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Social & Environmental Impact Assessment for The Proposed Baleh Hydroelectric Project Kapit Division, Sarawak

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Volume 1: Project Description

Final Report

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EXECUTIVE SUMMARY

Executive Summary

1 INTRODUCTION

The title of the Project is “**The Social and Environmental Impact Assessment (SEIA) Study for the Proposed Baleh Hydroelectric Project, Kapit Division, Sarawak.**” The Project Proponent is Sarawak Energy Berhad, while Chemsain Konsultant Sdn. Bhd. has been engaged to carry out the Social and Environmental Impact Assessment for this proposed Project.

1.1 PROJECT BACKGROUND

The proposed 188m high concrete face rockfill dam (CFRD) is located on Baleh river approximately 105 km upstream of Kapit Town at pala Bayong (**Figure ES-1**), about 3 km upstream of its confluence with the Putai river at 2454260 E and 5199534 N. The locality of the dam site is characterized by a pronounced bend of Baleh river, above which the river extends in a southwest direction for about 25 km to the confluence of Mengiong river.

The reservoir, at full supply level, with surface area of 588 km² will occupy parts of both the Baleh and the Mengiong sub-catchments and the reservoir will extend approximately 90 km upstream of the dam on the main stem of the Baleh River, and 65 km on the Mengiong river. Tributaries of both rivers will also be inundated for distances of up to 40 km. The expected reservoir volume is 29,867 x 10⁶m³.

The dam site's catchment area covers an area of 5,625 km², and runs to the border of Sarawak-Kalimantan (Indonesia).

BHEP is projected to generate 8,076 Gwh of electricity per year on average and of which 941 MW is firm energy. The installed capacity of Baleh HEP's power station is 1,285 MW.

1.2 ENVIRONMENTAL REQUIREMENTS

The development of Baleh Hydroelectric Project and its associated activities falls under several prescribed activities under the Natural Resources and Environment Ordinance (Prescribed Activities) Order, 1994. The prescribed activities are:

4. Activities Which May Pollute Inland Water or Affect Sources of Water Supply

- (ii) *Construction of dams, artificial lakes or reservoir with surface areas of 50 hectares or more for impounding of water.*
- (vi) *Diversion of watercourses, streams or rivers or the extraction of sand and other rock materials there form.*

6. Extraction and Removal of Rock Materials and Mining

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

7. Any Other Activities Which May Damage or Have An Adverse Impact On Quality of Environment or Natural Resources of the State

- (x) *The clearing of vegetation on any land or the breaking up of any land for any purposes of an area exceeding 50 hectares*

The Order requires that an Environmental Impact Assessment (EIA) report to be submitted to the Natural Resources and Environment Board (NREB) for approval prior to project implementation.

1.2.1 International Policies and Guidelines

In order that the Project could be implemented to international standards, international environmental policies and guidelines are taken into account for the preparation of this SEIA.

2 PROJECT DESCRIPTION

It was decided that the project should proceed with the Concrete Faced Rockfill Dam (CFRD) structure. This recommendation is based on the lower costs of a layout based on this construction, and that using a CFRD will lessen foundation and supply chain difficulties.

2.1 DAM'S FEATURES

The layout can be seen in **Figure ES-2**. The salient features are as follows:

Hydrological Data

Catchment area	5,625 km ²
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Reservoir Data and Water Levels

Full Supply Level (FSL)	220 masl
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Minimum Operating Level (MOL)	205 masl
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Maximum Flood Level	225 masl
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Reservoir Area at FSL	588 km ²
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Reservoir Area at MOL	470 km ²
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Volume at FSL	29,867 x 10 ⁶ m ³
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Active Storage	7,817 x 10 ⁶ m ³
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(intake operating range 205 to 220 masl)

Power Generation Data

Nominal Plant discharge per turbine	124 m ³ /s
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Turbine Rated Output Per Unit	257 MW
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Installed Capacity	1,285 MW
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CFRD

Dam crest elevation	225.0 masl
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Top of parapet wall	226.5 masl
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Maximum height (foundation to crest level)	188.0 m
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Crest length	1,100 m
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Plinth length	1,290 m
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Crest width	9 m
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Upstream and Downstream slopes	1.4H: 1V
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Area of concrete face slab	240,000 m ²
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Spillway

Type	Gated Ogee
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Number of Gates and Type	5 x Radial
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Gate sizes –approximate	14 m wide x 19 m high
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Ogee crest elevation	201 masl
Energy dissipation	Flip bucket discharging into plunge pool

