wildlife, which will lead to increase in human-wildlife conflicts and illegal poaching.**

   According to the EIA, the study area houses many wildlife, such as the Malayan Tigers, Panthers, Clouded Leopards, Tapirs, Asiatic Elephants, Short/Long Tailed Macaques, Langurs, Wild Boars, Sun Bears and Deer. In summary, the EIA found that 15 species are Totally Protected, 11 species are categorized as Protected under the Wildlife Conservation Act (Act 716). Under the IUCN Red Data Book 2020, 7 species are Near Threatened, 5 are Vulnerable, 3 species are Endangered and 1 species is Critically Endangered. Another 194 bird species were listed as totally protected and 11 bird species were protected under the Wildlife Conservation Act 2010 (Act 716).

   Further, salt licks were reported in just about 500m south from the proposed project site. Salt licks are primary sources of mineral supplements for many animals, and this should not be disturbed at all cost. Section 85 of the Wildlife Conservation Act 2010 (Act 716), clearly states no salt licks or the land in the immediate vicinity of any salt lick should be disturbed. According to EIA, there are clear signs of visiting by wild animals to these salt licks like elephants and tapirs. Elephant, tapir and sun bear are considered displaced wildlife that are prone to cause conflicts with humans and also potentially killed by poachers. Human wildlife conflict is expected to increase significantly during project development stage.

   Hence, the proposed project will escalate the already worsening situation for these animals like loss of habitats and food source, threatened by poaching and trapping, and human-wildlife conflicts. Moreover, as confirmed in Chapter 8, *"no mitigation measure will be able to totally mitigate the loss of habitat and the local extinction of wildlife species, mainly the ground dwelling and slow-moving species and no mitigation measures could be able to replace natural habitats for medium to large animals that have been lost due to clearing of forests and mine development in the proposed site"*.

4. **The potential of surface and groundwater contamination remain one of the main concerns for the proposed project. A senior hydrogeologist has commented that the water modelling contains several key weaknesses and the proposed pollution control measure and monitoring programme are deemed inadequate.**

   In-situ leaching was first used in Wyoming, US in the 1950s. According to Earthworks, an NGO who has been monitoring the mining industry in the US and globally, most of the in-situ leaching project has had numerous spills, contaminated underground aquifers, and have failed to reclaim non-operating on site wells.[1] While the US has strict regulations that require complete restoration of groundwater conditions after mining operations, Earthworks found that the mining industry has never fully cleaned up an aquifer pollution by in-situ leaching.[2] Another study has also confirmed that in-situ leach mining has environmental disadvantages, especially on groundwater. As it states, *"In particular, much attention has been directed toward the high (relative to baseline)*

[1] https://www.earthworks.org/issues/in_situ_leach_uranium_mining/
[2] https://www.earthworks.org/issues/in_situ_leach_uranium_mining/

ammonium concentration, following leaching with an ammonium-based system, and toward the fate of heavy metals solubilized during the mining process."[3] This is especially relevant as the project currently under consideration is proposing the use of ammonium sulphate as the leaching solution.

Attached are detailed comments on the potential water contamination by Dr. Gilles Wendling, a Senior Hydrogeologist from the Environmental Law Alliance Worldwide (E-LAW). In short, Dr. Wendling has pointed out the following key weaknesses in the report:

a) The project is located in the upstream of the Sg. Rui, a tributary of Sg Perak. Therefore, any degradation of the surface water or groundwater resulting from the proposed mining could affect the whole or a very large portion of these watersheds and their ecosystems.

b) The EIA did not take into account climate change impacts. It is believed that the modelled scenarios do not represent the worst-case scenarios and catastrophic events, particularly associated and compounded with extreme events resulting from climate change.

c) The project will result in permanent and irreversible modification of the natural infiltration, and of both the surface water and groundwater regimes.

d) The groundwater regime has been poorly described. Although 16 boreholes have been drilled and six of them pump tested, they only very partially describe the complexity of the subsurface. Conceptual and numerical models can provide a false sense of security. Their capacity of reproducing the reality is always partial and limited. The model was developed using a 100 m x 100 m grid. This is a major information gap for a project strongly relying of the movement of seepage/leachate in the subsurface through permeable media.

