

# **CY 2024 Annual Environmental Protection and Enhancement Program**

**MPP-002-2019-MGBMIMAROPA**

## **1.0 CORPORATE DATA**

**Name of Proponent:** **UNIVERSAL BASALT AGGREGATES CORP.**

**Name of Project:** **Basalt Aggregates Project**

**Main Office:** No. 5-I Future Point Plaza 3, Panay Avenue  
Barangay South Triangle, Quezon City

**Project Site:** Barangay Bacungan, Puerto Princesa City  
Palawan

**Contact Persons:** **STEPHEN P. TAN**

President

09171369739

**ALFRED TAN PE**

Plant Manager

09177029523

## **2.0 PROJECT DESCRIPTION**

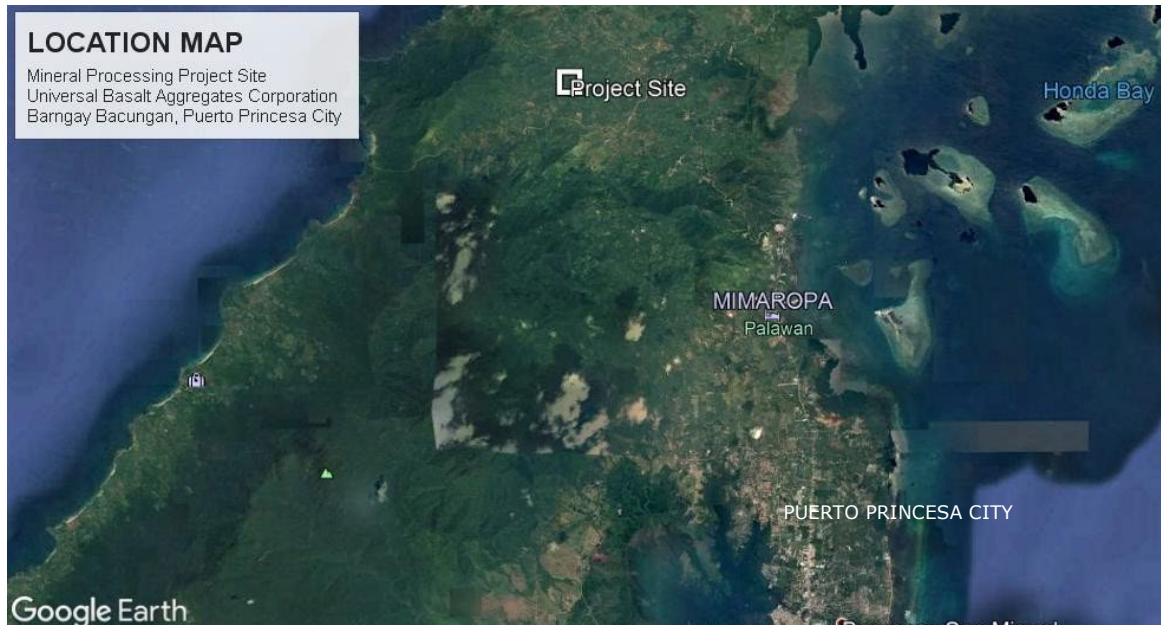
### **2.1 PROJECT DETAILS**

#### **2.1.1 Location**

The project site is located at Barangay Bacungan, Puerto Princesa City, Palawan. It is some 20 kilometers aerial distance northwest of the city proper. The processing plant seats at the intersection of 118°40'27.84" East Longitude and 9°54'33.00" North Latitude (WGS84).

Puerto Princesa is located 306 nautical miles southwest of Manila. It is bounded on the north by the Municipalities of San Vicente and Roxas and on the south by the Municipality

of Aborlan. Its western side faces the West Philippine Sea while in its eastern coast lays the Sulu Sea.



Shown below are the photographs of the crushing plant of Universal Basalt Aggregates Corporation.



