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ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

THE PROPOSED QUARRY B AND QUARRY C LICENCE TO QUARRY AND REMOVE STONES AT BTG. BALEH, ULU SG. PUTAI, KAPIT DIVISION, SARAWAK



**NREB REFERENCE NO.: NREB/6-6/3F/10
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Executive Summary

Introduction

This EIA study provides information, identifies alternatives and mitigation measures to reduce the environmental impact of the proposed Project. The study involves integrating environmental considerations into the decision-making process in the planning of the quarry development and operation. The appropriate potential environmental impacts and mitigation measures will be identified, predicted and evaluated in the early stages of proposed Project to prevent, minimise, or abate adverse effects that might arise.

The title of the Project is “**The Environmental Impact Assessment (EIA) Study for the Proposed Quarry B and Quarry C, Licence to Quarry and Remove Stones at Btg. Baleh, Ulu Sg. Putai, Kapit Division, Sarawak**”.

The conditional approval letter of the quarry licence issued to Sarawak Energy Berhad was approved by the Land and Survey Department dated 29th March 2018 (vide letter, reference number: 11/HQ/QL/1/2015(7D) and is valid for seven (7) years starting from the date of issuance of the quarry licence (see **Appendix C**).

Statement of Need

The main objective of the Project is to extract sandstone from the proposed quarries. The extracted rock materials are mainly used for direct dam filling and also for concrete aggregate production for the BHEP.

Project Proponent and EIA Consultant

The Proponent for this Project is **SEB Power Sdn. Bhd.** and the environmental consulting firm appointed to prepare the EIA report is **North Borneo Environmental Services Sdn. Bhd.**, registered with NREB (NREB/F/00148).

Environmental Legislative Requirement

The development of the proposed quarries and its associated activities is a Prescribed Activity in the First Schedule of the Natural Resources and Environment (Prescribed Activities) Order, 1994, conferred by Section 11(A) of the Natural Resources and Environment Ordinance (NREO), under Item 6(i), which states:

6. EXTRACTION AND REMOVAL OF ROCK MATERIALS AND MINING:

(i) *Quarrying of aggregate, limestone, silica, quartzite, sandstone, sand, marble and stones which may cause damage or have an adverse impact on fragile ecosystem.*

An Environmental Impact Assessment (EIA) report is required for submission to and approved by the Natural Resources and Environment Board (NREB) prior to commencement of Project implementation.

Project Description

Project Size, Location and Accessibility

The Project Proponent, SEB Power Sdn. Bhd., proposed to operate a stone quarry on Quarry B located at Batang Baleh, Ulu Sungai Putai, Kapit Division, Sarawak. The Quarry B with an area of about 185 hectares will serve as the main quarry area for the dam filling materials while Quarry C with an area of about 59 hectares will serve as a back-up quarry.

The project site is located in a straight distance from the BHEP at about 3.5 km to 6.5 km with mean value of about 5 km.

There is no existing public road to Kapit and no public road past Nanga Mujong, linking to the proposed Project site. The only existing public roads network in the region are around Kapit town, extending 30 km to a point, opposite Nanga Mujong located along the Baleh River. The Rejang River and the Baleh River hosts a large and practiced transport system for both goods and people. The proposed Project site can be reached via the existing logging road networks maintained by the logging companies from logging camp jetty. The logging roads are primarily designed to provide access from logging areas to loading points on the river.

Project Components

The existing site facilities are located at the eastern side of the proposed quarry face area such as temporary site investigation team camp, aggregate processing system, explosive magazine and proposed overburden dump sites. Currently, the employer's and contractor's camp is still under construction.

The various key activities carry out in the quarry include overburden stripping, drilling and blasting, loading and hauling, stockpiling, direct dumping, and crushing and screening.

Estimated Rock Reserve and Quality

Based on the proposed quarry design for Quarry B, the estimated extractable rock reserve is about 91.476 million metric tons (34.65 million m³). The proposed quarry face of Quarry B encompasses about 53.92 hectares out of total quarry licensed area of 185 hectares.

Production Rate

The estimated peak production rate for stone work excavation is about 1,689,600 metric tons (640,000 m³) per month or 20,275,000 metric tons (7,680,000 m³) per year.

Quarry Scheme

The Project Proponent has appointed a mining engineer to prepare the quarry scheme and submitted to the Department of Minerals and Geoscience Malaysia, Sarawak (JMG). The quarry scheme, in general, presents the designs and programs in the construction of access roads, the ground preparation and clearing works of the quarry site, the establishment and construction of the crushing plant and support facilities and preparation of the designated dump sites before the start of actual quarry operations.

The proposed quarry face for Quarry B is an irregular shaped polygon. It encompasses a total area of about 185 hectares, but only an approximate of about 53.92 hectares of the total area has been delineated as active quarry face for rock extraction activities. The strategy is to start the development of quarry face at the topmost elevation then gradually bench its way to lower elevation. Following quarry pit design standards and parameters, the development and quarry production will initially start at first bench (555 m to 540 m above mean sea level) and then to the last bench (315 m to 300 m above mean sea level). With the amount of volume of rock reserves, it is projected that the quarry can readily provide more than enough materials based on the estimated total stone work excavation requirement for direct dam filling and aggregates production are about 26 million m³.

Since the purpose of this quarry is only for the BHEP, the demand may increase and decrease throughout the year depending on the project requirements, the monthly production rate will also be adjusted accordingly in respond to the demand. For the whole works of the BHEP, the tentative delivery period of the stone work excavation would take about 72 months or 6 years starting from September 2019 to August 2025.

The mine site facilities and infrastructure are strategically designed to provide its optimum functions and provide maximum efficiency and at the same time give utmost priority on safety and provisions on environmental impacts. The proposed quarry face will be advanced from southwest to northeast direction.