River Diversion

Type	Twin Modified Horseshoe
Diameter	12 m each

Power Tunnels

Number	5
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Power Facilities

Type	Surface reinforced concrete structure
Number of units	5
Unit spacing	24 m

Turbines

Type	Vertical axis Francis
Rated discharge	132.2 m ³ /s

Generators

Type	3 phase synchronous
Rated output per unit	265 MVA
Rated frequency	50 Hz

Transformers

Type	One three phase per unit
Location	Outdoor
Nominal rating	265 MVA

Switchgear

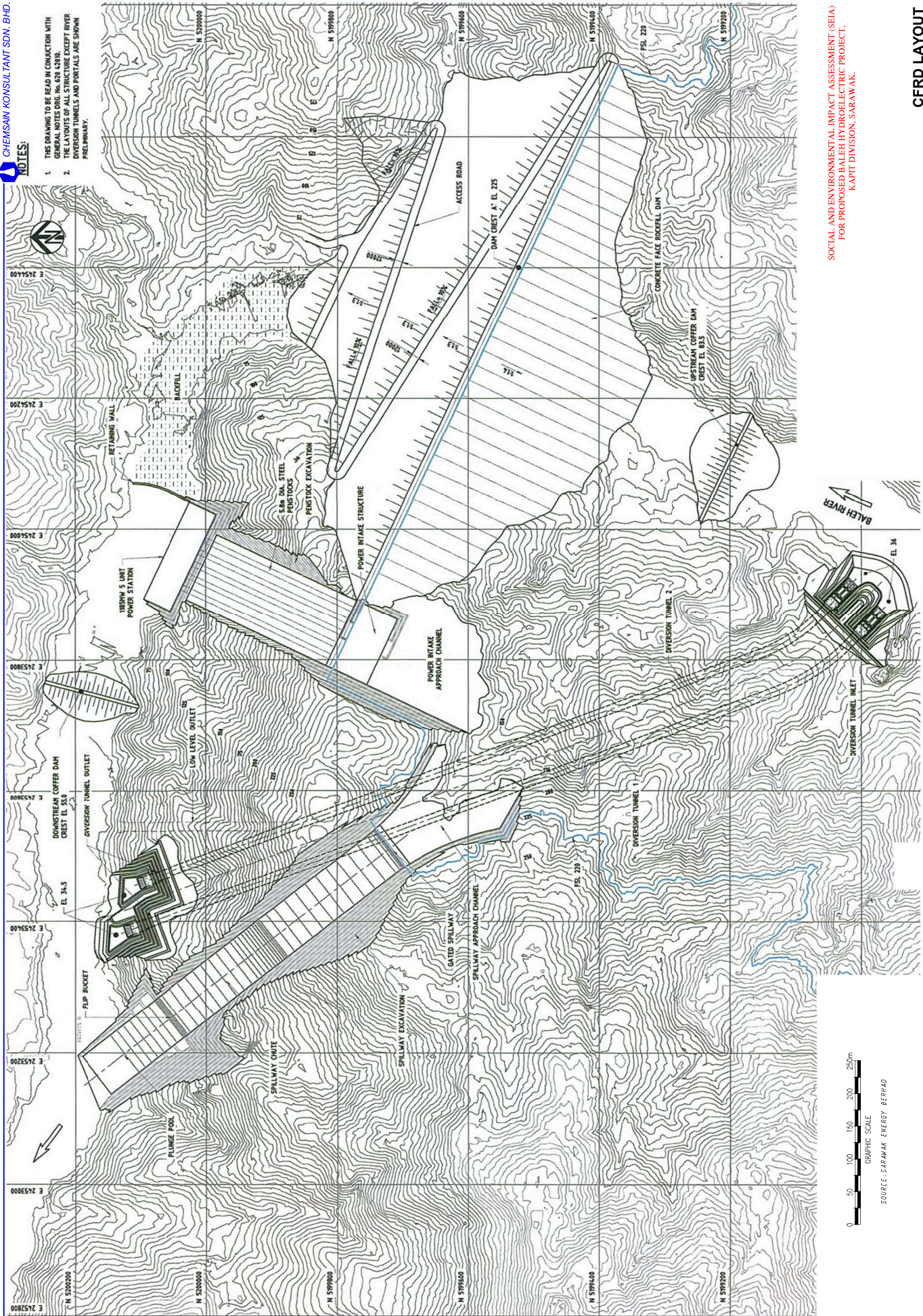
Type	Air insulated switchyard (AIS)
Location	Outdoor
Nominal voltage	500 kV

Transmission

Nominal voltage	500 kV
Type	Overhead, double circuit
Rating per circuit	2,200 MVA

NOTES:

1. THE DRAWING TO BE READ IN CONJUNCTION WITH GENERAL NOTES CBE. IN. 624.42018.
2. THE LAYOUTS OF ALL STRUCTURE EXCEPT RIVER DIVERSION TUNNELS AND PORTALS ARE SHOWN PRELIMINARY.



SOCIAL AND ENVIRONMENTAL IMPACT ASSESSMENT (SEIA)
FOR PROPOSED BALEH HYDROELECTRIC PROJECT,
KAPIT DIVISION, SARAWAK.

CFRD LAYOUT

2.2 ANCILLARY FACILITIES

2.2.1 *Transmission Line*

The transmission line will NOT be assessed in this SEIA as its final alignment has yet to be finalized at the point of report writing.

2.2.2 *Accessibility*

There is no connection from the existing road network to Kapit and no public road past Nanga Mujong in the direction of the site.

For the immediate commencement of development, and probably for the whole construction period, the primary means of transporting plant, machinery and other major items, in addition to the construction materials, will be by the Rejang River and the Baleh River.

2.2.3 *Operator Village*

There will be a small crew operating and maintaining the installations, so a small residential or operator village will be constructed on the right bank of the river for the use of the permanent operating staff.

2.2.4 *Communications*

During construction facilities will be required for voice and data transmission at the site, including cell phone towers around the site, to enable efficient working with the Kuching head office and worldwide telecommunication.

2.2.5 *Construction Camp*

The contractor construction facilities will be spread over a large area of the project works and the key components will be sited to suit the various construction processes.

2.2.6 *Explosive Magazine*

A magazine location will be selected and documentation prepared to facilitate its construction and operation (and the logistics of riverine transport of explosives) as soon as possible.

2.2.7 *Quarry*

At the time of drafting this report, four (4) quarry locations has been identified. These four (4) quarries are referred to as Quarry A, B, C & D (**Figure 3.1.1**).