Photo 1: Panoramic view of the crushing plant of Universal Basalt Aggregates Corporation installed at Barangay Bacungan, Puerto Princesa City, Palawan.





Photo 2: The jaw crusher and the plant hopper.



Photo 3: The secondary and tertiary cone crushers.



Photo 4: The vibrating screens.



Photo 5: The crushed product conveyors.

### 2.1.2 Estimated Capital Cost

**Capital Investment.** The total capital cost amounted to ₱17,000,000.00, which is distributed as follows:

Table 1: Estimated Capital Investment	
Capital Investment	Amount
Fixed Investments	₱ 13,500,000.00
Engineering and Administrative Cost	3,500,000.00
Total Capital Investment	₱ 17,000,000.00

**Estimated Production Cost.** The total cost of processing 164,571 cubic meters of mountain (basalt) aggregates is ₱ 94,968,146.00. This is translated to a unit production cost of ₱ 540.62 (reckoned from an annual output of 175,666 cubic meters). The details of the projected production costs are presented below:



<b>Table 2: Projected Annual Production Cost</b>	
Items	Annual Production Cost
Payroll (Labor)	₱ 891,000.00
Fringe Benefits	133,650.00
Power	8,900,496.00
Fuel	422,532.00
Repair and Maintenance	660,000.00
Overhead	522,000.00
Raw Material	82,285,500.00
Contingencies	1,152,968.00
Total	₱ 94,968,146.00

### 2.1.3 Mineral Commodity

The project shall have an output of concrete aggregates (crushed basalt) with sizes of G-1 (plus 20-mm to minus 40-mm), 3/4-inch (plus 10-mm to minus 20-mm), 3/8-inch (plus 5-mm to minus 10-mm) and S-1 (minus 5-mm).

### 2.1.4 Estimated Annual Production

The processing plant has a rated capacity of 300 metric tons per hour. The projected annual output of the plant is 175,666 cubic meters based on its rated capacity and the hereunder parameters.

□ Efficiency of processing plant	80%
□ Equipment mechanical availability	80%
□ Average specific gravity of raw material	2.80
□ Abrasion loss	5%
□ Swell ratio	0.89
□ Working hours per day	8 hours
□ Working days per month	25 days

The mineral processing project is covered by Environmental Compliance Certificate No. ECC-OL-R4B-2018-0156 for a crushing plant with a processing rate of 850,000 metric tons per year. Please see **Annex 2**.

### **2.1.5 Processing Operation**

The plant shall involve three stages of crushing and one stage of screening. The process flow is illustrated and discussed below.

