Serial No.: 1302

NATURAL RESOURCES AND ENVIRONMENT BOARD SARAWAK

[Incorporated under the Natural Resources And Environment Ordinance (Chapter 84 - Laws of Sarawak 1958 Ed.)]

SEIA REPORT APPROVAL

Terms and Conditions of Approval in accordance with the provisions of the Natural Resources & Environment Ordinance 1993 (Cap. 84 - Laws of Sarawak) and Natural Resources & Environment (Prescribed Activities) Order, 1994

Name of Project	:	**THE PROPOSED BALEH HYDROELECTRIC PROJECT, KAPIT DIVISION, SARAWAK**
Main Activity	:	**HYDROELECTRIC DAM CONSTRUCTION**
Project Proponent	:	**SARAWAK ENERGY BERHAD NO. 1, THE ISTHMUS, 93050 KUCHING, SARAWAK**
Date of Approval	:	**20th JANUARY 2015**
Reference No.	:	**(66) NREB / 6-4 / 7F / 1**

[PETER SAWAL]
Controller of Environmental Quality
Sarawak

GENERAL TERMS AND CONDITIONS

1. COMPLIANCE

(a) The project proponent shall adhere to the general operation and maintenance procedure that has been planned. If any changes are to be made, the NREB shall be duly informed.

(b) The project proponent shall sign an undertaking with the NREB to adopt and comply with all the *Terms and Conditions of Approval* contained herein for the protection and enhancement of the environment in its project site.

(c) The project proponent shall display a copy of the document, i.e. *Terms and Conditions of SEIA Approval for Environmental Protection*, at its site office. The document shall be made available for inspection by officers of the NREB when they carry out the monitoring or auditing.

(d) The NREB reserves the right to amend, delete or add any of these approval conditions as and when it deems fit.

2. CONTRACT AGREEMENT

(a) The project proponent must ensure that the Terms and Conditions for the protection and enhancement of the environment shall be included in all contract agreements with respect to the development and operation activities of the project; for further, the project proponent shall ensure that all these Terms and Conditions are observed, complied with and implemented by all contractors, their agents and servants, appointed to carry out the activities.

3. DATA AND REPORTS

(a) The Project Proponent shall engage an Environmental Consultant to carry out environmental monitoring and provide environmental reports and data on the state of the environment *once every three months* upon commencement of the project.

(b) The report shall be in the form and format as outlined in the **ANNEX II - "Environmental Monitoring Report" (EMR).**

(c) The Project Proponent shall include the agrochemical analyses in the EMR *once every six months* after planting has been carried out.

(d) The water sampling points shall be in the locations as recommended in the SEIA Report.

4. MONITORING

(a) The officers of the NREB shall monitor the project development to ensure that all conditions herein are complied with.

(b) The project proponent or its contractors shall give full cooperation and support to the officers of the NREB who shall carry out the monitoring and supervision on the development activities of the project.

5. CONSULTATION

(a) The project proponent, the NREB and relevant parties as determined by the NREB shall hold consultations as and when required with regard to the protection and enhancement of the environment of in the project site.

6. SPECIFIC TERMS AND CONDITIONS

(a) The specific terms and conditions for the environmental protection at the project are as outlined in **ANNEX I.**

SPECIFIC TERMS AND CONDITIONS

ANNEX 1

LIST OF ISSUES AND MITIGATING MEASURES RECOMMENDED BY THE ENVIRONMENTAL CONSULTANT AS CONTAINED IN THE SEIA REPORT FOR **THE PROPOSED BALEH HYDROELECTRIC PROJECT, KAPIT DIVISION, SARAWAK** AND ENDORSED BY THE NATURAL RESOURCES AND ENVIRONMENT BOARD (NREB)

ITEM	MITIGATING MEASURES RECOMMENDED BY THE ENVIRONMENT CONSULTANT	REFERENCE IN THE SEIA REPORT	ENDORSED BY NREB	
			IN TOTAL	WITH THE FOLLOWING VARIATION
1. PRE-CONSTRUCTION STAGE				
1.1 Investigation activity	(a) Waste management protocols shall be established for all works carried out. This includes the provision of sturdy and well maintained containers and storage facilities for fuel and lubricants for all field crews.	Page C4-2	√	
	(b) Proper tools and Personnel Protection Equipment (PPE) must be available for field crews handling oil and fuel containers. All field crews shall be trained to follow protocols for proper handling of waste and hazardous materials.	Page C4-3	√	
	(c) Prior to commencement, information on the scope and timing of activities must be conveyed to the communities near the proposed dam site through dialogues and mass media for those downstream if they are likely to be affected.	Page C4-3	√	
	(d) A Cultural Heritage Management Plan shall be developed to ensure the application of best practice in the management of cultural heritage within the area affected by the construction of the Baleh HEP.	Additional	√	

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			IN TOTAL	WITH THE FOLLOWING VARIATION
	(e) The archaeological fieldwork shall be done by qualified and trained archaeologists with the approval and cooperation of the Sarawak Museum Department. Important cultural heritage and archaeological sites and/or artefacts shall be excavated, dated, studied, relocated, conserved as required and displayed for posterity.	Page C4-3	√	
1.2 Site Preparation and Establishment of Site Facilities	(a) Site clearing shall be undertaken in stages, i.e. only as and when the main structures are ready to be constructed and the site can be stabilised.	Page C4-3	√	
	(b) Erosion control is the first line of defence against erosion and sedimentation. Proper management shall be done if site clearing activities, re-vegetation and stabilization of entrance, access road and park area are required.	Page C4-4	√	
	(c) Runoff from the Project site shall be routed to point discharge areas where temporary earth drain and temporary diversion channel shall be provided to channel and intercept all surface water from Project site to the proposed sediment basin for treatment.	Page C4-4	√	
	(d) Sediment control is the last line of defence against erosion and sedimentation therefore facilities like silt fence, check dams and sediment basin shall be installed to minimize the transfer of sediment out from the Project site.	Page C4-4	√	Refer to Figure 4.3.1 in the SEIA Report
	(e) Soil Nailing and cascading drain method shall be used to avoid the soil erosion at the slope	Page C4-4	√	Detailed diagram is attached as Figure 4.3.2 in the SEIA Report

ITEM	MITIGATING MEASURES RECOMMENDED BY THE ENVIRONMENT CONSULTANT	REFERENCE IN THE SEIA REPORT	ENDORSED BY NREB	
			IN TOTAL	WITH THE FOLLOWING VARIATION
	(f) A buffer zone shall be provided on both sides of the riverbanks and is to be left undisturbed.	Page C4-4	√	Refer to Table 4.3.1 in the SEIA Report
	(g) Site clearing shall be limited within the road corridor and progress gradually from one end or both ends of the road. Patch clearing shall be avoided.	Page C4-7	√	
	(h) Internal road is recommended to be aligned to avoid steep slopes to avoid extensive cutting and filling.	Page C4-7	√	
	(i) Earthworks shall be planned to avoid the rainy season whenever applicable.	Page C4-7	√	
	(j) Major cut slopes shall be compacted and benched as slope cutting generally produces slopes that are steeper than natural slopes.	Page C4-7	√	
	(k) 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.	Page C4-7	√	
	(l) Temporary slope protection shall be executed after earthwork activities on slope and prior to the establishment of permanent slope protection.	Page C4-7	√	

