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Environmental Impact Assessment (EIA)

Waste Dumpsite for the Proposed Baleh Hydroelectric Project: Main Dam – Civil Work, Kapit Division

Final Report

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Our Ref: CK/EV103-759/19

Project Proponent:

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EXECUTIVE SUMMARY

Executive Summary

1 Introduction

This Environmental Impact Assessment (EIA) report details the environmental issues associated with the "**Waste Dumpsite for the Proposed Baleh Hydroelectric Project: Main Dam – Civil Work, Kapit Division**".

2 Project Proponent and Consultants

The Proponent of this Project is CGGC-CGGCMalaysia-Untang Jaya JV and Chemsain Konsultant Sdn Bhd is the EIA consultant.

3 Project Location

The Project site is located at the Baleh Hydroelectric Project site, which is within Kapit division. The Dam area is approximately 250 km from Sibu Town and is only accessible by express boat from Sibu to Putai, of which Jetty A of the Baleh construction area is the final stop for all express boats (see **Figure ES-1**). The trip to Baleh will take an entire day from Sibu.

4 Legal Requirement

The proposed Project is categorized as a prescribed activity under the **Natural Resources and Environment Ordinance 1994**, under **Sub-item 6A(i)** of the Ordinance (Amended on 1st June 2001). It is regarding the development of landfill or in this case, dumpsite, for municipal wastes or any site or area used to or to be used for the storage, disposal, treatment, recycling or decomposition of municipal solid wastes.

Thus, an Environmental Impact Assessment (EIA) report is required for submission to the Natural Resources and Environment Board (NREB), Sarawak for approval prior to commencement of any work.

5 Statement of Need

Landfills are defined as a method of disposing refuse on land that minimizes nuisance or hazard to the environment, public health or safety, by utilizing the principles of engineering to control or minimize the pollution generated from the landfilling activities.

The Project is proposed to cater for the need of proper solid waste management at the site where 300 – 400 personnel currently produce an estimated 300 kg of waste per day. The Project will be located in a centralized area where solid wastes from the main dam area will be sent to for final disposal.

6 Project Description

6.1 Project Component

The Project consists of two main components, i.e.:

1. As the designs for the landfill are not yet confirmed, a conceptual layout designed in which the actual landfill may be based on. The proposed conceptual landfill has a **designated stock capacity of 3528 m³**, which is sufficient to cater for the site for at least seven years.
2. An access road shall be constructed west of the landfill connecting from the existing earthen track to the landfill. As the Project site is proposed to be in immediate adjacency to the existing road, a short access road to the Project comprising of a single lane carriageway of 6-7 m in length shall be constructed. The road shall be used for the construction of the landfill and the transportation of garbage to the landfill area during its operation.

6.2 Project Activities

Site Preparation and Construction Stage

The procedures for site preparation and construction are outlined below:

1. The vegetation in the working area shall be cleaned up. Obstacles which disrupt the operation of the bulldozers shall be removed. The bulldozer and excavator shall be used to clear an access path to the excavation area and the cofferdam construction area.

2. The topsoil shall be excavated by the bulldozer from the surface downward. Similar excavation method shall be adopted for leveling work, if any. The covering material shall be transported to the open space near the landfill site by lorries from within the Project site.

Operational Stage

The landfill method adopted is fundamentally the area method, adapted for hilly area. The operation and disposal measures for the landfill are outlined as follows:

1. The lorry shall be used to gather the garbage in the surrounding camps and transport it to the landfill site.
2. One excavator shall be arranged for the periodic spreading of the garbage in the landfill. After spreading, the excavator shall roll the garbage surface back and forth to make them dense.

Landfill Closure

Landfill closure indicates the termination of the landfill operation or that the landfill has already reached its lifespan or its capacity. Proper decommissioning needs to be applied to ensure all waste are properly buried and the Project site is clear before impoundment activity commences.

Submission of abandonment and rehabilitation plan will be submitted to NREB at least 3-4 months prior completion of the Project. Site visit shall be carried out together with SEB and NREB 3 months after the last work of abandonment activity to validate the progress of the abandonment plan.