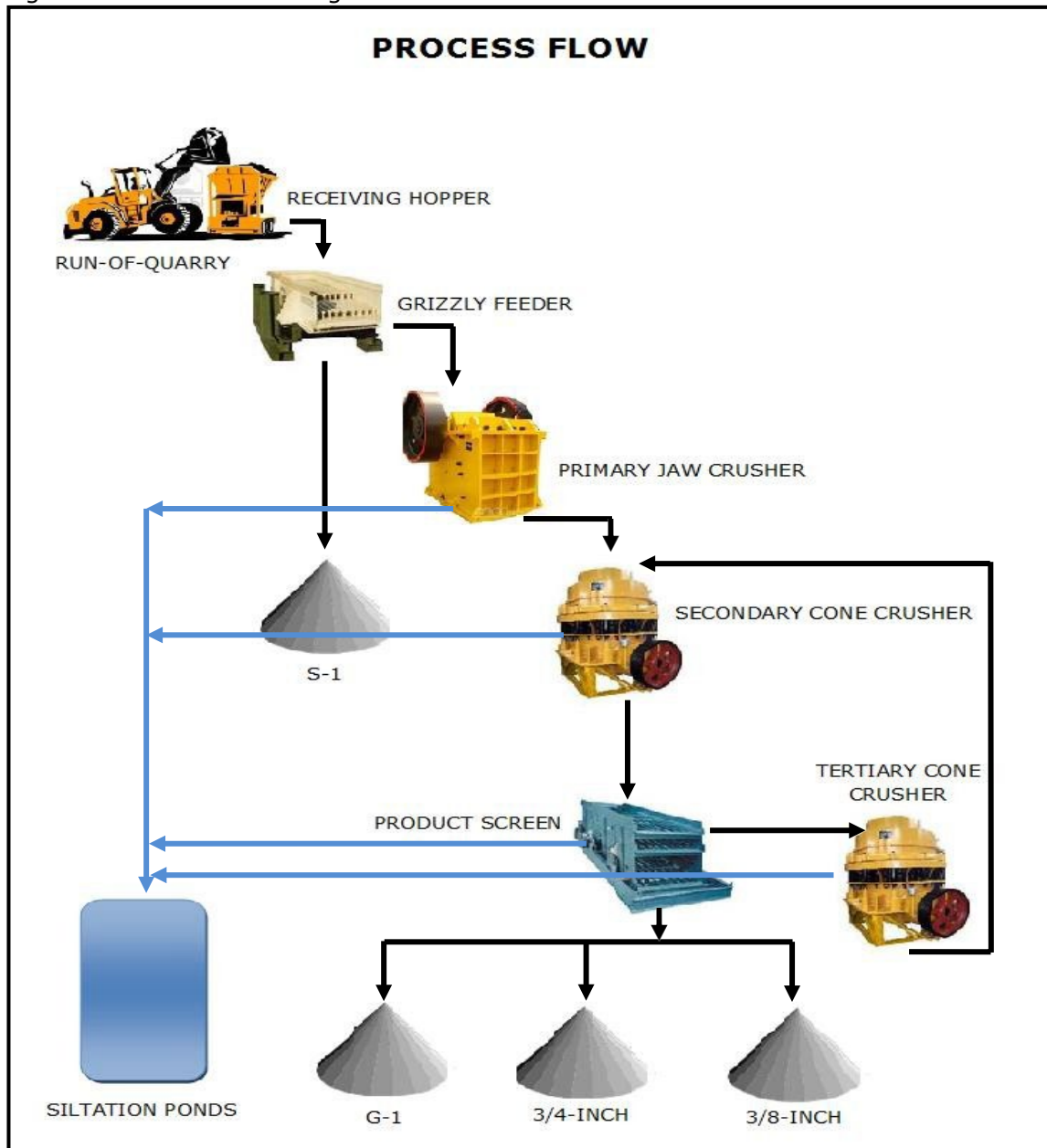
The Run-of-Quarry (minus 30-cm material) shall be dumped into the receiving hopper then fed thru a grizzly feeder to the primary jaw crusher. The natural fines from the grizzly shall be conveyed to the S-1 stockpile while the crushed materials shall be sent to the secondary cone crusher for further comminution.

The materials from the secondary cone crusher shall be conveyed to the product screens, with openings of 40-mm, 20-mm, and 10-mm. The plus 40-mm materials shall be sent to the tertiary cone crusher for auxiliary comminution. The crushed materials from this cone crusher shall be conveyed back to the product screens.

The plus 20-mm to minus 40-mm materials shall be sent to the G-1 stockpile; the plus 10-mm to minus 20-mm materials conveyed to the 3/4-inch stockpile; and the minus 10-mm materials sent to the 3/8-inch stockpile.

All the used wash water in the process shall be channeled through a culvert to the siltation pond.

Figure 1. Process Flow Diagram



## 2.2 Access and Transportation

### 2.2.1 Road

The main modes of transport within the city are tricycles, jeepneys, taxis, and vans-for-hire (public utility vehicles). Provincial buses and jeepneys provide transport off the city.

The project site may be reached from the city proper through the Puerto Princesa North Road leading to Barangay Bacungan, thence, from the junction an all-weathered road of 1.5 kilometers road. The products are delivered through dump trucks, passing in the barangay road going to the



highway – Puerto Princesa North Road.