Working Hours

The proposed working hour of six days per week and two (2) shifts of eight hours per day from 7:00 a.m. to 3:00 p.m. and 3:00 p.m. to 11:00 p.m. will be adopted.

Buffer Zone

The safety on the surrounding areas is one of the major concerns which are taken into consideration when designing the pit limit of the quarry. A buffer zone of 50 m shall be set as its distance from the quarry licensed boundary as per design.

Infrastructure and Utilities Requirement

The internal access roads of the quarry project are for internal connection to access various site facilities and to be used by service vehicles, trucks, crawler drill, and other mobile plant and equipment.

The quarrying sequence adopted as far as practicable, in such a way that all the surface run-off, seepage and effluent water will be drained out by gravitational drainage system. The surface run-off is channelled around the quarry area using drains, collection and diversion ditches. The quarry areas and the internal access and haulage roads shall be adequately drained.

Water is required throughout the operational life of the quarry mainly for employer's camp, dust suppression system and cleaning of plant. Currently, the source of water is from the nearby mountain spring water. The preliminary planning of the water supply for Quarry B operation, a water pump will be installed at the water intake point which is located at the tributary between Quarry B and Quarry C, and the water from the tributary will be pumped and directed to water the water treatment plant for purification. The treated water will be delivered to all camp sites by using water pump.

The total electricity requirement (power supply) for the proposed quarry operation such as excavation and loading operations, air supply, and site lighting is about 500 KVA. Due to lack of grid electricity around the Project area, the electricity supply will be sourced from diesel generator set. The gross capacity of the generator sets will be about 10,000 KW.

Hauling Operation

There are two major types of hauling operation in the proposed quarry project. First would be the hauling of overburden/inter-burden materials at the quarry face development area and hauling it to the designated overburden dump sites or hauling it directly to the road construction and maintenance sites or to working platform as fill materials. Next would be hauling of blasted rock material at the quarry face area and hauling it to the dam site or to the crushing plant.

Crushing and Screening Operation

The quantity of aggregates (reduced in various sizes using crushing plant) requirement for the BHEP is about 1 million m³. The aggregate processing system is composed of coarse crushing plant, semi-finished product stockyard, primary screening plant, intermediate crushing plant, finish screening plant, fine crushing (sand making) plant, and finished product stockyard.

Manpower Requirement

The estimated total workforce required to carry out the whole quarry operation is eighty four (84) workers for direct employment based on the maximum of three (3) shifts of eight (8) hours per shift.

Existing Environment

Topography

Based on topographic map, the Project site area undulates greatly with elevation ranges from 90 m to 600 m above mean sea level. The hill slopes is steep and covers with dense secondary logged over forest.

Geology and Soil Conditions

Based on the Geological Map of Sarawak, the Project site is underlain by both the Layar Member and the Kapit Member of the Belaga Formation. A review based on 1:70,000 soil map (source: Soil Management Branch, Department of Agriculture, Kuching, Sarawak, 2019), soil data shows that the soils found within the Project site to be of a combination of Kapit/Merit soil series and Merit/Bekenu soil series.

Climate and Meteorology

Generally, the climate of the proposed project site is typically equatorial, which can be characterized as warm, sunny and humid throughout the year. Like other parts of Sarawak, the weather is affected by the Northeast and Southwest monsoons, which prevail from November to March and May to September respectively.

Water Quality, Air Quality and Noise Level

Five water quality samplings were carried out to establish the baseline water quality of the waterways in the vicinity of the proposed quarry. The baseline water quality sampling exercise carried out indicated that the water ranged within acceptable levels and below the class IIB Standards of NWQS.

The baseline air quality monitoring exercise carried out showed that the Particulate Matter (PM₁₀) content at all sampling locations are below the Malaysia Ambient Air Quality Standard (MAAQS) level of 100 µg/m³ (24 hours average time).

The average results for all the noise levels are within the stipulated limits by the Department of Environment (DOE) i.e. 55 dB(A) during the day and 45 dB(A) during the night time.

Biological Environment

From site observation of the surrounding, the site is covered with secondary forest or mainly heavily disturbed forest. Thus, it is expected that the fauna population in these areas be confined to small mammals, birds and reptiles. Therefore, no species of conservation value and interest is expected to be within the Project site.

Land use

There are no settlements and other sensitive areas of concern with the 3 km radius of the Project site. Basically, the Project site is a mountainous area surrounded by secondary forests. Currently, there are three forest concession nearby the Project site that are still actively in operation, namely Juta Kayu Sdn Bhd (T/3250) aka Entelawan Camp, Sajung Etika Sdn. Bhd. (T/3397) aka Dapu Camp and Ninjas Development Sdn. Bhd. (T/3080)/ WTK aka Putai Camp.

Human Environment

There is no human settlement located within 3 km radius of the proposed quarry which makes the proposed quarry site environmentally friendly.

The nearest construction living area is approximately 680 meters from the Quarry B, followed by the contractors' management camp and the employer's temporary camp which is within the 2 km radius. The project is not expected to cause impact on this settlement.

Environmental Impacts and Mitigating Measures

The potential environmental impacts of the Project during its various stages are summarized in **Table ES-1**, as accompanied by the recommended mitigation measures.

Residual Impacts and Recommendations

The residual impacts that may arise as a result of the implementation of the present Project may include:

Positive Residual Impact

Catalyst for the infrastructure development, enhance prospects for economic development and create additional employment opportunities.

Negative Residual Impact

Residual impacts of possible long-term concern relate to the following:

- water and air quality deterioration;
- noise generation;
- loss of flora, fauna and habitats;
- aesthetic and visual impacts; and
- occupational health impacts to workers due to exposure to dust and noise.

These residual impacts are not expected to be significant if appropriate mitigation measures are properly implemented.