e) The list of parameters proposed for baseline water monitoring needs to be extended to include other parameters such as cobalt, nitrate, nitrite, light extractable petroleum hydrocarbon (LEPH) and benzene, ethylbenzene, toluene and xylene (BETX). Light extractable petroleum hydrocarbon (LEPH) and benzene, ethylbenzene, toluene and xylene (BETX) need be among the list of parameters proposed for analyses to take into account potential impacts from spills of petroleum use associated with the project. The proposed project envisions the use of large quantities of ammonium salts (see, for example, page C5-15 of the EIA). Nitrate and nitrogen need to be among the list of parameters proposed for analyses to take into account the conversion of ammonia to nitrate and nitrite via the nitrogen cycle. Cobalt needs to be among the list of parameters proposed for analyses to take into account the occurrence of cobalt in granitic soils at the proposed site.

[3] http://www.powertechexposed.com/Groundwater_restoration_with_ISL_uranium_mining.pdf

f) The proposed activities have a high risk of increasing the concentrations of ammonium, radionuclide – thorium. This will directly affect the local communities and their access to drinking water.

g) The design is based on discharge rates estimated and modeled for 3-month and 2-year return period. These are not representative of the worst-case conditions and will likely result in under sizing infrastructure. Return periods of 25 or 50 years should be considered. In addition, the compounding effect of climate change, with more extreme events expected, both in intensity and frequency, need to be accounted for and modeled. As presently designed, the risk of encountering precipitation events that will completely overload the system (e.g., overload and spill of interception ditches, pools, dams, etc.), resulting in the uncontrolled discharge of deleterious liquids to surface water, is high. These will have detrimental consequences on ecosystems and populations along Sg Rui and and Sg Perak.

h) When listing environmental prevention and control measures, it simply indicates that anti-seepage measures shall be taken for the liquid collecting ditches and all processing tanks and pools. Details should be provided. What will be the efficiency of such measures? What will happen with seepage that will not be captured? Any uncontrolled discharge could take time to be observed and confirmed. Once observed, it would take time to control and mitigate. Control and mitigation may not be able to reach a full control of the contamination. This may result in long (months) and diffused contamination. What will be the consequences of such uncontrolled seepage? How would such measure respond under extreme events?

i) What will be the efficiency of rinsing? What will happen to residual elements? How long will they keep seeping into the environment? What will be the consequences on ecosystems and the health of the local community? It will be difficult to confirm the full cleaning of the soil from reactant because the network of sampling locations will be limited. Therefore, reactants and poor-quality groundwater will likely discharge to surface water features and streams. This will have significant detrimental effects of the community, the watersheds and their ecosystems.

j) The ground of the processing plant footprint shall be concreted or paved with impermeable materials with slope protections for steep slope areas. These proposed measures have a long-term irreversible negative impact on the water cycle, ecology, and biodiversity.

k) The proposed of monitoring programme is inadequate. More surface water and groundwater sampling stations need to be located immediately downstream of proposed leachate collection structures and baseline data collected prior to any construction work. Surface water should be sampled at least monthly. Should

increasing trends be observed or values exceeding regulated thresholds reported, then the sampling schedule should be increased to weekly until concentrations are confirmed to drop below thresholds.

Further, with the use of ammonium sulphate as the key chemical, the groundwater modelling result has already indicated high risk of ammonium and sulphate contamination in Well 2 and 3 (used by plantation PPPNP and FELCRA).

For the record, there will be a residual concentration of 40.3 mg/l and 76.9 mg/l of ammonium at the end of the 30 years' period, which has far exceeded the stipulated limit of 1.5 mg/l ammoniacal nitrogen as per MOH drinking water quality standards. The existing Well 2, 3 and 4 has to be discontinued as raw potable source to give way to the proposed mining.

The concerns over river water contamination are also greatly stressed by respondents because river is an important source of water, fish and recreation activity especially for Kg. Pong. Tok Batin from KOA Bukit Asu also shared the same concern on the impacts on water.