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			IN TOTAL	WITH THE FOLLOWING VARIATION
1.3 Ecological Impacts	(a) Stream disturbance in the areas not inundated shall be minimized as these will serve as gene pools for macro invertebrates.	Page C4-8	√	
	(b) Biomass along strategic areas within the reservoir littoral zones shall be removed because this area potentially serves as new habitat for macro invertebrates that tolerate stagnant water.	Page C4-8	√	
	(c) River banks immediately below the proposed dam site shall be rehabilitated by planting fast growing wild fruit trees such as Ficus spp. These trees will serve as shade to the river surface, and will provide food to other animals.	Page C4-8	√	
	(d) A Catchment Management Plan shall be developed to ensure the application of best practice in the management of the catchment within the area affected by the construction of the Baleh HEP.	Additional	√	
1.4 Waste Generation and Management	(a) A landfill at a suitable location shall 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.	Page C4-10	√	
	(b) The establishment of landfill shall 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 and NREB.	Page C4-10	√	
	(c) Approved Landfill (NREB EIA Approval) has to be readied within six months before the commencement of any major contract.	Page C4-10	√	
	(d) Waste volume generated shall be recorded by contractors.	Page C4-10	√	

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			IN TOTAL	WITH THE FOLLOWING VARIATION
	(e) Contractors shall prepare a Waste Management Plan before commencement of major construction work. This plan shall include estimates of volume and type of schedule waste, potential transporter and handlers, temporary storage at the construction site and its design.	Page C4-10	√	
	(f) It is recommended that the waste management commitment from contractors to be included in the contractual agreement.	Page C4-10	√	
	(g) Adequately sized septic tanks or portable toilets shall be provided to treat 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.	Page C4-10	√	
	(h) Canteen and kitchen wastewater shall be channelled through physical screens and oil and grease traps to remove residual oil and solids before draining into the water ways.	Page C4-10	√	
	(i) Sewage and sullage wastewater from the Project area must be properly contained and treated at the site to meet Standard B of the Malaysian Environmental Quality (Sewage) Regulations 2009 prior to discharge into receiving water bodies.	Page C4-10	√	
	(j) On-site storage facility for all scheduled waste shall be properly designed to shelter the scheduled waste from the weather and to contain and prevent the waste from contaminating any nearby water bodies.	Page C4-10	√	

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			IN TOTAL	WITH THE FOLLOWING VARIATION
	(k) Only DOE approved transporters shall transport processed or scheduled wastes, and the waste is to be delivered to a DOE approved treatment facility (such as Sarawak Waste Management (SWM) Sdn. Bhd.'s Integrated Waste Management Centre, Mambong, Kuching). Transportation of such waste shall abide fully to the consignment notes system as introduced by DOE, Malaysia.	Page C4-10	√	
	(l) Dedicated containers shall be provided to collect the process waste such as sludge from the water treatment and wastewater treatment plants, used filter press cloths, used oils and containers. These waste materials are considered to be scheduled waste and the Project Proponent shall adhere to all rules and requirements regarding storage, labelling, transport and disposal of scheduled waste as stipulated in the Environmental Quality (Scheduled Waste) Regulations, 2005. This includes notification, inventory, labelling, handling, transport and final disposal site.	Page C4-11	√	
	(m) It is recommended that the biomass matter be used as mulching material for the temporary protection of exposed ground surfaces from erosion.	Page C4-11	√	
	(n) Biomass materials shall be neatly windrowed at designated sites at the proposed project area, which in turn shall be located at least 5 m away from the water bodies.	Page C4-11	√	
	(o) Open burning is prohibited unless with written permission from the NREB.	Page C4-11	√	
	(p) Excavated earth wastes shall be neatly deposited in a stable manner at designated areas of the proposed project site.	Page C4-11	√	

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			IN TOTAL	WITH THE FOLLOWING VARIATION
	(q) Suitable excavated earth material shall be used as fill material for the site.	Page C4-11	√	
	(r) Stockpiling of earth material shall be located at least 50 m from existing vegetation, concentrated water flows, roads and hazard areas.	Page C4-11	√	
	(s) The slope of the earth stockpile shall not exceed a gradient of 2(H): 1(V).	Page C4-11	√	
	(t) As and when the earth stockpiles are established on slopes, they shall be in the form of low, flat, elongated mounds.	Page C4-11	√	
	(u) As and when the earth stockpiles are located on slopes, an earth bank shall be constructed on the upslope side to divert runoff around the stockpile and a sediment fence installed 1 or 2 m downslope of stockpile.	Page C4-11	√	
	(v) Woody debris and/ or cover crops shall be used to stabilize bare earth.	Page C4-11	√	
	(w) Construction wastes shall be neatly stacked in areas designated for this purpose.	Page C4-11	√	
	(x) Recyclable and reusable construction wastes shall be segregated to greatest possible extent, and for reuse by the Contractor.	Page C4-11	√	

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1.5 Occupational Health	(a) Periodic housekeeping shall be carried out within the base camp. The construction site shall be kept clean by following the Guidelines on Construction Site Cleanliness.	Page C4-12	√	Guideline is as attached in Appendix 4.2.1
	(b) Water-logged areas shall be drained to prevent the propagation of disease vectors, e.g. mosquitoes.	Page C4-12	√	Vector-borne Diseases Control Programmed is as attached in Appendix 4.2.2
	(c) Sufficient first-aid facilities and medical supplies shall be kept on site for emergency medical cases.	Page C4-12	√	
	(d) Emergency transport shall be allocated for the transfer of patients on site to major medical centres for instance, the Kapit General Hospital.	Page C4-12	√	
	(e) Systematic contact mechanisms shall be instituted in case of an outbreak or circumstances which require external medical aids.	Page C4-12	√	
	(f) An Emergency Action Plan shall be developed in case of any accidents that may happen during the construction works.	Additional	√	

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1.6 Socio-economics and Traffic Implication	(a) Where the river sections are obstructed for fishing activities during the construction of bridges, alternative temporary routes are recommended for the transfer of boats. The routes can be provision of land access or temporary canals.	Page C4-13	√	
	(b) Where the river sections are temporarily unavailable for riverine traffic to Ng. Entawau and Putai, land access shall be provided from the point of closure to the respective destination.	Page C4-13	√	
	(c) Signage/day marks shall be installed at the bridge site to warn the passing riverine traffic. The size of the day marks shall be as large as practicable and shall be visible from a distance of approximately 800 m, 400 m and 100 m respectively.	Page C4-13	√	

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2. CONSTRUCTION PHASE				
2.1 Soil Erosion and Slope Stability	(a) Erosion and Sedimentation Control Plan (ESCP) shall be prepared for the major construction areas of the Baleh HEP Project. ESCP, if designed and implemented properly can limit the impact of soil erosion and sediment transport to the receiving waterways. ESCP shall be prepared for the following major construction areas: i. Main Dam ii. Spillway iii. Power House iv. Power Intake v. Power Tunnel vi. Diversion Tunnel vii. Main Access Road viii. Quarry Sites	Page C4-18	√	The ESCP should be submitted to the NREB before the commencement of the ground works.