An Environmental Management Plan is recommended to ensure all issues are properly managed and mitigated. Regular monitoring of air, water, noise and socio-economics concern are suggested to determine the effectiveness of the mitigating measures.

Conclusion

The EIA study evaluated the potential environmental impacts related to the development of the proposed Project. Based on the quantity of reserve, rock type and favourable geological conditions, it is concluded that this quarry is feasible and technically practical to use for the dam filling materials and concrete aggregate production

With the implementation of the mitigating measures, it is anticipated that, in general, the proposed Project should not pose major significant impacts to the environment. The mitigating measures recommended should significantly reduce the adverse impacts predicted. Full commitment by the Project Proponent and regular enforcement by the relevant authorities will ensure that the mitigating measures are properly implemented and thus minimizing any impacts to the environment.

TABLE ES-1: SUMMARY OF ENVIRONMENTAL ISSUES AND MITIGATING MEASURES

| Potential Impacts / Issues | Mitigating Measures | Reference in EIA Report | Remarks |
|--|--|----------------------------|-----------------------|
| A. SITE INVESTIGATION/EXPLORATION STAGE IMPACTS | | | |
| No significant impacts | | | |
| B. SITE PREPARATION AND QUARRY DEVELOPMENT STAGE IMPACTS | | | |
| <p>I. Soil Erosion and Sedimentation</p> <p>Clearing of covered vegetation, removing of overburden and inter-burden and other associate earthwork activities would eventually exposed the soil surface and lead to the sedimentation.</p> <p>The sedimentation may result in impacts to the quality of natural water systems and ultimately the biological systems that use these waters.</p> | <p>a) Site clearing shall be restricted to only that necessary for road construction to the quarry face. Vegetation in areas of the site where earthworks are not required shall be left untouched.</p> <p>b) Work shall not be carried out during rainy days to minimise ground disturbance and soil erosion. It is recommended that quarrying operation should stop during rainy days.</p> <p>c) Work scheduled shall be properly implemented in such a way that works are to be carried out in phases and site clearing be limited to benches associated with its particular phase to minimise soil surface exposing area.</p> <p>d) Protection of all unpaved roads shall be achieved through application of a layer of crusher run or firm soil material to reduce surface erosion.</p> <p>e) Riparian buffer with double the width of the waterway shall be retained to reduce sediment delivery into the waterway.</p> <p>f) Sedimentation ponds or silt traps should be constructed and maintained at strategic locations (where site conditions permit) to trap and minimise the entry of sediment into existing waterways. The typical design of the sedimentation pond is shown in Figure 4.1. Where necessary, other ponds shall be built depending on the actual site conditions as the Project is being developed. It is preferable to install the sedimentation ponds or silt traps before the major earthworks commence. Such ponds can also serve as water conservation/ retention structures.</p> | Section 4.4.1 Page C4-4 | Compliance Monitoring |

| Potential Impacts / Issues | Mitigating Measures | Reference in EIA Report | Remarks |
|---|---|------------------------------------|---------|
| <p>2. Slope Stability</p> <p>Most of the landslides that occur in quarry areas are related to slope failures such as cut slopes in road construction; overburden and inter-burden removal and dumping; and activities at the quarry production benches.</p> | <p>g) Proper drainage system along both sides of access roads as well as other cleared areas shall be constructed to channel the water properly and directed into the sedimentation pond area for retention and recycling.</p> <p>h) Drainage installations and the sedimentation ponds shall be regularly desilted and checked to ensure that they are not clogged and are functioning effectively.</p> <p>i) Total Suspended Solids (TSS) content in the discharge water shall not be exceeding the limit of Class IIB of the National Water Quality Standards for Malaysia (NWQS) (see Appendix F). Quarterly monitoring shall be carried out to determine their effectiveness.</p> <p>j) All cleared and exposed areas, not meant for further quarry development, shall be rehabilitated with suitable final ground contour and be re-vegetated or turfed with fast growing indigenous vegetation or creeping grass cover as soon as possible to maintain the site in a condition so that erosion and sediment runoff are minimised. To expedite re-vegetation, areas that are already depleted could be covered with topsoil from newly opened extraction site.</p> | <p>Section 4.4.2 Page C4-7</p> | |
| <p>a) Site clearing shall be limited within the road corridor and progress gradually from one end or both ends of the road. Patch clearing is to be avoided.</p> <p>b) It is recommended that the internal road be aligned to avoid hill crests and steep slopes to avoid extensive cutting and filling.</p> <p>c) Earthworks shall be planned to avoid the rainy season, whenever applicable.</p> <p>d) As slope cutting generally produces slopes that are steeper than natural slopes, major cut slopes shall be compacted and benched.</p> <p>e) Slope benches shall be provided with a proper drainage system consisting of bench drains (usually on cut slope benches), berm drains (usually on fill slopes or embankment) interceptor drains and cascade drains etc.</p> <p>f) Slopes which are already depleted shall be re-vegetated with fast growing grass or small trees.</p> | | | |