6.3 Project Implementation Schedule

The Project shall commence with the construction of its access road during early December and is proposed to conduct its operation for approximately two (2) years. The detailed schedule for the Project has not been prepared at the time of reporting, however it will be provided in future monitoring reports upon request from the authorities.

7 Existing Environment

7.1 Physical Environment

Geology

Based on the Geological Map published by the Geological Survey Department of Malaysia (2nd ed. 1992), it showed that the bedrock of the Project site consists of the Sedimentary Late Cretaceous Period. The general geological characteristics of the Project site is rhythmically-interbedded shale, mudstone, slate, phyllite, metagreywacke with some conglomerate lenses and shows strong regional metamorphism.

Soil

The Project site is located on an area of mainly skeletal soils and red-yellow podzolic soils which compose of very shallow to moderately deep loamy sands to clays, on sedimentary rocks.

Meteorology

The Project site experiences an equatorial type of climate. There are two distinct monsoon regimes, the Northeast Monsoon from November to March, and the Southwest Monsoon from May to September. The meteorological data featuring the characteristics of the climate are obtained from the nearest MMS station located at Sibu Airport.

Annual Mean Rainfall:	3,422. mm/ year
Mean daily sunshine duration:	6 hours/ day
Annual 24-hr Mean Temperature:	26.4°C
24-hr Mean Relative Humidity:	83.2% to 88.2%

River System and Hydrology

Batang Baleh is one of the several main tributaries of Batang Rajang. Batang Baleh Catchment encompasses an area of 12,433 km² equivalent to 24.2% of the entire Rajang Basin. The area of the catchment located upstream of the Baleh dam site is approximately 5,625 km², representing 45.2% of the total catchment area of the Batang Baleh. The upper reaches of the Batang Baleh Catchment (25 km upstream of the proposed dam site) are formed by two main tributaries namely Upper Batang Baleh and Sungai Mengiong

respectively. Upper Batang Baleh flows westwards from the highlands along the border with East Kalimantan whereas Sungai Mengiong flows eastwards from the highlands along the border with West Kalimantan; joining the Upper Batang Baleh and flows downwards. Downstream of the dam site, the Batang Baleh flows westward for 97 km before joining with the Batang Rajang.