5. **The EIA estimated a loss of RM4,473,566 (at discount rate 3%) for the environmental and social impacts caused by the project and this cost will be unfairly borne by the local community, indigenous people and the society.**

The Economic Valuation of Environmental Impacts section estimated a loss of RM4,473,566 (at discount rate 3%). This has indicated how much the society would have to suffer from the environmental and social impacts of the project. Stakeholders who will have to bear the losses are the local communities, estate workers/ planters living and working in the vicinity of the project site and the society for various reasons such as the loss and damage from human wildlife conflicts, loss of potential fresh water fishes, loss of environmental services of forest, among others.

It should be noted that the majority of the local communities and indigenous people are self-employed, either doing any forest collecting, hunting, gardening jobs, house construction/repairing or short contract jobs. This comprises 47.8% from Kg. Pong, and 71.1% from KOA Bukit Asu and 23.1% from PPMS Tanah Hitam. To compound matters further, the proposed site is part of the territory of the indigenous communities who reside close to the project site and this area provides them with their sources of livelihoods/forest products as confirmed by the Tok Batin of KOA Bukit Asu.

On a relevant note, based on the focus group discussion findings, the community leaders have expressed expectations that there should be a dedicated session to help them understand better the implications of the project. The project proponent and consultant should provide a briefing to the local community on the key findings from the EIA, of which should include the estimated loss in RM.

6. **The impacts of climate change have not been described. This is particularly important for a region with high precipitation (approximately 1.9 m average annual precipitation).**

Information is required to describe:

a) How the project going to handle extreme events?

b) How extreme events are going to be exacerbated by climate change and how the project will address the increased risks resulting from these anticipated very extreme events?

D. Conclusion

In view of the very serious shortcomings in the EIA and the significant environmental and social impacts of the project, SAM calls for the EIA to be rejected. The proposed mining will have serious negative impacts and should not be allowed in the very first place in an environmentally sensitive area such as this.

Attached herewith is the detailed comment from ELAW.

FROM: Dr Gilles Wendling

TO: **ELAW**

DATE: July 31, 2021

SUBJECT: **PROPOSED MINING AND BENEFICIATION OF LANTHANIDE ELEMENT ION-ADSORPTION DEPOSIT IN MUKIM KENERING, DAERAH HULU PERAK, PERAK DARUL RIDZUAN, MALAYSIA**

This is a memo completed on behalf of Environmental Law Alliance Worldwide (ELAW) for Consumers Association of Penang/Friends of the Earth Malaysia outlining comments and concerns of part of the EIS for the proposed mining and beneficiation of lanthanide element ion-adsorption deposit on a total area of about 5,339 acres (2,161 ha), in Mukim Kenering, Daerah Hulu Perak, Perak Darul Ridzuan, Malaysia.

Text *in italics* is text from the reviewed report.

1 COMMENTS

1.1 Project Specific Comments – (Related to water)

1.1.1 Key Weaknesses

- The project is located in the headwaters of the Sg Rui river, a tributary of Sg Perak. Therefore, any degradation of the surface water or groundwater resulting from the proposed mining could affect the whole or a very large portion of these watersheds and their ecosystems. Of particular concerns are:
    a. The uncontrolled accidental release of reactant (e.g., sulfuric acid) during set-up and operation; This could have catastrophic consequences. It could be compounded with the effect of extreme precipitation.
    b. The release of contaminated groundwater during operations. The discharge of contaminated groundwater in the headwaters could take time to be observed and confirmed. Once observed, it would take time to control and mitigate. Control and mitigation may not be able to reach a full control of the contamination. This may result in long (months) and diffused contamination.

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c. The release of contaminated groundwater after mining operations. The washing of reactants will be challenging to fully monitor and be thoroughly completed. The discharge of contaminated groundwater in the headwaters post operations is likely to occur.

d. The release of contaminated groundwater after mining operations should the operations be interrupted because of technical or operational challenges, or other unforeseen reasons. The lessons learned from how the recent Covid19 pandemic has disturbed overnight and in a catastrophic way economic activities that were assumed to be unalterable should be kept in mind. There is a risk that operations will not end as planned. In this case, control and monitoring may abruptly end. However, the modification of the subsurface will remain and discharge of products detrimental to the groundwater will keep discharging to the surface water in an uncontrolled manner. Time elapsed during which contaminated groundwater will keep discharging to the headwaters could be very detrimental to the watershed and its users. Groundwater movement is not a flow you can stop by turning off a valve. It will be practically impossible to stop.