| Potential Impacts / Issues | Mitigating Measures | Reference in EIA Report | Remarks |
|--|---|------------------------------------|-----------------------------|
| <p>3. Water Quality</p> <p>The potential water pollutants that are anticipated during site preparation and quarry development stage are suspended sediment, sewage and solid waste from workers' camps and oil and grease from machineries.</p> | <p>g) To reduce large volumes of soil material from slipping downright, the cuttings or excavation works should be reduced to a maximum of 3-m depth. Subsequent cuttings made until the required stacking height of 235 m with an average stacking height of 47 m has been established, should also take note on the compactness or looseness of the soil as guide so as to help reduce or prevent further occurrences of slippages.</p> <p>h) On the extreme, wedge failures and rotational failures could also result in a massive collapse of slopes. Based on the soil nature and adopting a slope cutting gradient of 1:1.5 (vertical to horizontal), it is anticipated that the slope stability may not pose a problem.</p> <p>i) Where possible, constructions on steep slopes should be avoided. When this is unavoidable in some cases, then the question of most suitable safe cut and fill slopes should be determined on a case to case basis supported by detailed soil investigation. All slopes to be worked on must be within the limits of steepness to ensure stability.</p> <p>j) The dump sites shall be compacted to stabilize and reduce soil erosion.</p> <p>Soil Erosion and Sedimentation</p> <p>a) Mitigation measures for the control of soil erosion and sedimentation has been discussed in the Section 4.4.1. Thus, the Project Proponent shall endeavor to implement them to prevent and minimise water pollution from sediment runoff.</p> <p>b) The water qualities of the streams around the Quarry sites shall be monitored regularly. Water quality monitoring once in every three (3) months is recommended to be conducted throughout the Project operation period. Where relevant, the water qualities shall be maintained and/or improved to Class IIB of the National Water Quality Standard for Malaysia (NWQSM).</p> | <p>Section 4.4.3 Page C4-8</p> | <p>Quarterly Monitoring</p> |

| Potential Impacts / Issues | Mitigating Measures | Reference in EIA Report | Remarks |
|----------------------------|--|-------------------------|---------|
| | <p><i>Sewage</i></p> <ul style="list-style-type: none"> c) Direct discharge of sewage into waterways shall be prohibited. Prefabricated individual septic tank systems shall be provided at the workers' quarters, labour lines and offices for the treatment of sewage. Maintenance of these facilities will require periodic de-sludging of septic tanks (and proper treatment of the septic sludge) to ensure that the treatment systems are effective at all times. d) Canteen and kitchen wastewater should be channelled through physical screens and oil and grease traps to remove residual oil and solids before draining into the water ways. e) The sewerage systems should be able to produce effluent with quality that would comply with Standard B of the Environmental Quality (Sewage) Regulations, 2009, prior to discharge (refer to Appendix G for further details). <p><i>Oil and Grease (Schedule Wastes)</i></p> <ul style="list-style-type: none"> f) All scheduled wastes must be disposed of and stored properly according to the Environmental Quality (Scheduled Wastes) Regulations, 2005 (refer to Appendix I for further details). g) All scheduled wastes should be stored in durable containers, which are able to prevent spillage or leakage of the scheduled wastes into the environment. h) Containers of scheduled wastes should be clearly labelled in accordance with the Third Schedule for identification and warning purposes. i) Incompatible scheduled wastes should be stored in separate containers. j) The generation of any scheduled wastes should be notified to the Director General of Department of Environment (DOE) in writing. The notification shall be completed in the form prescribed in the Second Schedule (Notification of Scheduled Wastes). k) Areas for the storage of the containers should be designed, constructed and maintained adequately to prevent spillage or leakage of scheduled wastes into the environment. | | |

| Potential Impacts / Issues | Mitigating Measures | Reference in EIA Report | Remarks |
|--|--|-------------------------------------|-----------------------------|
| <p>4. Air Quality</p> <p>Site preparation works, onsite vehicle movements over unpaved surfaces, wind erosion, exhaust gas emission from machinery are among sources of air pollution.</p> | <p>l) Temporary scheduled waste (oil and grease wastes) storage area must be located away from water courses to avoid contamination of the drains and receiving water.</p> <p>m) All above-ground storage tanks (for fuels or chemicals, if any) shall be bunded to contain 110% of the maximum storage volume of the biggest tank in the storage area. Place to load and unload containers are designed so that any spill will be contained. There shall be no opening in the dyke that may allow surface water runoff from entering or leaving the site. Close supervision of refueling (bulldozers, excavators, core drilling machine and lorries) in a designated area shall be carried out.</p> <p>n) All stationary equipment and machinery to be routinely checked for leaks. In case of leakage, immediately stop the leakage by removing the machinery from the Site. Maintenance of vehicles and machinery shall be carried out away from any source of surface water.</p> <p>o) In case of any spillage, immediately contain spillage to prevent from getting into the waterways, using spills kit or sand. The removed spilt-material shall be placed in sealed container and keep in a designate temporary storage area with proper labelling prior disposal.</p> <p>p) Disposal of scheduled waste should be carried out by DOE-approved contractor and send only to DOE's licensed disposal site.</p> | <p>Section 4.4.4 Page C4-11</p> | <p>Quarterly Monitoring</p> |
| <p>a) All vehicles and associated equipment should be properly maintained through regular servicing to reduce the emissions pollutants.</p> <p>b) Spraying of water shall be carried out twice a day or more frequently during dry weather and windy conditions, especially along the road near the office and worker quarters. Graveling the internal roads, especially around the site office and living quarters would reduce dust problem.</p> <p>c) If the stockpiles prove to be a problem during drier days, the dust can be controlled by watering the active stockpiles with fixed or mobile sprays. Stockpile area especially quarry dust stockpiles need to be sprayed with water at least 3 times a day, particularly during dry windy days.</p> | | | |