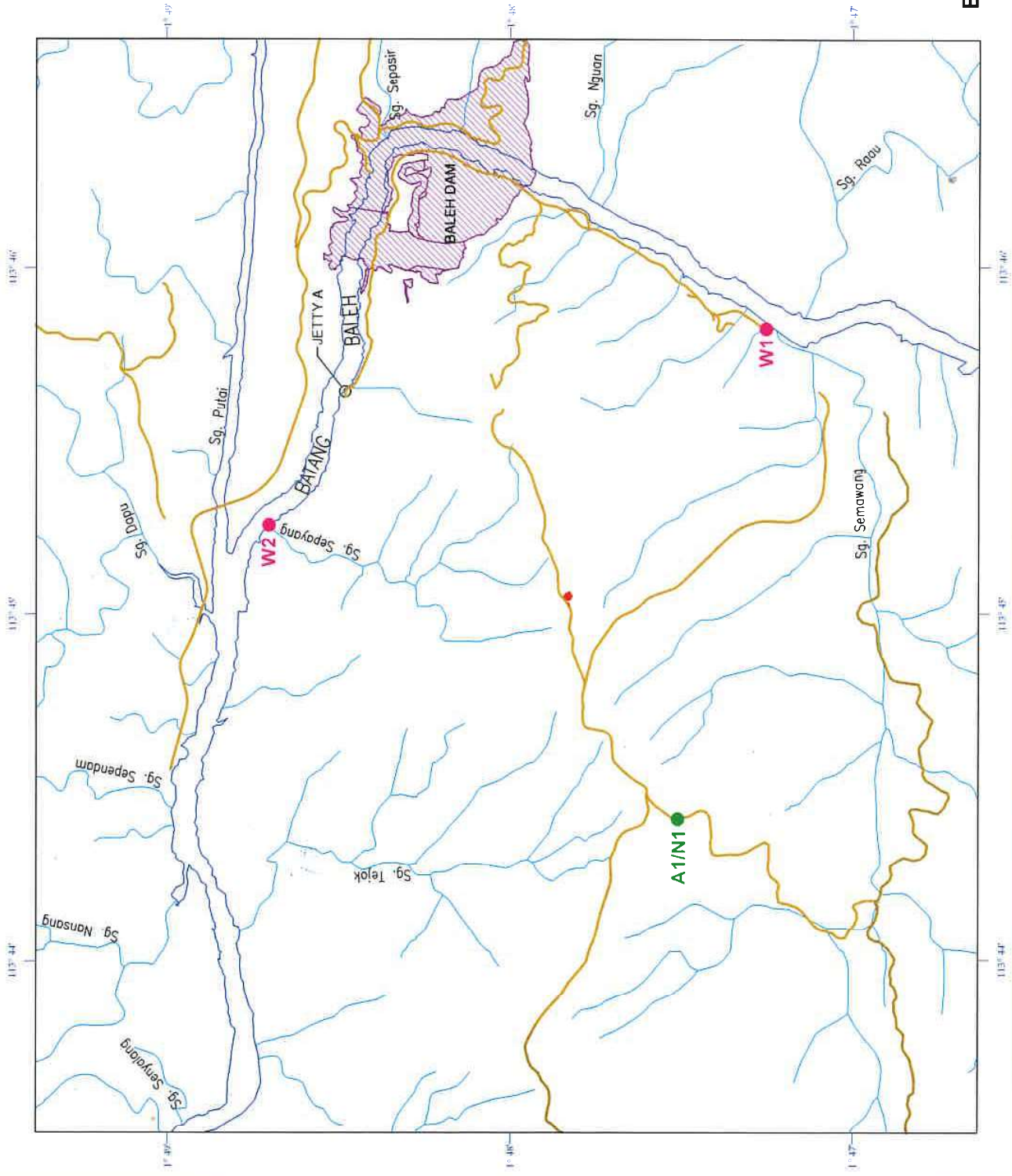
Water Quality

Two (2) surface water samples were collected from the river near the Project site during fine weather condition (see **Figure ES-2**). All water quality parameters were found to be well within the Class IIB of the National Water Quality Standards Malaysia (NWQSM) except the pH value of W2, which was slightly more acidic than expected at 5.8.








Air and Noise Quality

The existing air quality was measured at the contractors' camp and office. The sampling results revealed that the baseline level of Particulate Matter 10 at the sampling station is below the threshold limit of the New Malaysian Ambient Air Quality Standard of 100 µg/m³

Generally from L_{eq} readings, the baseline night time noise level slightly exceeds the stipulated Second Schedule of the Schedule of Permissible Sound Levels from the "Guidelines for Environmental Noise Limits and Control" by the Department of Environment under the category of Low Density Residential. This category is deemed to fit the setting of the Project site though the surrounding is devoid of any permanent residents. However the result is predictable as the main sources of night time noise was mainly from the sound of insects, wind and passing vehicles.



LEGEND:

-  PROJECT SITE
-  BALEH DAM
-  RIVERS / STREAMS
-  LOGGING ROAD
-  ACCESS ROAD
-  BASELINE WATER SAMPLING LOCATIONS - (W1-W2)
-  BASELINE AIR AND NOISE SAMPLING LOCATION - (A1-N1)



SOURCE: Adapted from
SERIES T28
SHEET 6513
EDITION 3/2001
GRID
-The outer ticks indicate the Latitude and Longitude

BASELINE SAMPLING LOCATIONS

FIGURE: ES-2

7.2 Biological Environment

Flora

The Project site is largely composed of secondary forest. The areas along the river are composed of a range of young and old secondary forests. Shifting cultivation along Batang Baleh and Sungai Mengiong are still active and patches of newly slashed and burned areas, and areas planted with hill paddy are common along the rivers.

The occurrence of *Ensurai* (*Dipterocarpus oblongifolius*) and *Tapang* (*Koompassia excelsa*) are common along the riverbank. Ensurai is frequently found along the Batang Baleh and Sungai Mengiong riverbanks. This tree species is easily recognized by its crooked and twisted trunks with almost horizontal base leaning over the river. Ensurai fruit is an important source of food for many fresh water fish. Tapang is seen as emergent trees and it can be recognized by its smooth, slippery whitish bark and huge buttresses.