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	(b) ESCP shall be prepared prior to the commencement of works and shall be included in the site specific plans prepared for each major construction sites. The ESCP prepared shall include the following practices: (a) Where possible, land clearing within the construction area shall be carried out in phases. Nevertheless, the erosion and sediment control measures shall be installed before earthwork is carried out. These measures shall include stabilized entrance and wash trough, temporary fencing and earth drain, check dam and silt traps or sediment basins, etc. (b) Temporary earth drains shall be constructed within the construction area to channel overland flow from the disturbed area into the silt traps /sediment basins, before discharging into the receiving waterways. The drainage system shall be regularly inspected and maintained, especially after each heavy downpour. (c) Check dams shall be installed along the temporary earth drain to regulate the flow rate of runoff. (d) Silt traps / Sediment Basins shall be located at the lowest point of the construction site, receiving runoff from the temporary earth drains. Detailed calculation and design of the traps and/or basins shall be submitted to Jabatan Pengairan dan Saliran (JPS) for approval during the detailed design stage. A conceptual plan showing the proposed location of sediment basins is presented in Figure 4.4.5. The exact location of sediment basins/silt traps can be only ascertained when detailed ESCP is prepared. The silt traps / sediment basins must be maintained regularly, depending on the rain conditions to achieve maximum efficiency. Inspection of the silt traps/sediment basins and temporary earth drain and other	Page C4-18	√	

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	mitigation measures shall be carried out after every storm event. Removal of accumulated sediment in the traps/basins could be carried out manually. The removed sediment shall be compacted. Effluent discharged from the silt trap / sediment basin shall not exceed TSS level of 150 mg/l. A maintenance log shall be kept for all silt traps / sediment basins, detailing the inspection and desilting work. (e) Temporary stockpile for earth material removed is anticipated from each construction area. Any stockpile for topsoil or earth material shall be located away from any waterway, suitably compacted and sprayed with water to prevent generation of wind-blown dust. A low bund shall be built surrounding the stockpile to contain siltation. The low bund can be constructed using compacted soil or sandbags. (f) Avoid earthworks during inclement weather. (g) Detailed ESCP is be submitted to JPS for approval.			

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	(c) Proper muck disposal sites have been identified to avoid muck going into the river. Faces of open excavation and filled up areas resulting from construction activities will accelerate the soil erosion, which may obstruct the natural drainage if not prevented.	Page C4-21	√	
	(d) Maintaining a natural green belt around the reservoir periphery is recommended to avoid soil erosion and prevent land slips from the direct draining from the catchment into the reservoir. The creation of a green belt on either side of the reservoir will ensure protection of the reservoir rim area from any minor slips due to fluctuations in the water level.	Page C4-21	√	
	(e) The slopes on both banks above the maximum flood level shall be maintained with the existing vegetation for the creation of a green belt around the reservoir rim. In areas with moderately steep slopes, indigenous, economically important, soil binding tree species will be planted, which are able to thrive well under high humidity and flood conditions. The reservoir area will give an aesthetic look and can cater for the recreation needs of the local population and tourists.	Page C4-21	√	
	(f) Soil erosion control measures will include bio-engineering measures, vegetative measures, reduction in use of fuel wood and management measures. These measures are used to improve slope stabilization by breaking the slopes and covering them with vegetation. Bio-engineering measures consist of intercepting ditches, check dams retaining walls, debris basins, and construction of bench terraces. These structures shall be designed for safe runoff disposal.	Page C4-21	√	

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	(g) Vegetative control measures include mixed plantation of coniferous and broadleaf trees, in combination with bushes and grasses. The main factors determining vegetative growth are soil and moisture, which are closely related to the slope and its orientation. A combination of trees, shrubs and grasses suited to the characteristics of a particular site shall be planted.	Page C4-21	√	
2.2 Recruitment of Workers	(a) The use of local workers shall be maximized as far as possible. This can be done by ensuring that contractors and sub-contractors employ stipulated percentages of local workers. Where local workers lack necessary skills, training programmes should be instituted as part of the contractual agreements.	Page C4-22	√	
	(b) Where foreign workers are employed, it must be through proper channels with proper documentation in compliance with the Immigration and Labour Rules and Regulations, and monitoring of these workers must be strictly enforced.	Page C4-22	√	
	(c) A repatriation programme must be instituted at the end of the employment contract to ensure smooth and legal departure. A clause of this requirement must be stated in the contract document between the Project Proponent and its contractors and sub-contractors.	Page C4-22	√	
	(d) All workers must go through a medical check-up before being employed with special emphasis on communicable or infectious diseases especially malaria, other mosquito-borne disease and tuberculosis (TB) upon employment and consequently every year. This is particularly important for all foreign workers. 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) carriers.	Page C4-22	√	

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	(e) The provision of workers' quarters shall comply with the local statutory or other Government Authorities. Proper sanitary facilities such as toilets with septic tanks shall be provided for the workers' quarters in accordance with the guidelines issued by the Ministry of Health. This is to safeguard the existing local communities at the vicinity of the Project site from being exposed to physiological or communicable diseases.	Page C4-22	√	
	(f) Accommodation and food of good hygiene and access to healthy entertainment must be provided as a substitute to undesirable social behaviour.	Page C4-22	√	
2.3 Mobilisation	(a) Materials, especially hazardous material/ waste, should not be received or dispatched in damaged and/or leaking containers.	Page C4-23	√	
	(b) All containers containing hazardous material/ waste shall be inspected prior to loading to ensure that the seals are tight, the containers are in good, non-leaking condition, and labels and markings are in place, legible and complete.	Page C4-23	√	
	(c) The containers shall be compatible with their contents and be equivalent to regulatory specifications for the material being shipped.	Page C4-23	√	
	(d) Shipping placards shall be used as required by law for shipments on public roads.	Page C4-23	√	
	(e) Smoking should not be permitted during loading and unloading of hazardous materials like fuels, etc.	Page C4-23	√	
	(f) Appropriate spill containment and control supplies and equipment shall be provided at or in proximity to loading and unloading areas.	Page C4-23	√	
	(g) Containers shall be loaded in a manner which allows for easy access.	Page C4-23	√	

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	(h) Tools or equipment which could damage containers shall not be used.	Page C4-23	√	
	(i) Incompatible materials shall be segregated.	Page C4-23	√	
	(j) Containers especially containing flammable material shall be loaded such that contact between containers during transit does not occur.	Page C4-23	√	
	(k) Blocks on vehicles shall be set and vehicle hand brakes engaged before loading and unloading.	Page C4-23	√	
	(l) Only pallets which are in good condition shall be utilised for safe and efficient transfer of goods and materials.	Page C4-23	√	
2.4 Ecological Impacts	(a) An environmental flow is recommended to maintain the continuum of river downstream. This is important to minimize the adverse effect of water level changes on the survival of aquatic life at downstream of Baleh River and Mengiong River due the decrease of river flow.	Page C4-24	√	
	(b) Soil erosion and increase in siltation loading due to construction activities at both dam and powerhouse shall be minimized using soil protection measures (such as plastic sheeting) at the slope of the construction site.	Page C4-24	√	
	(c) Installation of silt traps at strategic slopes at the construction site is also important to minimize the increase of loading into the river system.	Page C4-24	√	
	(d) Watershed upstream shall be conserved via a State managed mechanism. The SEB can assist in facilitating the State.	Page C4-25	√	
	(e) The habitats shall be restored.	Page C4-26	√	
	(f) Protected species shall not be captured and domesticated.	Page C4-26	√	

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	(g) Preparation and submission of a Wildlife Rescue and Monitoring Plan shall be conducted before major construction work commences.	Page C4-26	√	The wildlife rescue operation shall be carried out prior to and during the impoundment of the reservoir.
	(h) A detailed Biomass Removal Plan (BRP) must be prepared and to manage reservoir clearing operations.	Additional	√	The BRP shall be submitted to the NREB prior to the commencement of the reservoir preparation.
2.5 Traffic Impact	(a) Warning and traffic signs shall be erected within the project site especially at the intersecting points of the proposed linkages to indicate traffic flow along the logging roads to avoid traffic conflicts.	Page C4-27	√	
	(b) Contractors shall ensure that the heavy vehicles are capable and the drivers are trained to negotiate the steep, winding terrain; otherwise construction of bypass roads will need to be considered.	Page C4-27	√	
	(c) Contractors and Sub-Contractors shall adhere to appropriate road safety procedures and regulations to ensure the safety of other road users and residents of the surrounding areas at all times. All drivers to be trained to handle the local road conditions.	Page C4-27	√	
	(d) Routes and time schedules of transportation of heavy machineries shall be made known to the public in order to avoid any inconvenience or risk caused during course of delivery.	Page C4-27	√	