| Potential Impacts / Issues | Mitigating Measures | Reference in EIA Report | Remarks |
|---|---|-------------------------|---------|
| <p>During operational stage, the main sources of air pollution are dust from the drilling, blasting, crushing, screening and transportation activities. If the dust is not suppressed and controlled, it could lead to reduced visibility around the quarry site, and cause air pollution and health hazard to the workers.</p> | <p>d) During crushing, one method of suppressing the dust emission is to keep the rock moist at all stages of the crushing operation. The crushers should be provided with water spray nozzles during the crushing operation. Provided that these are properly installed and maintained, they should be able to control the dust problem.</p> <p>e) Dust generated during drilling operations is confined to the working area (quarry face) as the dust and particulates are heavy and will not be airborne for long before they settle down. Therefore, the dust and particulates created from drilling operation are localized in nature. Workers should wear respirator (breathing masks) to avoid inhaling excessive particulates containing silicates.</p> <p>f) Drilling machines equipped with dust suction system could greatly reduce the dust emission during the drilling operation.</p> <p>g) During the materials transportation, the loads shall be properly covered with tarpaulin sheets/canvas to prevent spillage that can become source of dust pollution.</p> <p>h) A speed limit of (20km/hr) shall be imposed for vehicles travelling within the quarry sites and whenever they are passing by places such as the worker's quarters and site office to reduce kick up of dust.</p> <p>i) Road signs and speed bumps should be introduced at such locations.</p> <p>j) The workers exposed to the dust generated at the Project site shall be provided with approved facemasks if the dust condition becomes serious.</p> <p>k) There must be lorry/wheels wash troughs facility for heavy vehicles and machineries leaving the Quarry sites.</p> <p>l) Quarterly monitoring of air/dust impacts from the Project shall be carried out at sensitive areas.</p> | | |

| Potential Impacts / Issues | Mitigating Measures | Reference in EIA Report | Remarks |
|---|--|-------------------------------------|-----------------------------|
| <p>5. Noise Pollution</p> <p>Site preparation and overburden removal includes noise emitted due to land clearing machineries and hauling trucks. These may temporarily increase ambient noise levels at the Project site. However, the impacts are deemed to be temporary or localised, would be confined to the site preparation period only.</p> | <p>m) It is noteworthy that in accordance with the Regulations 36 and 37, Environmental Quality (Clean Air) Regulations, 1978-P.U (A) 280, any installation of fuel-burning equipment that is used for the purpose of generating power (e.g. generator) and that consumes liquid or gaseous fuel at 15 kg or more per hour, or pulverised fuel or solid fuel at 30 kg or more per hour, should apply for a written permission from the DOE.</p> <p>a) Workers exposed to noisy working environment shall be provided with hearing protection device such as ear muffs or ear plugs that is approved by the Department of Occupational Safety and Health (DOSH). The Project Proponent/Contractor shall also ensure that it is being used by all employees exposed to noise level at or above the permissible exposure limits prescribed below:</p> <ul style="list-style-type: none"> • No employee shall be exposed to noise level exceeding the equivalent continuous sound of 90 dB(A) or exceeding the limits specified in the First Schedule of the Factories and Machinery (Noise Exposure) (Regulations), 1989 or exceeding the daily noise dose of unity. No employee shall be exposed to impulsive noise exceeding 115 dB(A) at any time. • Noise impact to the workers could also be minimised through administrative control, such as scheduling work shifts to maintain Employee's Exposure Level over the eight-hour work shift within the Permissible Exposure Limits - (First Schedule of the Factories and Machinery (Noise Exposure) (Regulations), 1989). • The management is recommended to establish and maintain free audiometric testing programme for employees exposed to noise. The management should also establish baseline and Employee's Medical and Occupational Records for every employee within 6 months from the day the employee commences work. Audiometric testing shall be repeated every year for employees exposed to noise level at or above action level of 85 dB(A). <p>b) Equipment shall be adequately maintained to minimise noise, including lubrication and replacement of worn parts, especially exhaust system.</p> | <p>Section 4.4.5 Page C4-14</p> | <p>Quarterly Monitoring</p> |

| Potential Impacts / Issues | Mitigating Measures | Reference in EIA Report | Remarks |
|---|---|-------------------------|---------|
| <p>The noise generated during the quarry operations stage includes:</p> <ul style="list-style-type: none"> • Cutting quarry benches into the hillslopes; • Drilling and blasting operations; • Ripping materials from the quarry face and transferring materials onto the trucks; • Operational movement of heavy machineries (i.e. excavators) within the quarry sites; • Vehicles movement during the material transportation to the crusher plant and stockpile area. | <p>c) The generator house should be sited far away from the workers' quarters. It should be well padded to make it as sound-proof as possible, and the generator should be well maintained to reduce the noise level.</p> <p>d) Noise level must not exceed the limits stipulated in Annex A (Scheduled 1 for daytime limit) of Planning Guidelines for Environmental Noise Limits and Control (refer to Appendix F).</p> <p>e) Quarterly ambient noise monitoring is recommended to be carried out. The Permissible Noise Exposure Limits are given in Table 4.5.</p> <p>f) Geologic conditions that cause blowouts should be stemmed through and a check of column rise will avoid overcharging.</p> <p>g) Holes must be drilled accurately to maintain the designed burden. This is especially important with inclined holes.</p> <p>h) If there is a high free face in the direction of nearby built-up areas, the face should be reoriented, if possible, or reduced in height.</p> <p>i) Collar priming should be avoided where airblast is a problem (actually collar priming is seldom desirable).</p> <p>j) Early morning, late afternoon, or night firing, should be avoided or prohibited. Blasting when a significant wind is blowing toward nearby built-up areas will increase airblast.</p> <p>k) Use of longer delays between rows than between holes in a row will promote toward rather than upward movement of the burden. Five milliseconds per foot of burden between rows is a good rule of thumb, but this should be increased in later rows for shots with many rows.</p> <p>l) Excessively long delays that may cause a hole to become unburdened before it fires should be avoided.</p> <p>m) Avoid blasting in adverse weather conditions, especially when the wind is blowing from the blasting site towards sensitive premise or when there is low cloud. Consider the orientation of the working area in relation to sensitive areas.</p> | | |