### **2.2.2 Air Access**

Puerto Princesa International Airport is within the city proper. Puerto Princesa is accessible by direct flights to and from the major cities of Manila, Cebu, Davao, Iloilo and Clark.

### **2.2.3 Shipping**

The city is served by domestic passenger ferries to and from Manila and Iloilo at the Port of Puerto Princesa.

## **2.3 Power Supply**

The power supply of the crushing plant complex is being supplied by two (2) units generating sets (1 unit 900kW and 1 unit 640 kW) with a total capacity of 1,540kW at continuous rating category. The crusher and other activities area powered by generators. These are used alternatively, average utilization is estimated at 187,200 kwh/month.

## **2.4 Water Supply**

Water is sourced from deepwell on site. NWRB permit shall be secured. Water requirement is about 2-3 cubic meters per day.

## **2.5 Mineral Processing Equipment**

The processing plant established shall be producing 850,000 metric tons/year of crushed aggregates as indicated in the approved ECC. Attached in Annex 3 is the Permit to Operate of the equipment in the plant.

## **2.6 Workforce Information**

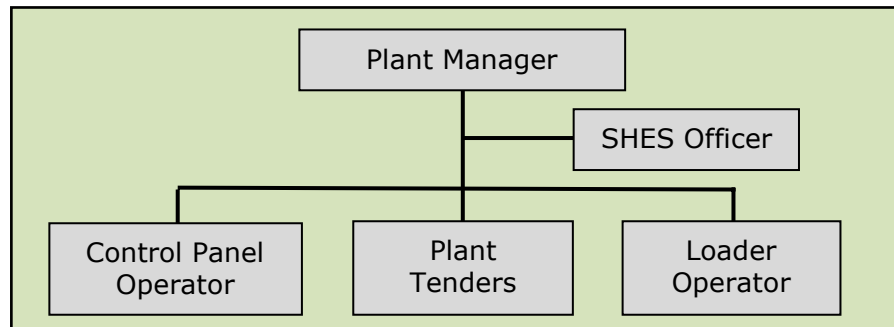
### **2.6.1 Total Operational Workforce**

Eight (8) regular employees shall be hired for the project. Below is the operational workforce showing the position and number of personnel.

Table 3: Operational Workforce	
Position	Number of Personnel
Plant Manager	1
SHES Officer	1
Control Panel Operator	1
Loader Operator	1
Plant Tender	4

### 2.6.2 Organizational Chart

Figure 2. Organization Chart



### 2.6.3 Housing Options

A bunkhouse was constructed to house the managerial staff as well as the rank and file employees.