Vegetation around the proposed dam site is largely dominated by agricultural crops. From the proposed dam site downstream to the Entawau settlement the forests are predominantly agricultural land. Among the main agricultural crops planted were paddy, rubber (*Hevea brasiliensis*), durian (*Durio zibethinus*) and rambutan (*Nephelium lappaceum*). Other tree crops cultivated include dabai (*Canarium odontophyllum*), petai (*Parkia* spp.), mawang (*Mangifera pajang*), ujong/tampoi (*Baccaurea* spp.), terap and temedak (*Artocarpus* spp.) and Kepayang (*Pangium edule*).

Fauna

A total of 2,432 birds representing 152 species from 38 families were recorded. The most abundant species was the Pacific Swallow with 187 individuals recorded followed by Dusky Munia, the second most abundant species of birds. The most common bird observed was the Little Spiderhunter.

16 species of mammals were recorded. The common ones are rodents, two species of Viverids and one Mustelid, wildpig, a species of mousedeer, two species of deer, two species of monkey and one species of ape.

34 species of frogs and 29 species of reptiles were recorded within the Baleh dam area. The reptiles comprise of 6 snakes, 20 lizards and 3 turtle species.

Macroinvertebrate communities in the proposed Baleh dam area comprise 74 species and 47 families comprising aquatic insects, crabs, shrimps, snails, aquatic worms, aquatic leaches and nematodes.

For fish, species from families Balitoridae, Mastacembelidae and Sisoridae are normally found in rocky bottom and fast flowing rivers from the total of 5,159 fish sampled.

7.3 Human Environment

Regional Profile

There are no nearest human settlement besides the one employed for Baleh HEP. The second nearest human settlement would be Nanga Entawau which is located approximately 8 km away from the Project site.

Based on the previous EIA report¹, there are about 10 Merirai-Entawau-Singut (MES) community in the Baleh Catchment. Nine longhouses are located in the vicinity of Nanga Entawau, Nanga Sepanggih, Nanga Entelawan, Nanga Serengat and Nanga Entelangau – downriver of the proposed HEP Dam site. Upriver, at Long Singut there is only one settlement bearing the same name. The predominant ethnic group in the nine longhouses is Iban, while Long Singut is predominantly Kenyah.

In addition, there are 44 longhouses along the Batang Baleh immediately downriver from Rh. Banggau Ak Undi (just below Nanga Merirai) to Nanga Baleh. None of these longhouses will be affected by inundation, and none of the members of these 44 communities has any claim on the land in the project affected area. However, the affected area has a history of settlement and resettlement over a period of time and there may be some individuals making claims on the land there.

Land Use

According to the previous EIA report, the area around the Batang Baleh is of the permanent forest estate as identified in the 1970s and '80s by the FAO2, Forest Industries Project. The area is thus under long-term forest management contracts, most of which are directed towards managing natural forests with some designated for conversion to industrial tree plantations.

The existing longhouses generally lie closely along the river banks and tributaries from the confluence of Sungai Putai such as Nanga Entawau. Above that point, there are only logging camps and the Kenyah settlement in Singut near the Upper Baleh.

Other than the components and facilities of the MHEP, there are no special land uses featuring 3 km of the Project site.

¹ SEIA Study for the Proposed Baleh Dam Hydroelectric Project, Kapit Division, Sarawak

8 Impacts and Mitigation Measures

The prediction of impacts and recommended mitigation measures were made based on the assessment of Project activities. The **key environmental impacts** identified during the Project activities are:

- Soil Erosion and Potential Slope Failure
- Potential Soil Contamination
- Water Quality Impact
- Noise Pollution
- Air Pollution
- Waste Generation and Management
- Health and Safety Impact
- Socio-Economic Impact