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2.6 Quarry Establishment	(a) An Explosive Storage Magazine Plan shall be developed to ensure proper handling and storage of magazine by the quarry operator.	Additional	√	
	(b) Clearing of quarry site shall be restricted to necessary area of rock extraction.	Page C4-27	√	
	(c) Sedimentation ponds are recommended for the retention of eroded particles from the quarry. A typical sedimentation pond design is provided in Figure 4.4.6. Proper drainage shall be established to channel the runoff to the sedimentation ponds before final discharge into the waterway, i.e. Putai river and tributary of Baleh river.	Page C4-27	√	
	(d) Regular desilting of the sedimentation ponds shall be carried out to ensure the efficiency of the ponds. Total Suspended Solids (TSS) content in the final discharge shall be maintained at a level not exceeding 100 mg/l, i.e. Standard B of the Environmental Quality (Industrial Effluent) Regulations 2009.	Page C4=27	√	
	(e) In consideration of its impacts to surrounding environment, the quarry operation shall utilise an environmental friendly blast initiation system in its blasting operation. This will enable a multi-row blast pattern to be implemented in order to achieve a desired shot volume.	Page C4-31	√	
	(f) The initiation system recommended for primary blasting is Nonel or electrical system with minimal holes per delay design. The use of millisecond delay intervals between adjacent holes in a single row will minimise ground vibrations, air blast, flyrock and increase fragmentation. Good fragmentation is achieved when each charge is given sufficient time to break its quota of burden from the rock mass before the next charge detonates, the second and subsequent charges can then shoot to free additional face sequentially.	Page C4-31	√	

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	(g) A staggered/ rectangular drill pattern shall be utilised. This pattern is of the symmetric plough formation type. This usually results in a better control of the blast's progression, and thereby reduces the risk of flyrock.	Page C4-31	√	
	(h) Direction of rock motion as a result of blasting operation shall be planned in order to ensure that should any flyrock generated from the blasting operation, it will not endanger any adjacent interests. In this particular case, attention must be drawn to ensure that the direction of the rock motion must be away from the sensitive areas nearby the quarry operation area. Furthermore, works shall be done in a way that the rock face shall be shielded from the area of concern. In this case, the forest area and high hill shall be utilized for that purpose.	Page C4-31	√	
	(i) Buffer zones shall be available to ensure that there is always sufficient distance between blasting activities and adjacent environment. The existing trees and vegetation within the buffer zone may allow the distance between quarrying activities and the open areas to be reduced. As the quarry operation site is naturally buffered by the natural forest area, this element shall be used to protect the operation from the adjacent interests.	Page C4-31	√	
	(j) Competent personnel handling the blasting operation are an important factor to ensure that the operation is conducted in a professional manner. The person in charge which is the shotfirer shall have experience in blasting operation at sensitive areas and possess good knowledge in the latest technology in blasting operations. This competent person shall have the qualification in term of certificates from the Minerals and Geoscience Department and the Royal Malaysian Police.	Page C4-32	√	

ITEM	MITIGATING MEASURES RECOMMENDED BY THE ENVIRONMENT CONSULTANT	REFERENCE IN THE SEIA REPORT	ENDORSED BY NREB	
			IN TOTAL	WITH THE FOLLOWING VARIATION
	(k) Safety margin as follows shall be incorporated: i. Prepare blast design including the size of maximum instantaneous charges and detonating sequence to minimize environmental effects. ii. Check the setting out of holes and record any deviations. iii. Use correct stemming. iv. Monitor the blast to provide feedback for future blast designs and also to study the impact to the adjacent interests. v. Blasting works inclusive of drilling, charging and blasting is supervised by competent personnel. vi. Only workers with experiences handling the blasting works and familiar with the safety of blasting shall be involved in quarry operations. vii. Explosives to be used on site shall be controlled from any misuse or being tampered.	Page C4-33	√	
	(l) The air blast shall be controlled using the following measures: i. Avoid use of surface detonating cord and secondary blasting where possible. If it has to be used, cover it adequately. ii. Avoid blasting in adverse weather conditions, especially when the wind towards sensitive areas and when there is low cloud. iii. Consider an appropriate orientation of the working face in relation to sensitive areas. iv. Stemming shall be correctly stamped.	Page C4-33	√	

ITEM	MITIGATING MEASURES RECOMMENDED BY THE ENVIRONMENT CONSULTANT	REFERENCE IN THE SEIA REPORT	ENDORSED BY NREB	
			IN TOTAL	WITH THE FOLLOWING VARIATION
	(m) The flyrock shall be controlled using the following measures: i. Inspect the boulder for natural joints, voids and other weaknesses. ii. Check the front face burden to ensure that it has adequate distance. iii. Ensure that the design is thorough and follows the regulations. iv. Select the orientation of the boulders. v. Use screen nets when in any doubt.	Page C4-33	√	
	(n) The safety features as follows shall be adhered to: i. Times of shotfiring - The times of shotfiring would be posted where persons who may be affected would be able to see them. As this may include members of the workers of other activities, it is advisable to place notices at the quarry entrance and other access points, e.g. 'Danger – Shotfiring between the hours of ... and ..., Warning ..., All Clear ...' ii. Assessment of danger zone - To assess the area that is cleared for shotfiring. iii. Withdrawal of personnel from the danger zone and taking appropriate shelter. iv. The 'safe position' where the shotfirer can take shelter during initiation. v. Warning system - The system of audible signals for shotfiring and "all clear" that can be heard clearly throughout any area likely to be affected. vi. Any flags or portable notices that are used and where they are to be positioned. vii. Sentries - The specific places where they are to stand to form their duties.	Page C4-34	√	

ITEM	MITIGATING MEASURES RECOMMENDED BY THE ENVIRONMENT CONSULTANT	REFERENCE IN THE SEIA REPORT	ENDORSED BY NREB	
			IN TOTAL	WITH THE FOLLOWING VARIATION
	viii. The other workers that are to be warned beforehand that shotfiring is to take place. ix. Inspection of the site after the blast - Shotfirer shall check the blasted area before allowing the all-clear signal to be given. x. Entrances and access points to the quarry operation site should be guarded and logged in order to have full control of workers' movement into and out from the quarry site. xi. Procedure for the shotfirer to follow in the event of a misfire: consulting the manager, posting of notices, erection of barriers, etc. xii. Explosive storage magazine should be clean, dry, well-ventilated, reasonably cool, with bullet and fire resistant shelters. A safe distance must be maintained between the magazine and settlements as well as other installation of the Project (refer Appendix 4.4.1 for Guidelines by the Mineral and Geosains Department Malaysia on various components and siting of an explosive magazine). Blasting caps should never be stored in the same magazine with other explosives.			
	(o) The quarry sites shall be rehabilitated and replanted with species indigenous to the area.	Additional	√	A site rehabilitation plan shall be submitted to the NREB half a year before the abandonment of the quarry.