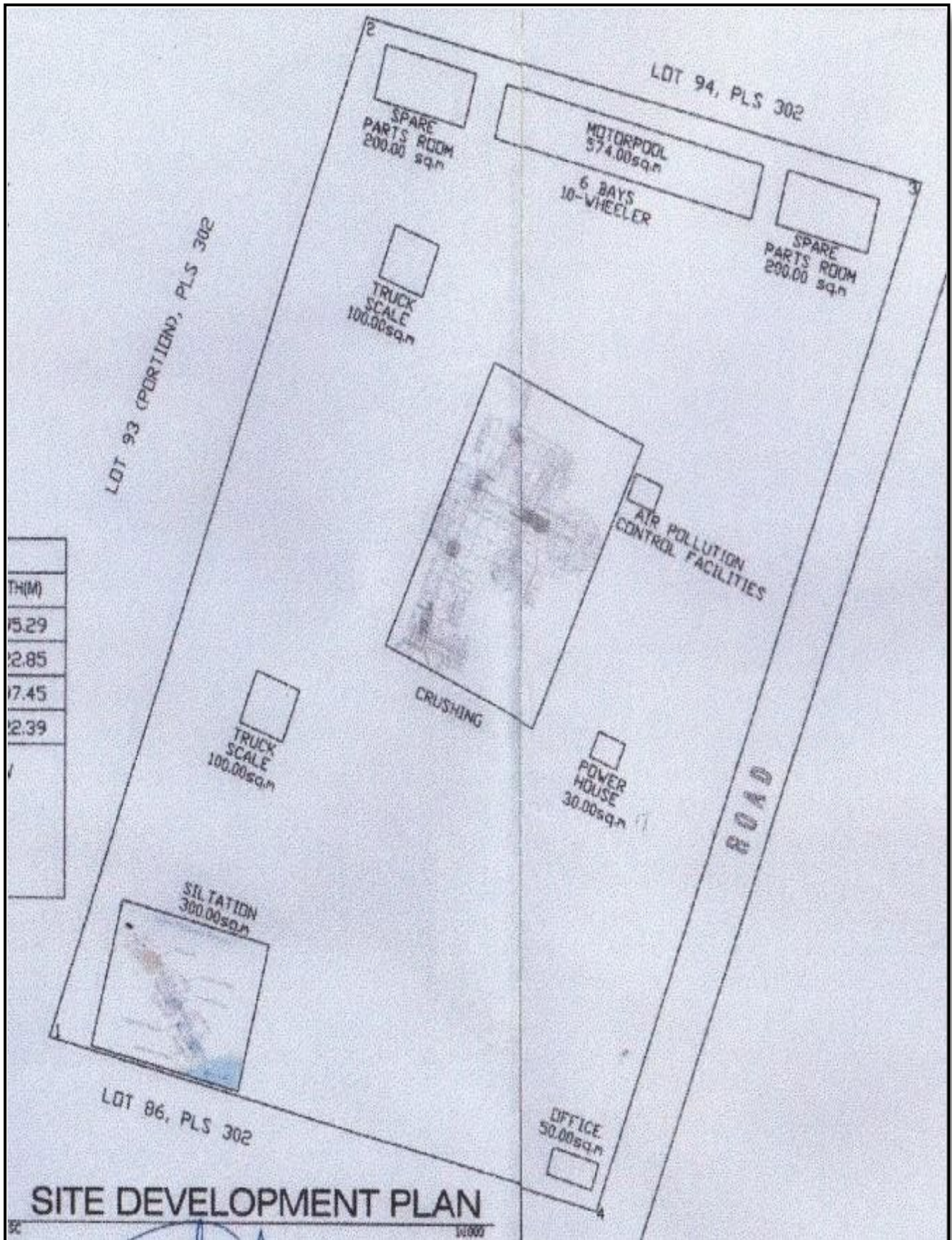
## 2.7 Development and Utilization Schedule

### 2.7.1 Development Program

The plant site encompasses 23,931 square meters of land owned by Johanne Borot with Transfer Certificate Title (TCT) No. 074-2016002174 duly covered by a 10-year Lease Contract dated September 14, 2018 between the landowner and Mr. Stephen Tan attached as **Annex 4**.

The Site Development Plan is presented below showing the relative location of the processing plant and other allied facilities within the leased lot.

Figure 3. UBAC Site Development Plan





There is an existing 1.5-kilometer access road leading to the site from the national highway. The quarry areas are just adjacent to the plant between 100 to 320 meters aerial distance away. The plant is operational since late 2019.

The layout of the crushing plant is likewise shown below as Figure 4.