Table ES-1: Summary of Impacts and Recommended Mitigating Measures

NO.	POTENTIAL IMPACTS/ISSUES	MITIGATING MEASURES	PAGE IN REPORT	MONITORING
1.	<p>Soil Erosion and Potential Slope Failure</p> <p><u>Site Preparation and Construction</u></p> <p>The direct effect of vegetation and topsoil removal is soil erosion. Though the extent of earthworks is not foreseen to be large, earthworks generally tend to escalate the soil erosion due to disturbance of soil integrity.</p> <p><u>Operation</u></p> <p>Cover material, particularly soil covering, stored at the open space near the landfill area will be subject to erosion by rainfall and wind action.</p> <p>The access road will also be affected in the event of slope failure, posing hazards to people and traffic on the access road.</p>	<p><u>Site Preparation and Construction</u></p> <ul style="list-style-type: none"> Site clearing shall be confined to areas necessary for landfill development. Earthworks shall be scheduled during non-rainy days, where possible. Plastic sheets or mulches from felled vegetation to be laid on bare slopes as temporary surface protection. Clearing and earthworks must be carried out in stages and, where possible, scheduled to be concurrent with dry periods. Consolidation works for open slopes must be carried out immediately and simultaneously during the site clearing phases. The filling elevation of every layer of the landfill shall be labelled by the survey team to allow the timing of clearing. 	C4-2	Quarterly water monitoring

NO.	POTENTIAL IMPACTS/ISSUES	MITIGATING MEASURES	PAGE IN REPORT	MONITORING
2.	<p>Potential Soil Contamination</p> <p>The Project site is not intercepted by any water bodies. The concern that flooding due to overflowing of water bodies within the site is not significant.</p> <p>The landfill is intended for solid waste and not scheduled wastes. As such, the concern of soil contamination is reduced.</p>	<ul style="list-style-type: none"> Ensure adequate drainage is provided at the Project site and the drainage system shall be periodically inspected to ensure no blockage. Ensure that the garbage is adequately compacted and the cover material placed and compacted over the garbage layer. 	C4-3	Quarterly Environmental Audit
3.	<p>Water Quality Impact</p> <p>During construction stage, clearing and earthworks at site will expose the site to soil erosion which can cause waterway sedimentation.</p> <p>During operational stage, rainfall seepage will eventually pass through the landfill and enter the ground.</p> <p>There are no waterways in the Project site and no groundwater flow according to the Hydrogeological Map of Sarawak.</p>	<ul style="list-style-type: none"> The landfill must be at least 100 m from the nearest water bodies. Interceptor and perimeter drains shall be installed to channel runoff into the sedimentation pond. All surface drains and culverts shall be regularly maintained and inspected. Quarterly water quality monitoring shall be carried out from the commencement of landfill construction. 	C4-3 to C4-4	Quarterly surface water monitoring Quarterly environmental audit

NO.	POTENTIAL IMPACTS/ISSUES	MITIGATING MEASURES	PAGE IN REPORT	MONITORING
	<p>Odour nuisance based on emissions from the proposed landfill which is properly managed is predicted to be insignificant. However, if the landfill is poorly managed, odour may become a nuisance up to a kilometer from the Project site.</p>	<ul style="list-style-type: none"> No open burning should be permitted unless gotten a written approval from NREB. Construction vehicles and associated equipment should be properly maintained through regular servicing to reduce the emission of pollutants. Quarterly monitoring of total suspended solids and methane once the landfill construction commences. 		
6.	<p>Waste Generation and Management</p> <p>The establishment of the landfill will generally improve the waste management of Baleh.</p> <p>The concern of waste generation is during the construction stage where the landfill area will be cleared and vegetative wastes will be generated.</p>		C4-6	Quarterly environmental audit

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NO.	POTENTIAL IMPACTS/ISSUES	MITIGATING MEASURES	PAGE IN REPORT	MONITORING
7.	<p>Health and Safety Hazards</p> <p>Site Preparation and Construction</p> <p>The construction works associated with the landfill will expose the workers to risks such as accidents, manual handling injuries, respiratory problems as well as slips and trips.</p> <p>The operation of the landfill will have the risks of traffic accidents, fire due to potential release of methane from anaerobic decomposition of wastes, odour which can become nuisance, the propagation of pests and outbreak of diseases as well as the</p>	<ul style="list-style-type: none"> The landfill shall not be used to dispose any type of Scheduled Waste and other toxic wastes. Waste compaction shall be carried out as it increases the life expectancy of the landfill. It is recommended that areas and facilities for separation of recyclable or reusable materials to be provided to encourage the salvaging of wastes. 	C4-6 to C4-8	Quarterly environmental audit