| Potential Impacts / Issues | Mitigating Measures | Reference in EIA Report | Remarks |
|---|---|-------------------------------------|----------------------------------|
| <p>6. Ecological</p> <p>Site clearing, overburden removal and quarry face preparation can lead to permanent loss of vegetation and convert the forest area to non-forest area. The loss of habitat is the major impact on the terrestrial and aquatic fauna in the quarry sites. The impact will be localised but significant to the smaller fauna; larger fauna will relocate rapidly into neighbouring forest.</p> | <p>a) Site clearing shall be properly planned and done in stages as this would allow terrestrial fauna to have sufficient time to escape to adjacent undisturbed area.</p> <p>b) The existing trees and bushes in the buffer zone shall be utilized as natural buffer and will not be removed unless it is necessary such as haulage road construction.</p> <p>c) Prior to site clearing and earthworks, the Project boundary must be marked clearly to avoid clearing and disturbance of areas outside the work limit. Vegetation's outside the Project site shall be left untouched.</p> <p>d) Site clearing and overburden removal activities shall be carried out during dry period.</p> <p>e) A comprehensive revegetation or restoration programme shall be undertaken particularly for the open and disturbed areas within the Project site.</p> | <p>Section 4.4.6 Page C4-20</p> | <p>Compliance Monitoring</p> |
| <p>7. Occupational Safety and Health</p> <p>Site preparation and the operation of the quarry in general is a high-risk related job.</p> | <p>a) The access roads and the entrances should be fenced off. Visitors must be required to sign in and out at the gate for security as well as for safety reasons. To discourage illegal trespassing into the sites, the local people must be educated to the dangers within a quarry site. Appropriate warning signs must be placed conspicuously and visibly at appropriate places such as at the gates to warn of the dangers inside.</p> <p>b) No trespass signs also should be placed at the strategic location and height where in the event of un-authorised personal trespass; Project Proponent will not be liable for any injuries or death.</p> <p>c) All necessary safety signs for the quarry sites should be erected at the main entrance or at strategic area with clear visibility. These shall include, but not limited to safety signs, direction signs, un-authorised personnel trespass signs and emergency escape route/assembly areas.</p> | <p>Section 4.4.7 Page C4-21</p> | <p>Quarterly Site Monitoring</p> |

| Potential Impacts / Issues | Mitigating Measures | Reference in EIA Report | Remarks |
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| | <p>d) All workers should be medically screened prior to being employed, as part of their employment contract. There should also be health inspection at regular intervals for the workers and their families.</p> <p>e) Safety awareness among workers shall be instilled through regular safety briefing.</p> <p>d) The proposed working hour of 6 days per week and two (2) shifts of eight hours per day from 7:00 a.m. to 3:00 p.m. and 3:00 p.m. to 11:00 p.m. shall be adopted. With regards to the drilling operations, it is recommended that work be only at maximum of 8 hours per day and should not go beyond 7:00 p.m.</p> <p>e) Workers' safety must be observed at all time. The Occupational Safety and Health Act (OSHA) 1994 shall be implemented and must be strictly followed by the Project Proponent and/or Contractor to secure and protect the safety, health and welfare of workers against risks arising out of their daily work routines. The National Institute of Occupational Safety and Health (NIOSH) is responsible to disseminate information on OSHA, while the DOSH is empowered to enforce the Act. All serious accidents at the site should be reported to the relevant authority.</p> <p>f) Appropriate safety gears such as boots, eye protection glasses, helmet, masks, gloves and ear-muffs should be made available to all workers involved in hazardous jobs. Even though the workers may be reluctant to use protective gears as they usually find them cumbersome, they should be encouraged to use at least the basic items required for the job that they are doing. These safety gears should be provided by the Project Proponent and/or Contractor free-of-charge to the workers, and they must be kept handy at the Project site for use in case of emergency.</p> <p>g) A written report must be made to the authorities on the detail findings of any incidents that potentially affecting human health and safety and include ways of preventing reoccurrence and improving future response to similar incidents.</p> | | |

| Potential Impacts / Issues | Mitigating Measures | Reference in EIA Report | Remarks |
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| <p>8. Blast Vibration and Flyrocks All blast creates ground vibrations.</p> | <p>j) A person, preferably in the managerial position, should be assigned to oversee the health, safety and environmental (HSE) aspects of the workers and take care of the wellbeing of the environment. Persons should not operate equipment or perform tasks for which they are not trained and competent. Persons that are properly trained will work in a safe efficient manner. The Project Proponent and/or Contractor should establish and maintain training programmes for the purpose, or hire persons with appropriate training and experience.</p> <p>k) First-aid facilities and fire extinguishers should be made available in the site office and quarters.</p> <p>l) Emergency transport shall be allocated for the transfer of patients on site to major medical centers.</p> <p>m) All materials shall be properly stacked or stored so that it does not endanger any persons. Good housekeeping procedures shall be enforced.</p> <p>n) All the machinery and equipment used should be well maintained so that accidents attributable to faulty machinery and equipment could be prevented.</p> <p>o) Provide all fire-preventive measures, fire protection and fire-fighting equipment in the Project site in accordance with the recommendations by the Department of Fire and Rescue, where applicable.</p> <p>p) Telecommunication facilities shall be provided for workers particularly for use during emergency.</p> <p>q) All stagnant water bodies created by rubbish, ground depression or settlements, materials storage and bunding shall be removed or properly managed to prevent the proliferation of mosquito larvae.</p> <p>a) A buffer zone should be established to ensure safe distance for the quarrying activities such as flyrocks generated from the blasting operations. A buffer zone of 50 meters shall be implemented as its distance from the quarry licenced boundary as per design.</p> | <p>Section 4.4.8 Page C4-24</p> | <p>Compliance Monitoring</p> |