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			IN TOTAL	WITH THE FOLLOWING VARIATION
2.7 Air Quality	(a) Soil loads on construction vehicles, particularly during excavation activities be kept covered during transit on public roads (this is of less concern during dam construction stage wherein the loads are mainly aggregate or rockfill).	Page C4-35	√	
	(b) Topsoil stockpiles must be kept covered or have a suitable dust palliative applied.	Page C4-35	√	
	(c) A suitable dust palliative should be applied to unsealed roads if dust rises above acceptable levels.	Page C4-35	√	
	(d) Dust deposition monitoring should be conducted during construction.	Page C4-35	√	
2.8 Surface Water Quality	(a) No waste of any kind shall be disposed of directly into any of the rivers.	Page C4-36	√	See also **Section 1.4** for waste management.
	(b) Base camp, workers' quarters and site offices shall be provided with individual septic tanks capable of treating the sewage to Standard B under the Second Schedule of the Environmental Quality (Sewage) Regulations 2009.	Page C4-36	√	
	(c) Construction wastes and earth stockpiles shall be located away from waterways and provided with measures to prevent the waste from washing into the waterways.	Page C4-36	√	
	(d) Scheduled wastes shall be properly stored and contained to prevent leakage into waterways.	Page C4-36	√	

ITEM	MITIGATING MEASURES RECOMMENDED BY THE ENVIRONMENT CONSULTANT	REFERENCE IN THE SEIA REPORT	ENDORSED BY NREB	
			IN TOTAL	WITH THE FOLLOWING VARIATION
2.9 Occupational Safety and Health	(a) No employee shall be exposed to noise levels exceeding 115 dBA at any one time. No employee shall be exposed to impulsive noise exceeding a peak sound level of 140 dBA.	Page C4-38	√	
	(b) For the safety and comfort of the workers, the management is required to provide workers who work in high noise level areas with adequate protective devices such as earmuffs or earplugs. No employees shall be exposed to noise levels exceeding the equivalent continuous sound of 90 dBA for 8 hours or more or exceeding the limits specified in the First Schedule of the Factories and Machinery (Noise Exposure) (Regulation), 1989.	Page C4-38	√	Permissible noise exposure limit is shown in Table 4.4.5 of the SEIA Report
	(c) Work shifts shall be introduced for workers manning noisy equipment to avoid long-duration exposure to high noise levels.	Page C4-38	√	
	(d) Environmental specifications are to be includes in contract documents for contractors and machine operators for noise reduction in construction, hours of operation, material haulage routes and permissible noise standards.	Page C4-38	√	
	(e) Unauthorized entry into confined spaces shall be prevented. Warning signs and barriers shall be erected to prevent unauthorized entry or to protect workers from external hazards.	Page C4-39	√	
	(f) Hazards in the tunnel, shall be identified e.g. by conducting atmospheric tests prior to entering to determine oxygen and flammable gas contents, as well as levels of hydrogen sulphide and carbon monoxide.	Page C4-39	√	
	(g) Adequate ventilation of tunnels shall be ensured. Mechanical ventilation shall be adopted where natural ventilation is lacking.	Page C4-39	√	

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			IN TOTAL	WITH THE FOLLOWING VARIATION
	(h) Necessary personal protective equipment (PPEs) shall be provided for all personnel working in confined spaces. The workers shall be ensured to use the PPEs when carrying out their work.	Page C4-39	√	
	(i) Rescue procedures and protocols (including emergency contacts) shall be established for any emergency in confined space (particularly access tunnels). Staff shall be trained in the protocols and safety procedures and the use of retrieval lines from outside the tunnels.	Page C4-39	√	
	(j) Safety regulations and procedures must be observed at all times. All safety rules and regulations as stipulated by the Occupational Safety and Health Department shall be observed.	Page C4-40	√	
	(k) Formulation of a Safety and Health Policy shall be the responsibility of the Contractor. The policy will form the basis of rules and regulations. These are to be made available at the Project site office.	Page C4-40	√	
	(l) The Project Proponent and Contractor shall inform the workers of their responsibilities and roles in maintaining safety at the Project site and provide training where necessary.	Page C4-40	√	
	(m) Adequate number of competent safety officers shall be appointed. The incumbent will be in charge of health and safety and will ensure all health and safety regulations are observed. Appointment of competent Safety and Health Officers shall comply with Occupational Safety and Health (Safety and Health Officer) Regulations, 1997.	Page C4-40	√	
	(n) A Safety and Health Committee shall be established. A Safety and Health Committee will review the measures taken to ensure the safety and health of all workers and also to investigate relevant issues that may arise.	Page C4-40	√	

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			IN TOTAL	WITH THE FOLLOWING VARIATION
	(o) Systematic notification of accidents, dangerous occurrence, occupational poisoning and occupational diseases shall be provided.	Page C4-40	√	
	(p) Safety procedures and regulations shall be incorporated into contract agreement with contractors and sub-contractors	Page C4-40	√	
	(q) Workers shall be provided with suitable personal protective equipment (PPE) such as gloves, hard hats, safety boots, earmuffs, etc. Those working above ground (above 2 m) shall wear half or full harness with lifelines and safety belts to prevent falling.	Page C4-40	√	
	(r) Workers exposed to dust shall be provided with masks or respirators.	Page C4-40	√	
	(s) An on-site clinic shall be maintained with sufficient supply of medicines and medical equipment (i.e. ambulance) for first aid and emergency purposes.	Page C4-41	√	
	(t) Transport and medical evacuation facilities, assistance, ambulances and medical services shall be provided to transport injured workers to the appropriate medical facility required to address the medical cases wherever and whenever required.	Page C4-41	√	
	(u) Telecommunication facilities shall be provided for workers for use during emergency.	Page C4-41	√	
	(v) Fire Department-approved fire extinguishers (10 kg dry powder type or pressurised carbon dioxide) shall be provided. The recommended number is 2 for every fire- sensitive location such as fuel depot/skid tank areas, workers quarters, workshop and 1 for non-sensitive areas such as site office and guard house.	Page C4-41	√	

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			IN TOTAL	WITH THE FOLLOWING VARIATION
	(w) Construction Safety and Health programmes (such as those provided by the Construction Industry Development Board (CIDB)) shall be provided for workers. This is to ensure that they are aware of the inherent risks at construction sites and are well prepared to deal with emergency situations.	Page C4-41	√	
	(x) It is compulsory that all workers attend the relevant safety courses (such as those conducted by the CIDB-Construction Industry Development Board).	Page C4-41	√	
	(y) Safety barriers shall to be provided on dangerous areas such as steep slopes under development, dug pits, etc. High visibility reflective stickers and warning signs shall also be set up.	Page C4-41	√	
2.10 Blasting Hazards	(a) Blast design shall be prepared and the blasting operation shall be carried out by a competent and licensed shot-firer meeting the requirements of the Minerals and Geoscience Department Malaysia	Page C4-41	√	
	(b) The danger zone shall be evacuated for fly rock during every blasting session.	Page C4-41	√	
	(c) Affected workers shall be provided with earplugs and facemasks.	Page C4-41	√	
	(d) Workers shall be informed prior to any blasting session. Use of siren shall be implemented.	Page C4-41	√	
	(e) Signboards shall be erected at strategic places to inform the workers, visitors and other personnel at or near the blasting site about the blasting session.	Page C4-41	√	
	(f) No trespassing of workers and the general public members into the blasting area prior to blasting operation.	Page C4-42	√	
	(g) A safe area shall be assigned for the shot-firer and workers during the blasting operation.	Page C4-42	√	

ITEM	MITIGATING MEASURES RECOMMENDED BY THE ENVIRONMENT CONSULTANT	REFERENCE IN THE SEIA REPORT	ENDORSED BY NREB	
			IN TOTAL	WITH THE FOLLOWING VARIATION
	(h) Explosives shall only be handled by authorized and competent personnel and only with approved tools and equipment.	Page C4-42	√	
	(i) Storage of explosives shall be as per requirements of the Police Department and Explosives (Amendment) Act 2007.	Page C4-42	√	
2.11 Decommissioning of Site Installation	(a) Decommissioned parts shall be placed at designated temporary sites for subsequent transportation to the intended destinations.	Page C4-42	√	
	(b) The area of decommissioned installations shall be cleaned up.	Page C4-42	√	
	(c) Where possible selling, recycling and reusing the waste materials shall be practiced. Where this is not possible, then the material shall be designated as wastes. These wastes, together with other construction wastes, shall be disposed to a pre-assigned and managed landfill on site or in an approved off-site location. Under no circumstance shall waste material be burned or disposed into watercourses.	Page C4-42	√	
	(d) Landfill(s) shall be closed as per the closure plan approved by the Natural Resources and Environment Board.	Page C4-42	√	
	(e) A Decommissioning and Rehabilitation Plan shall be prepared and submitted to NREB for approval and full pull-out of contractor.	Page C4-42	√	This applies in the event of any decommissioning of the dam and its ancillary facilities.