- *"The EIA has conducted studies to demonstrate failure scenarios such as WWTP failure (under Scenario 3) and an incidental major leak at leaching solution pipeline (under Scenario 4), where major impact on the river water system is expected."* It is believed that the modelled scenarios do not represent the worst-case scenarios and catastrophic events, particularly associated and compounded with extreme events resulting from climate change. Therefore, the proposed project could very significantly damage the ecosystems and the local communities at a scale much worse than anticipated.
- The project will result in permanent and irreversible modification of the subsurface through the drilling, installation of vertical wells and horizontal collector pipes. It will be impossible to restore the site back to its original state. This will result in permanent and irreversible modification of the natural infiltration, and of both the surface water and groundwater regimes.
- The effects of modification of the land and the subsurface will compound with modification of the water cycle anticipated due to climate change. This is expected to be more noticeable with extreme events, whether increasing the amount of water to be managed during extreme precipitation and associated risks of flooding, or exacerbating the effects of droughts.
- The groundwater regime has been poorly described. Although 16 boreholes have been drilled and six of them pump tested, they only very partially describe the complexity of the subsurface. Conceptual and numerical models can provide a false sense of security. Their capacity of reproducing the reality is always partial and limited. The model was developed using a 100 m x 100 m grid. This is a major information gap for a project strongly relying of the movement of seepage/leachate in the subsurface through permeable media. The following information is required:

    a. A much finer grid (e.g., 10 m x 10 m) should have been used.

    b. A wide range of values should have been used (e.g., recharge) to model input parameters and sensitivity analyses presented.

    c. The model does not replicate geological anomalies (e.g., geological fault).

    d. Changes of both the surface water regime and the groundwater regime due to climate change have not been accounted.

e. Piezometric contour maps, showing high and low piezometric conditions, as well as seasonal fluctuations need to be presented.

f. Representative cross-sections have to be generated to illustrate typical areas and encountered conditions.

- Water quality: A stronger baseline needs to be defined, both for surface water and groundwater, covering several seasons. Particularly:

  a. The list of parameters proposed for analyses needs to be extended to include other parameters such as cobalt, nitrate, nitrite, light extractable petroleum hydrocarbon (LEPH) and benzene, ethylbenzene, toluene and xylene (BETX).

  b. Water quality results need to be presented in tables and graphs easy to read and interpret. Numerical values for applicable standards need to be presented to allow comparison to standards and guidelines.

  c. Some parameters have been monitored close to drinking water standard (e.g., Ammonium, radionuclide – Thorium). The proposed activities have a high risk of increasing the concentrations of these elements. This will directly affect the local communities and their access to drinking water.

  d. The modeled water chemistry results strongly rely of the quality of the conceptual and numerical model developed to replicate the movement of water at surface and in the subsurface. As the hydrogeological numerical model presents significant flaws and weaknesses, the values obtained to describe the water quality are not reliable. The deterioration of the water quality could be much worse than modeled and presented. Still, the model already shows that the concentration of ammonium in Wells 2, 3, and 4, located within the proposed mining area, will exceed the drinking water standards and the wells should be discontinued as sources of drinking water.

- The design is based on discharge rates estimated and modeled for 3-month and 2-year return period. These are not representative of the worst-case conditions and will likely result in under sizing infrastructure. Return periods of 25 or 50 years should be considered. In addition, the compounding effect of climate change, with more extreme events expected, both in intensity and frequency, need to be accounted for and modeled. As presently designed, the risk of encountering precipitation events that will completely overload the system (e.g., overload and spill of interception ditches, pools, dams, etc.), resulting in the uncontrolled discharge of deleterious liquids to surface water, is high. These will have detrimental consequences on ecosystems and populations along Sg Rui and and Sg Perak.

- When listing environmental prevention and control measures, it simply indicates that *anti-seepage measures shall be taken for the liquid collecting ditches and all processing tanks and pools*. Details should be provided. What will be the efficiency of such measures? What will happen with seepage that will not be captured? Any uncontrolled discharge could take time to be observed and confirmed. Once observed, it would take time to control and mitigate. Control and mitigation may not be able to reach a full control of the contamination. This may result in long (months) and diffused contamination. What will be the consequences of such uncontrolled seepage? How would such measure respond under extreme events?