| Potential Impacts / Issues | Mitigating Measures | Reference in EIA Report | Remarks |
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| <p>The effects of blasting on people and structures depend on individual psychology, the type and nature of the structure and the geology of the area. Experiences show that the main reason for complaints of vibration is not usually actual structural damage but fear of damage and/ or nuisance. Geological conditions, improper blasting design or carelessness can cause flyrocks. Therefore, adopting suitable blasting method is important.</p> | <p>b) Proper blasting design shall be followed to control the extent of flyrocks by taking into consideration the characteristics of the rock to be blasted. This includes provision of sufficient stemming to the blast holes, namely at least equal to the burden. Blasthole locations shall be carefully laid out and drilling shall be controlled as closely as possible. Bench marks shall be established for use in setting out hole locations for the next blast before the current blast is made to avoid possible error due to back break.</p> <p>c) The charge weight of explosives per delay shall be reduced. This is most easily done by reducing the number of blast holes fired on each day. If the blast already employs only one blast hole per delay, smaller diameter blast holes, a lower bench height, or several delayed decks in each blast hole can be used.</p> <p>d) Overly confined charges such as those having too much burden or too much subdrilling shall be avoided. The primer shall not be placed in sub drilling.</p> <p>e) Each driller shall make careful examination of his working place and remove any loose rocks, stones, earth or other material which might be dangerous, especially after blasting, before commences the quarry works.</p> <p>f) Use blasting netting when in any doubt.</p> <p>g) Use sand bag to put on top of the suspected hole.</p> <p>h) Prior to any blasting operation, warning siren shall be implemented to warn and evacuate the workers from the area or flyrocks target. Sufficient time after the siren warning shall be given to allow the affected people to seek shelters prior each blasting and it is recommended that a specific time and day be designated for the blasting operation.</p> | | |
| <p>9. Handling and Transportation of Explosive</p> <p>Explosives and all its accessories are safe to handle when they are properly treated.</p> | <p>a) All shot firers must know the characteristics, limitation and the recommended usage of the explosives they are using.</p> <p>b) Suitable initiation system shall be used. For non-electric system, make sure exploder rating is appropriate; have the exploder serviced regularly; make sure the shot firing cable is in good condition; connect using series circuits; and use joint insulators. Be attentive to detail such as do not work under pressure; check the rise of explosive column; use primer and choose the position carefully; be meticulous in making up the primers; know the limitation of any system</p> | <p>Section 4.4.9 Page C4-30</p> | |

| Potential Impacts / Issues | Mitigating Measures | Reference in EIA Report | Remarks |
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| <p>10. Transportation Impacts Loading and unloading are the two possible processes that could generate dust and particulates.</p> | <p>used; do not handle the detonators roughly; check that the circuit resistance is within tolerances; and know own limitations.</p> <p>c) It is prudent that shot-firer must adhere to safety rules issued by the explosive manufacturer so as to avoid incidence like misfire. He must obtain the necessary certificate from Minerals and Geoscience Department and Royal Malaysian Police before being allowed to manage blasting activities in the quarry.</p> <p>d) The Shot-firer shall be responsible to check and ensure that all circuits, pattern and timing of shock tube and connector prior to the "go ahead" signal.</p> <p>e) After the blast, the Quarry Manager and the Shot-firer shall return to the site to counter check on any possible misfires, after a lapse of about 15 minutes or more.</p> <p>f) Explosives should only be handled by authorised and competent personnel and only with approved tools and equipment.</p> <p>g) Warning siren to be initiated immediately before and during blasting. Siren should only be switched off after final inspection</p> <p>h) The transportation vehicle for the explosive shall be equipped with fire extinguishers.</p> <p>i) Prominent signboards bearing "EXPLOSIVES", "DANGER" must be displayed on the vehicle.</p> <p>j) No flammable material and batteries shall be carried together with the explosives.</p> <p>k) Explosives shall be transported with their original packages or boxes.</p> <p>l) Detonators must not be transported together with the explosives. Loose numbers of detonators shall be carried inside a wooden box and be kept away from explosives.</p> <p>m) Explosives shall be transported during day time only.</p> <p>n) Smoking is strictly prohibited on/near the explosive transportation vehicle.</p> <p>a) Appropriate signs shall be erected to show where loading lorries are turning in and out of the Project site.</p> <p>b) Drivers must maintain proper road courtesy, e.g. refrain from using their horns unnecessarily and travelling very fast.</p> <p>c) Overloading of lorries shall be avoided at all times. Loads shall be properly covered with canvas sheets and fastened to prevent spillage which may cause accidents.</p> | <p>Section 4.4.10 Page C4-32</p> | |

| Potential Impacts / Issues | Mitigating Measures | Reference in EIA Report | Remarks |
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| <p>11. Waste Generation and Management</p> <p>Site clearing at new area would generate biomass that needs to be disposed of properly in order to prevent them from becoming the source of water pollution. Oil and grease are generated from machinery and vehicular maintenance activities might result in ground and water contamination if proper disposal is not carried out. Indiscriminate and improper disposal of sewage and solid wastes onto land or into drains within the Project site could result in adverse environmental impacts to ground soil and water quality.</p> | <p>a) Open burning is prohibited unless with written permission from the NREB.</p> <p>Biomass/ Earth Wastes</p> <p>b) It is recommended that biomass matter to be used as mulching material for the temporary protection of exposed ground surfaces from erosion.</p> <p>c) Vegetative and unsuitable earth wastes should be piled up for natural decomposition within the undeveloped area of the Project site. The stockpiles shall be constructed with the slope no greater than 2:1 (horizontal to vertical) and located at least 20 m away from any water bodies.</p> <p>d) Suitable excavated earth material shall be used as fill material for the site.</p> <p>Overburden and Inter-burden</p> <p>e) The overburden and inter-burden removed from the Quarry shall be properly landfilled at the designated dumpsites (see Figure 2.2) which are located at the eastern side of the proposed quarry site.</p> <p>f) Spoil area should be compacted to prevent loose soil from runoff into nearby water bodies.</p> <p>g) Turfing and/or re-vegetation with suitable cover plants should be carried out immediately at completed areas which are not involved in further activities. This would ensure the establishment of cover plants and help to minimise discharge from surface runoff.</p> <p>h) Perimeter earth drain should be constructed to contain and channel the runoff to nearest sedimentation pond for treatment before direct discharge into existing water bodies.</p> <p>i) The perimeter earth drain system should be maintained and inspected regularly to ensure that they are not blocked and is sufficient to cater for the expected maximum storm or detain the storm water runoff on-site.</p> <p>Scheduled Wastes</p> <p>j) The measures for control of scheduled wastes discussed in Section 4.4.3 above are applicable for the control of impacts from scheduled wastes. Thus, the Project Proponent shall endeavor to implement them to prevent and minimise water pollution due to the scheduled wastes intrusion.</p> | <p>Section 4.4.11 Page C4-32</p> | <p>Compliance Monitoring</p> |