ITEM	MITIGATING MEASURES RECOMMENDED BY THE ENVIRONMENT CONSULTANT	REFERENCE IN THE SEIA REPORT	ENDORSED BY NREB	
			IN TOTAL	WITH THE FOLLOWING VARIATION
3. RESERVOIR IMPOUNDMENT				
3.1 Environmental Flow Consideration	(a) During the impoundment period, a controlled discharge equivalent to environmental flow is recommended to be released from the reservoir. The recommended environmental flow is within the 90th percentile flow (or 10% natural low flow), which is equivalent to about 250 m^3/s.	Page C4-44	√	
3.2 Impact on Navigation and Accessibility	(a) The environmental flow shall be set at 250 m^3/s	Page C4-54	√	
	(b) Gauging stations shall be set up at strategic locations such as Ng. Entawau to ensure that the water levels do not drop to a point affecting river navigation.	Page C4-54	√	
	(c) Regular dialogues with cargo vessel and express boat operators shall be conducted to ensure their needs are met.	Page C4-54	√	
	(d) Vegetation shall be cleared at strategic areas for navigation and other essential areas identified by the Biomass Removal Plan prior to dam impoundment to prevent trees from standing out in the water all along the dam reservoir as a measure to reduce hazard to boats travelling in the reservoir. In addition, post impoundment surveillance or monitoring shall be undertaken for areas identified for safe navigation.	Additional	√	

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3.3 Ecological Impact	(a) In order to maintain the aquatic life below the dam, it is crucial that at least certain minimum volume need to be available at all time during construction, impoundment and operation of the dam. Adopting the 90th percentile flow as residual flow is required. This translates to be about 250 m^3/s which has to be available to the downstream of Baleh dam.	Page C4-56	√	
	(b) When a river drops below its minimum flow, the aquatic life of that ecosystem can be harmed. Fish are present in a river because they are able to withstand the flow regime or are specifically adapted to it. Therefore, it is important to preserve the existing key features of its natural hydrograph which affects fish directly such as through flows, suitable habitat and water quality and indirectly through riparian habitat.	Page C4-56	√	
	(c) Clearance for access roads, jungle trails and for other construction purposes outside the reservoir shall be kept to a minimum.	Page C4-57	√	
	(d) Re-vegetation and landscaping of the slopes shall be carried out in pace with the progress of the project in order to reduce soil erosion and thereby reducing the total suspended solids in the water.	Page C4-57	√	
	(e) Soil erosion could also be minimized if the clearing of vegetation in the impoundment site is done during dry season. For areas within the 50 m from the river banks, clearing activity shall be done right before the dam is impounded.	Page C4-57	√	

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			IN TOTAL	WITH THE FOLLOWING VARIATION
	(f) Fishing activities shall be controlled as the development of Baleh Dam will increase the susceptibility of fish populations to fishing pressure especially during the construction and impoundment stages. Riverine fish populations are highly sensitive to uncontrolled fishing activities and some highly priced fish species such as Tor spp takes a few years to become sexually mature. During the construction stage, large populations of fish tend to aggregate around and through the diversion tunnels. This would make them easy prey to any fishing activities.	Page C4-57	√	
	(g) Manpower requirements for reinforcement of fishing regulations must be available in the two major rivers prior to the development of Baleh Dam to ensure that overfishing does not occur and illegal fishing methods such as electroshocking are not used in the area. There should also be strict enforcement by relevant agencies during the impoundment stage to prohibit commercial netting to prevent overfishing when there will be easy access to the headwaters due to the formation of the lake.	Page C4-57	√	
	(h) Any catchment areas that are conserved shall be designated as totally protected areas from commercial fishing. This would ensure that these areas would act as breeding and nursery ground for the supply of juvenile fishes to downstream areas.	Page C4-57	√	

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	(i) Conservation of upstream watershed shall be undertaken to ensure existing natural diversity of fish fauna. Watershed chosen for conservation shall cover an area from the upper most stretch of the river to as far downstream as possible in order to include as many streams (tributaries) as possible. This would reduce fragmentation of the fish populations from different tributaries. Additionally, by conserving these areas, there will be less input of sediment into the reservoir area and thus reducing the rate of sedimentation and expanding the life span of the dam.	Page C4-57	√	
	(j) At least one hatchery shall be built in the watersheds that are being conserved for the purpose of restocking of these watersheds. This hatchery should consist of a few ponds and large tanks for the stocking of broodstocks. Additionally, there should be many smaller tanks where larvae and fry are reared to reach juvenile stage before they should be stocked in the rivers. The recirculating system in the hatchery should have proper aeration and water treatment systems. Only native fish species are to be spawned and restocked into the rivers	Page C4-58	√	
	(k) A Wildlife Rescue and Monitoring Plan must be ready during impoundment so that rescue can commence properly. For wildlife rescue, the relevant agency and experts should be consulted; these include officers from the Sarawak Forestry Corporation (the nearest regional office is in Sibu) and Veterinary Section of the Department of Agriculture. Mitigation measures should also include briefing the construction workers on the Sarawak Wildlife Protection Ordinance 1998 and the protection status of various wildlife species.	Page C4-59	√	

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	(l) The impact of site clearing and disposal of vegetation from the lowland that will be inundated can be reduced by starting work at the lowest elevation near the river bank and proceed towards the higher ground. This will allow time for as many species and individuals as possible to move to higher ground above the watermark where they can establish new home. Clearing of land in a manner so as to create a forest island should not be done because it does not leave corridor for wildlife to flee from disturbance. Any injured animals or birds found should be given proper veterinary care and then released into the adjacent forest or surrendered to the appropriate agency (Sarawak Forestry Corporation) for keeping in their zoo.	Page C4-59	√	
	(m) Wildlife Rescue shall be carried out for any animal trapped on temporary islands. Small mammals can be captured using live trapping methods and released to the nearest contiguous habitat in order to maintain continuity of habitat experience and thereby reduce stress. Large mammals are absent in the project area but should a medium size terrestrial mammals, e.g. sun bear, are reported trapped on a island, rescue should be done immediately. If this is not possible, some form of temporary provisioning should be carried out. Such animals may be captured using tranquilizer dart and translocated to the nearest available habitat to reduce unnecessary transport stress. Only a registered veterinarian is licensed to use a tranquilizer gun and dart. If translocation cannot be carried out immediately the animal must be held in a cool and comfortable cage, adequately provisioned and protected from predators and inclement weather. This rescue operation should be carried out and supervised by relevant officers from the Sarawak Forestry Corporation and/or Sarawak Forestry Department.	Page C4-60	√	