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NO.	POTENTIAL IMPACTS/ISSUES	MITIGATING MEASURES	PAGE IN REPORT	MONITORING
	potential collapse of waste piles.	<ul style="list-style-type: none"> Only authorized personnel are allowed to enter the landfill site. It is recommended that the landfill area be fenced to keep out the vermin and stray animals. Equipment defects or safety hazard identified shall be promptly reported and dealt with. A sign shall be erected at the entrance of the landfill. 		
8.	Socio-Economic Impacts			
	<p>Adverse Impacts</p> <p>1. Site Preparation and Construction</p> <p>Non-existence of any permanent settlements within and near the Project site eliminates the major socio-economic concerns.</p> <p>2. Operation</p> <p>The operation of landfill gives rise to odour which may affect the workers and waterway contamination by landfill leachate.</p>	<ul style="list-style-type: none"> Any complaints regarding water contamination especially in terms of odour should be addressed promptly. Re-vegetation shall be carried out on the outer surface of the landfill to act as a barrier for odour propagation 	C4-9	None

NO.	POTENTIAL IMPACTS/ISSUES	MITIGATING MEASURES	PAGE IN REPORT	MONITORING
	<p><u>Beneficial Impacts</u></p> <p>The proposed landfill is for the internal use of Baleh dam and does not have any commercial function; hence not aimed for revenue generation.</p> <p>It will improve the overall waste management thus eliminating many health and social issues associated with improper waste management.</p>	<ul style="list-style-type: none"> None 		None
9.	<p>Closure and Abandonment</p> <p><u>Closure</u></p> <p>Issues related to closure of landfill are potential propagation of pest and health and safety matters related to potential presence of scavengers, emission of landfill gases and generation of leachate.</p> <p><u>Abandonment</u></p> <p>Abandonment of the landfill during construction stage prior to abandonment will not pose the concern of odour and emission</p>	<p><u>Closure</u></p> <ul style="list-style-type: none"> A closure plan for landfill shall be submitted and approved by NREB at least six (6) months before its closure. A post closure plan for the landfill must be submitted to and approved by the NREB at least six (6) months before its closure. <p><u>Abandonment</u></p> <ul style="list-style-type: none"> During abandonment, a proper landfill closure plan is also necessary. 	C4-9	None

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NO.	POTENTIAL IMPACTS/ISSUES	MITIGATING MEASURES	PAGE IN REPORT	MONITORING
	<p>of landfill gases. Instead, the concerns are soil erosion, aesthetic and health and safety issues.</p> <p>Abandonment during the operational stage will pose issues related to landfill leachate and emission in addition to aesthetic and health and safety matters.</p>	<ul style="list-style-type: none"> All machinery and equipment shall be removed from site. All temporary structures shall be dismantled or as per the directives of the Project Proponent or Sarawak Energy Berhad. All vegetative matters shall be disposed of at appropriate location for natural decomposition. All earth wastes shall be disposed of at appropriate location, or where suitable, used as the covering material for the landfill during its closure for abandonment. 		

9 Residual Impacts and Monitoring Programmes

Residual impacts identified as a result of the operation of the proposed landfill are as follows:

- ❖ Water quality degradation – This shall arise where untreated landfill leachate finds its way into the surrounding waterways.
- ❖ Air quality degradation – particularly due to odour dispersion from the landfill site.
- ❖ Safety and health – in terms of work-related injuries both during the construction and operation of the landfill.

The main environmental parameters that are to be monitored are surface water quality, air quality as well as noise monitoring.

Monitoring shall be undertaken on a quarterly basis. Environmental audit shall be done quarterly to investigate the aspects of soil erosion, health and safety, water pollution, noise as well as waste management. An environmental management plan is recommended to ensure that all impacts and mitigation measures are managed and monitored properly.

10 Conclusion

The EIA study covered the description of the Project components and activities, the physical, chemical, biological and human environment of the proposed Project site as well as the assessment of the environment impacts in relation to the Project activities and the proposition of the associated mitigation measures.

This EIA has proposed the mitigation measures to be implemented to lessen, and avoid these impacts. Monitoring recommendations have also been proposed to check on the effectiveness of the mitigation measures. With the implementation of the mitigation measures and the institution of the monitoring and auditing program, the Project can be implemented with minimal environmental impacts.