| Potential Impacts / Issues | Mitigating Measures | Reference in EIA Report | Remarks |
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| <p>12. Social Economic Impacts</p> <p>The implementation of the proposed quarry will result in positive socio economic impacts.</p> | <p>Sewage and Domestic Solid Waste</p> <p>k) The measures for sewage discussed in Section 4.4.3 above are applicable for the control of impacts from sewage.</p> <p>l) A landfill at a suitable location should be set up to cater for the worker's population at the site. The level of the landfill will be decided according to the NREB requirements and will require a separate EIA study to be carried out for the landfill.</p> <p>m) The establishment of landfill has to be carried out before any major construction work begins. During initial phase, before the landfill is ready, temporary dumping site shall be established and has to be identified and agreed by SEB Power Sdn. Bhd. and NREB.</p> <p>n) It is recommended that the waste management commitment from contractors to be included in the contractual agreement.</p> <p>o) Good housekeeping practices should be enforced and waste materials should not be left where they can be easily blown or washed away.</p> | <p>Section 4.4.12 Page C4-34</p> | |
| | <p>a) Whenever possible, the Project Proponent/ Contractor should prioritize hiring local manpower for the Quarry jobs. Only when there is lack of recruits should the Project Proponent/ Contractor source workers from outside/ other countries.</p> <p>b) Where skills are lacking, specific training should be given.</p> <p>c) All workers must be screened for malaria parasite upon employment and consequently every yearly. This is particularly important for all foreign workers. The risk of foreign workers bringing in malaria into the Project site is high. Suspected persons should not be employed and should be directed to the relevant health authorities for further action. The same should be applied for suspected sexually transmitted disease (STD) carrier.</p> <p>d) Adequate accommodation with proper sanitary facilities for the construction workforce should be provided and care should be taken to minimise the potential for social tensions to develop with the existing population of the area.</p> <p>e) Proper repatriation program should be instituted at the end of the contract to ensure smooth and legal departure.</p> | | |

| Potential Impacts / Issues | Mitigating Measures | Reference in EIA Report | Remarks |
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| C. PROJECT ABANDONMENT AND REHABILITATION STAGE | | | |
| <p>13. Abandonment and Rehabilitation</p> <p>Abandonment will leave the site with exposed land surface, site unmaintained, exposed to hazards and in the long run may leave the landscape with unsightly scenery. Systematic and proper abandonment will ensure the suitability of the Project site for other purpose in the future.</p> <p>Rehabilitation of the quarry site is required to avoid surface erosion and unsightly landscape.</p> | <p>a) Systematic revegetation of exposed slopes and provision of proper drainage to minimise erosion and flooding. The use of indigenous fast growing plants would be one of the ways of achieving it faster.</p> <p>b) Dismantle or demolish structures that cannot be made safe or cannot be assured to remain safe with time.</p> <p>c) All machinery and equipment (excavation and trucks) must be removed from the Project site.</p> <p>d) All concrete slabs may be broken and removed or buried.</p> <p>e) Transmission poles, cement and concrete mixing plants, gates and fences, fuel or water storage tanks, water pipelines, and septic systems must be removed.</p> <p>f) All pits and burrow areas must be filled with sand or earth.</p> <p>g) The Project Proponent shall submit a proper abandonment plan to NREB at least 3 months before the event occurs. Early notification and report shall be submitted to NREB and relevant authorities to ensure proper abandonment plan, thus avoid detrimental impacts due to negligence.</p> <p>h) Site visit shall be carried out 3 months after the last work of abandonment activity to validate the progress of abandonment plan.</p> | <p>Section 4.5 Page C4-35</p> | |

Residue Impacts And Monitoring Programs

The potential residual impacts that arise from the implementation of the Project are such as environmental impacts that remain after all mitigating measures are successfully implemented. These residual impacts may remain due to the natural limitations (such as effects of weather) or inefficiencies of methods adopted. There are possibilities that some residual impacts that may occur such as the aesthetic and visual impacts, water quality degradation, waste management, noise, vibration and dust pollution. Thus, environmental monitoring programme proposed in this EIA report shall be conducted periodically as per NREB requirements throughout the operational stage of this Project.

Apart from these, the Project is predicted to bring beneficial impacts can be seen from the human perspective. The Project will generate employment and business opportunities, particularly to those skilful workers during the operational stage. This is a residual impact that is beneficial in nature. It does not require monitoring.

Conclusion

Based on the EIA study, it can be concluded that with incorporation of appropriate design and mitigating measures, the potential impacts can be controlled to tolerable limits if all mitigation measures are implemented properly and accordingly. Also, with the implementation of proper post-monitoring, this development will not pose significant adverse impacts on the environment.