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3.4 Greenhouse Gases	(a) Production of methane and other noxious gases (e.g. hydrogen sulphide - H_2S) from decomposing forest biomass inundated in portions of a reservoir can be reduced, or eliminated, by removing forest biomass from the reservoir shorelines prior to reservoir impoundment. It is recommended that biomass be removed down to a level 5-10 m below the MOL level of the reservoir. At depths greater than 5-10 meters below the reservoir MOL, water temperature and oxygen levels are lower, resulting in reduced rates of anaerobic biomass decomposition and reduced emission of methane, hydrogen sulphide and other noxious gases.	Page C4-61	√	
	(b) All commercial timber shall be harvested from the reservoir to avoid loss of potential economic benefit from this resource due to its inundation in the reservoir.	Page C4-61	√	
	(c) Residual non-commercial forest biomass shall be removed from the periodically inundated reservoir shoreline at strategic and essential areas; for example between the Maximum (220 m asl) and Minimum (205 m asl) operating levels of the reservoir. This will avoid protruding dead trees which may impede future use of the reservoir for transport, fisheries and tourism enterprises.	Page C4-61	√	
	(d) Biomass shall be cleared from 5 to 10 m below the minimum operating level (i.e. until 195 m asl) to avoid decomposition of biomass in shallow water along the reservoir shoreline at strategic and essential areas.	Page C4-61	√	
	(e) All remaining non-commercial forest biomass below the 195 m elevation shall be left in situ, to be inundated under the reservoir where its value as a carbon sink will be preserved.	Page C4-61	√	

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3.6 Soil Erosion and Sedimentation of the Reservoir	(a) To reduce soil erosion in the reservoir area, it is recommended that clearing be limited to designated stretches of the shoreline only. In this case, the shoreline strip between maximum reservoir flood level (220m) and minimum flood level (205m). In addition, a 100m wide buffer zone of vegetation around the perimeter of the reservoir is recommended to be maintained. The intact roots structure will help maintain the structural integrity of the soil embankments and reduce shoreline erosion and wave erosion.	Page C4-62	√	
	(b) Soil erosion from the cleared shoreline strip can be reduced by removing residual non-commercial forest biomass just before inundation; i.e. start clearing lower elevation portions of the shoreline strip first, then proceed to higher elevation portions, as water in the reservoir rises, during the two year impoundment period. This strategy also facilitates wildlife relocation during impoundment.	Page C4-62	√	
3.7 Water Quality	(a) Maximize harvest and utilization of commercial forest biomass to reduce the quantity of biomass decomposing, consuming dissolved oxygen, releasing gases and toxic chemicals, and leading to elevated nutrient levels in reservoir waters.	Page C4-62	√	
	(b) Non-commercial forest biomass removal shall be limited to a relatively narrow, strip of shallow, periodically inundated shoreline, where, if biomass is left to decompose, it would have significant negative impact on water quality. Biomass in the deeper permanently inundated areas of the reservoir deteriorates very slowly thus reducing short-term negative impacts on water quality.	Page C4-62	√	

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	(c) Removal of non-commercial forest biomass from the reservoir shoreline where it deteriorates rapidly will facilitate maintenance of adequate levels of dissolved oxygen in the reservoir to maintain aquatic life and enable bacteria to breakdown organic matter and pollutants such as H_2S and CH_3Hg.	Page C4-63	√	
3.8 Air Quality	(a) To reduce the quantity of biomass to be disposed, recovery and utilization of commercial forest products shall be maximized during the period prior to reservoir inundation.	Page C4-63	√	
	(b) Burning of large quantities of non-commercial shall be avoided by cutting, spreading and crushing biomass to facilitate decomposition by natural processes.	Page C4-63	√	
	(c) Controlled burning shall be conducted subject to approval from the authorities like NREB and DOE.	Page C4-63	√	

ITEM	MITIGATING MEASURES RECOMMENDED BY THE ENVIRONMENT CONSULTANT	REFERENCE IN THE SEIA REPORT	ENDORSED BY NREB	
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4. DAM OPERATION				
4.1 Hydrological Impact	(a) For water levels greater than the Minimum Operating Level (MOL), normal operations shall apply with discharges greater than the environmental flow.	Page C4-69	√	
	(b) For water levels below MOL, operation of an environmental flow release structure to maintain a discharge at least 250 m^3/s downstream.	Page C4-69	√	
4.2 Channel Erosion and Sedimentation Downstream of the Dam	(a) A Detailed Sediment Transport Modelling is recommended for the Baleh River downstream of the proposed dam so that locations that are subjected to erosion, transport or deposition can be identified, and appropriate mitigation measures can be formulated for better environmental management.	Page C4-70	√	
4.3 Reservoir Water Quality	(a) The dam operator should consider draw offs from the top 10m in order to ensure that the dissolved oxygen (DO) level in the discharge is suitable.	Page C4-72	√	
	(b) To ensure the dissolved oxygen (DO) level in the draw off water is suitable, the dam operator should consider a draw off, ideally at 5m interval from the full supply level (FSL) up to just the hypolimnion, or anoxic zone in order to allow flexibility in draw off depths, depending on the actual temperature and DO profile in the reservoir as the levels rise fluctuates.	Page C4-72	√	
4.4 Reservoir Sedimentation	(a) A 100m buffer zone around the reservoir boundary shall be preserved to minimize sediment run-off to the reservoir.	Page C4-77	√	

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4.5 Ecological Impact	(a) Upstream habitats (not inundated areas) should be considered for conservation. The potentially important areas include the upper sections of the Baleh River, the Balang River, the upper section of the Mengiong River and the Entalawang River.	Page C4-81	√	
	(b) Discharge to maintain environmental flow at 250 m^3/s so that downstream river flow and its ecological functions are less affected.	Page C4-81	√	
	(c) Construction of aeration weir and riffle structure in the downstream river of the dam is recommended to overcome the potentially problem of low dissolved oxygen in the water discharge from the dam reservoir.	Page C4-82	√	
	(d) The flow shall be maintained at optimum level at downstream of the dam reservoir to minimize the effects on aquatic life downstream, and to avoid drastic change in water level change. The magnitude of environmental flow recommended for Baleh River and Mengiong should be based on the hydrological data obtained at the river ecosystem (refer to hydrological studies for details). Seasonal changes in water level should be considered in the magnitude of environmental flow.	Page C4-82	√	
	(e) Nuisance phytoplankton growth at the reservoir especially some blue green algae (e.g. Anabaena, Oscillatoria and Lyngbya) and green algae (e.g. Cosmarium) should be monitored by the plant operator. Blooms of diatom, Synedra, Blue green algae, Anabaena, Aphanizomenon, might cause deterioration of water quality by producing taste and odor to the waters (Palmer, 1959). Monitoring is important to ensure the safety of water in Baleh River where some villagers obtain water supply for daily use.	Page C4-82	√	
	(f) Ban on hunting by workers of the local wildlife shall be imposed.	Page C4-82	√	

ITEM	MITIGATING MEASURES RECOMMENDED BY THE ENVIRONMENT CONSULTANT	REFERENCE IN THE SEIA REPORT	ENDORSED BY NREB	
			IN TOTAL	WITH THE FOLLOWING VARIATION
	(g) Wildlife rescue based on the approved Wildlife Rescue Plan shall be carried out.	Page C4-82	√	
	(h) Establishment of totally protected area at Baleh's upper catchment is recommended. On the other side of the border in Kalimantan is Betung Kerihun National Park and further to the west within the Sarawak side is the Lanjak Entimau Wildlife Sanctuary. These two protected areas harbor similar species to that found in the project area.	Page C4-82	√	
4.6 Traffic Impacts	(a) Logging trucks shall be discouraged from using the proposed Baleh road for safety and road maintenance reasons.	Page C4-83	√	
	(b) Overtaking lanes along the Baleh road may also be required to allow safe overtaking opportunities for smaller vehicles.	Page C4-83	√	
	(c) Proper signages shall be erected at approaching junctions to alert drivers to take precautionary actions	Page C4-83	√	
4.7 River Navigation	(a) Gauging stations shall be set up at strategic locations, upstream, at the dam and downstream of the proposed dam, to ensure that the water levels do not drop too low and impede accessibility. This shall be linked to the operators at BHEP to enable them to properly manage the flow/discharge during operations.	Page C4-88	√	
	(b) A river alarm system shall be installed downstream of the proposed dam site at all the various kampongs so that it will be active in the event of an imminent danger. This is to warn the river users and communities of the dangers that a large volume of water is on its way and downstream and the residents are warned. The system could be installed together with the telemetry system.	Page C4-88	√	