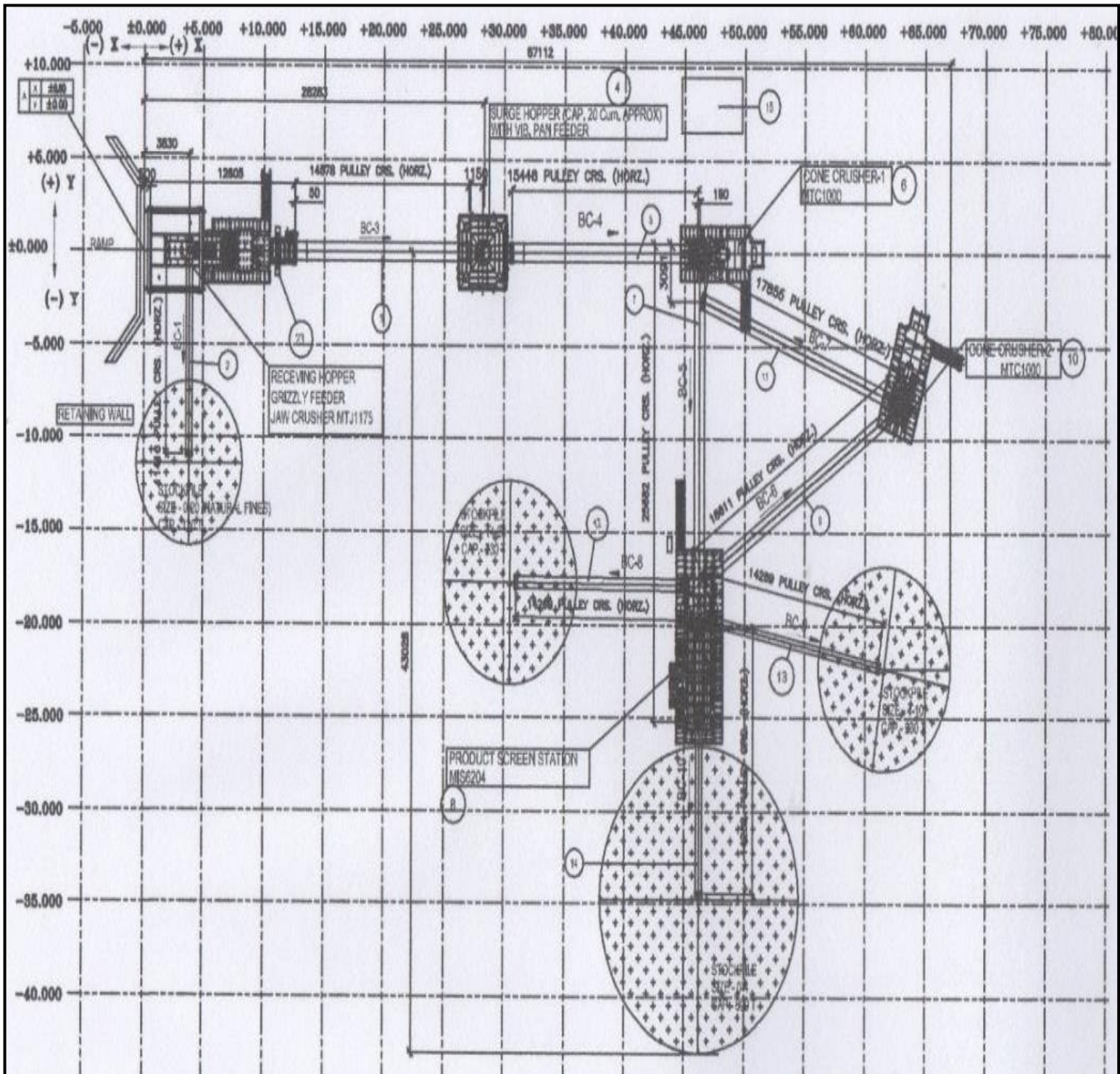


Figure 4. Lay-out of Crushing Plant

The first six (6) months after the granting of the Mineral Processing Permit was allotted for the Construction and Development Stage. The Gantt Chart below details the schedule of activities during this stage.