- What will be the efficiency of rinsing? What will happen to residual elements? How long will they keep seeping into the environment? What will be the consequences on ecosystems and the health of the local community? It will be difficult to confirm the full cleaning of the soil from

reactant because the network of sampling locations will be limited. Therefore, reactants and poor-quality groundwater will likely discharge to surface water features and streams. This will have significant detrimental effects of the community, the watersheds and their ecosystems.

- *The ground of the processing plant footprint shall be concreted or paved with impermeable materials with slope protections for steep slope areas*. These proposed measures have a long-term irreversible negative impact on the water cycle, ecology, and biodiversity.
- "*Emergency containment: emergency tank (with volume not less than 100 m^3) shall be made available at low-lying part of the ISL mining area"* to reduce risks of spillage during high flow events. It will be very important to overdesign to take into account extreme events compounded with the effects of climate change.
- The waste water treatment relies on reverse osmosis. These systems require regular and adequate maintenance to operate as designed. They also require a lot of energy, and themselves generate waste. How will that waste be handled and disposed off? These adverse elements have to be taken into consideration.
- The monitoring program needs to be detailed and trigger mechanism for decision making described. What will be the delay before an information is collected, confirmed, and then action taken to address the problem that was identified? What type of negative effects may result? Will they have permanent and irreversible consequences? What would be the affected sensitive environment?
- More surface water sampling stations need to be located immediately downstream of proposed leachate collection structures and baseline data collected prior to any construction work.
- More groundwater sampling stations need to be located immediately downstream of proposed leachate collection structures and baseline data collected prior to any construction work. The location of the stations should be based on the result of the detailed (i.e., small grid) 3D conceptual and numerical hydrogeological model and the proposed layout of the leachate and collection pipe infrastructure.
- The monitoring program proposes quarterly sampling for surface water (Table 9.4.1). Surface water should be sampled at least monthly. Should increasing trends be observed or values exceeding regulated thresholds reported, then the sampling schedule should be increased to weekly until concentrations are confirmed to drop below thresholds.
- Monitoring post mining should not have a fixed period of one year. It should be result-based (i.e., confirming decreasing trends), and gradually reduced after concentration milestones have been reached. Concentrations may vary seasonally, therefore it will be important to gather sufficient information to confirm that negative effects are not observed or expected.
- The impact to drinking water supplies needs to be further detailed. On one hand, a map (Figure 6.2.28) shows several potable water intakes along Sg Rui downstream of the project, and on the other hand the text indicates there is no potable use upstream of the Kenering reservoir. Table 7.3.1 shows four wells used for drinking water within the project site. Such a discrepancy needs to be clarified. Where is the local population getting its drinking water? Any discharge of contaminated water from the proposed mining would likely result in increase of concentrations of several parameters (e.g., nitrate, sulfate, metals, radionuclide) rendering the water not potable.

- The impacts of climate change have not been described. This is particularly important for a region with high precipitation (approximately 1.9 m average annual precipitation). Information is required to describe:
    a. How the project going to handle extreme events?
    b. How extreme events are going to be exacerbated by climate change and how the project will address the increased risks resulting from these anticipated very extreme events?

1.1.2 Other Comments

- An adequate security deposit system needs to be designed and implemented to cover the potential costs associated with:
    a. The rehabilitation cost of the project, should the mining be completed to its proposed life of mine or not;
    b. Long-term monitoring post-closure;
    c. The control, remediation, clean-up and long-term monitoring of the site should the project be unexpectedly interrupted.
- It appears that the area is mapped and ranked under Environmental Sensitive Area Rank 1 (Figure 6.4.2). How could such a mining project be allowed, according to the criteria listed in Table 6.4.2?
- A project of this scale needs a local study area and a regional study area. This approach is lacking. Only the local study area has been considered.
- There is no climate station and collection of climate data within the watersheds discharging to the study area. Local data are required for at least three years.

2 LIMITATIONS

Models were not reviewed in detail. The reviewer has relied on summary information provided in the main body of the report, assuming that they accurately reflected the results of the model.