ITEM	MITIGATING MEASURES RECOMMENDED BY THE ENVIRONMENT CONSULTANT	REFERENCE IN THE SEIA REPORT	ENDORSED BY NREB	
			IN TOTAL	WITH THE FOLLOWING VARIATION
	(c) A thorough hydrographic survey shall be conducted from Kanowit to Baleh to chart a safe passage for vessels, ascertain the depth of the river, ascertain the type of river bed, ascertain and locate all hazards in the river in terms of submerged rocks, sandbanks, wrecks and enhance the safety of life and vessels operating the routes.	Page C4-88	√	
4.8 Dam Breach Analysis	(a) An appropriate emergency management procedures / emergency response plan should be implemented with an understanding of the hazard, travel times and inundation extent. Development of an Emergency Action Plan (EAP) in case of dam break, with a methodology for warning for an evacuation of downstream communities at risk. As part of the EAP, a more detailed assessment of overland inundation, the timing of the flood wave propagation and the potential consequences to critical land use and services downstream shall be made.	Page C4-91	√	
	(b) An Emergency Response Plan (ERP) shall be formulated for both the construction and operation stages of the dam. The ERP shall cover various aspects of the dam failure emergency response and address different dam break scenarios and flood. Inundation mapping and warning system to downstream settlements shall also be included.	Additional	√	ERP for operational stage shall be submitted to the Ministry of Public Utilities Sarawak for approval with a copy to NREB.

ITEM	MITIGATING MEASURES RECOMMENDED BY THE ENVIRONMENT CONSULTANT	REFERENCE IN THE SEIA REPORT	ENDORSED BY NREB	
			IN TOTAL	WITH THE FOLLOWING VARIATION
5. PROJECT ABANDONMENT				
	(a) The safety of all communities downstream of the proposed dam shall be maintained at all times during demolishment.	Page C4-92	√	
	(b) The environmental effect of releasing large quantities of oxygen deprived water shall be mitigated to the fullest.	Page C4-92	√	
	(c) Slopes shall be secured after demolishment of the dam structure and after emptying the reservoir.	Page C4-92	√	
	(d) The reservoir shall be re-vegetated.	Page C4-92	√	
6. ADDITIONAL				
6.1 Environmental Monitoring and Auditing	(a) A comprehensive Environmental Management Plan (EMP) shall be prepared and submitted to the NREB prior to project implementation.	Additional	√	The EMP shall be regularly revised to cater for new activities and progress of works.
	(b) The Project Proponent shall appoint and employ throughout the period of the construction a full time competent and suitably experienced Environmental Manager to implement the Environment Management Plan.	Additional	√	

ITEM	MITIGATING MEASURES RECOMMENDED BY THE ENVIRONMENT CONSULTANT	REFERENCE IN THE SEIA REPORT	ENDORSED BY NREB	
			IN TOTAL	WITH THE FOLLOWING VARIATION
	(c) The Project Proponent shall undertake environmental monitoring programmes of the Project as proposed in Chapter 6 of Volume 2 of the SEIA Report and make periodic report to the NREB at a quarterly basis (every 3 months) until such time as may be determined by the NREB.	Additional	√	Additional air quality parameters to be monitored include greenhouse gases, methane and hydrogen sulphide (H_2S).
	(d) The Project Proponent shall conduct internal environmental audits and to commission independent environmental audits during the whole construction period, commissioning and operation of the Project, as may be determined by the NREB.	Additional	√	Independent environmental audit shall start from the commencement of the Project.
6.2 Continuous Monitoring Stations	(a) The Project Proponent shall set up continuous monitoring stations (CMS) at upstream, in the reservoir and downstream of the dam to monitor the water quality parameters as proposed by the NREB.	Additional	√	The locations of the CMS shall be proposed to and agreed by NREB.

ANNEX II

FORMAT OF ENVIRONMENTAL MONITORING REPORT

1.0 GENERAL INFORMATION

- Project title
- Date of commencement
- Physical progress of construction
- Date of submission of the previous Environmental Monitoring Report

2.0 WATER QUALITY SAMPLING AND ENVIRONMENTAL MONITORING

2.1 Particulars of Water and Air Quality Monitoring

- Frequency
- Date of sampling / monitoring
- Weather and tidal conditions during and prior to sampling
- Geographical coordinates of the water sampling points

2.2 Environmental Monitoring

Compliance to the Terms and Conditions of the SEIA approval and implementation of the prescribed Mitigating Measures on:-

- Control of air and water pollution;
- Control of soil erosion and sedimentation;
- Control of noise;
- Waste management and etc.

3.0 RESULT AND DISCUSSION

3.1 Water and Air Quality

- Collation and evaluation of data (to attach Laboratory Analysis Report)
- Interpretation of data with comparison to the baseline and the previous monitoring data
- Discussion
- Recommendation(s)

3.2 Other Environmental Parameters

- Various environmental components as stated in section 2.2.
- Status of implementation of the recommended mitigating measures
- Proposed remedial action(s)

3.3 Comments Or Recommendation/Amendment to the Prescribed Mitigating Measures

- Immediate remedial actions to be taken;
- Additional mitigating measures required

4.0 APPENDICES

- Relevant plates and maps should be inserted

AN UNDERTAKING

[In accordance with section 6(b) of the Natural Resources and Environment (Prescribed Activities) Order, 1994]

WE, the undersigned, **DO HEREBY UNDERTAKE** to comply with all the terms and conditions prescribed in the Social and Environmental Impact Assessment (SEIA) approval document ***Ref.:* (66) NREB/6-4/7F/1** issued by the Natural Resources and Environment Board (NREB), Sarawak dated **20th January 2015** with respect to the development and operation for **"The Proposed Baleh Hydroelectric Project, Kapit Division, Sarawak"**.

Dated this **13TH** day of **March 2015** in the office of the Natural Resources and Environment Board, 20th Floor, Menara Pelita, Jalan Tun Abdul Rahman Ya'akub, Petra Jaya, 93050 Kuching, Sarawak.

Signed for and on behalf of

SARAWAK ENERGY BERHAD
NO. 1, THE ISTHMUS
93050 KUCHING
SARAWAK

(As Project Proponent)

SARAWAK ENERGY BERHAD (007199-D)

Authorised Signatory

Name : **TAN CHUAN NGAN**

I.C. Number : **541206-13-5165**

Designation : **PROJECT DIRECTOR, BALEH HEP**

Signed for and on behalf of

CHEMSAIN KONSULTANT SDN. BHD.
NO. 47, WISMA KO-PERKASA
JALAN SIMPANG TIGA
93350 KUCHING
SARAWAK

(As EIA Consultant of the Project)

CHEMSAIN KONSULTANT SDN. BHD. 130904-U

Authorised Signatory

Name : **ANTHONY RENTAP ENCHANA**

I.C. Number : **690811-13-5955**

Designation : **DIRECTOR**

Signed in the presence of:

Natural Resources and Environment Board Sarawak

(PETER SAWAL)
CONTROLLER OF ENVIRONMENTAL QUALITY
SARAWAK