<b>Table 4: Gantt Chart of Construction and Development Stage</b>							
Activities	Month						Status
	1	2	3	4	5	6	
Mobilization of equipment	■						<b>Done</b>
Site development		■					<b>Done</b>
Foundation preparation		■					<b>Done</b>
Installation of processing plant			■	■			<b>Done</b>
Construction of allied facilities				■			<b>Done</b>
Construction of settling ponds				■			<b>Done</b>
Test run and debugging					■	■	<b>Done</b>

### 2.7.2 Production Program

The primary source of basaltic material to be fed to the plant is from several quarry permit areas within its vicinity, under the following names:

<b>Table 5: Sources of Raw Materials</b>	
Permit Holder	Quantity Allowed
Johanne Borot	49,999 cu. m.
Annievie Alcosaba	49,999 cu. m.
Marieta Atud	49,999 cu. m.
Madelyn Digo	49,999 cu. m.
Joseph Repuerzo	49,999 cu. m.
<b>Total</b>	<b>249,995 cu. m.</b>

The processing of mountain aggregates is thru a 300 MTPD capacity wet processing plant equipped with

three-stage crushing and one-stage screening. At the end of the line are four stockpiles for the finished products of crushed G-1, ¾-inch and ⅜-inch, and natural fines (S-1).

It is expected that commercial operation shall commence six (6) months after the granting of the MPP. The projected production for Year 1 is 87,833 cubic meters at a raw material feed of 82,285.50 cubic meters.

There is no significant value-heritage and cultural establishments surrounding the premises.

### 3.0 ENVIRONMENTAL IMPACTS AND CONTROL

Table 6: Summary Matrix of Environmental Impacts and Control				
Activity	Affected Areas	Foreseen Impacts	Mitigating Measures	Estimated Budget
<b>Water Resources</b>				
Processing	Forest lands	Used wash water may cause siltation of the adjacent forest lands if not properly contained and managed.	Used wash water from the plant shall be discharged to the settling ponds where it is decanted before it is recycled to the process.	₱ 96,000.00 Maintenance of slime impounding system
		Surface run-off during heavy rains may carry the silt from the raw material stockpile to the nearby surface water body.	The surface run-off shall be collected at the peripheral drainage canal (with silt traps) that shall discharge to the settling ponds.	₱ 30,000.00 Maintenance of peripheral drainage canal and silt traps



Activity	Affected Areas	Foreseen Impacts	Mitigating Measures	Estimated Budget
Processing	Ground water	Contamination of water resources and spread of water borne disease due to improper sewerage, solid waste and hazardous waste handling.	Sewerage and septic tanks shall be constructed to prevent contaminating ground water.	Integrated in the plan of operation
			Implementation of solid waste management program.	₱ 10,400.00
			A hazardous waste storage facility (HWSF) shall be constructed and maintained.	₱ 12,000.00 Maintenance of HWSF
Noise				
Processing	Residents	Noise generated by the processing plant and other equipment	Plant operation shall be limited to a single shift of 8:00 AM to 5:00 PM to reduce nuisance	Integrated in the plan of operation
			Planting of trees along the periphery of the plant compound shall serve as sound barrier (to dampen sound migration).	₱ 10,000.00 Tree planting with care and maintenance
			Haulers shall be instructed to strictly observe 20 KPH speed limit when cruising along populated areas	Integrated in the plan of operation

Activity	Affected Areas	Foreseen Impacts	Mitigating Measures	Estimated Budget
<b>Air Quality</b>				
Hauling of raw feed and processed products	Residents	Dust generated and smoke emitted by haul trucks	Daily water spraying of the haul road shall be done during summer to reduce dust migration.	₱ 78,000.00
			Quarterly maintenance of generators / heavy equipment shall be made to avoid emission of harmful gas.	Integrated in the plan of operation
			Haulers shall be instructed to strictly observe 20 KPH speed limit.	Integrated in the plan of operation
			Provision of dust mask to plant workers and operators.	Integrated in the plan of operation
Processing	Residents	Dust generated during crushing and screening of aggregates	Water sprinklers are installed in the processing plant where the generation of dust is greatest.	Integrated in the plan of operation
			Planting of trees along the periphery of the plant site shall reduce wind velocity and minimize dust mobilization.	₱ 10,000.00 Tree planting with care and maintenance

Activity	Affected Areas	Foreseen Impacts	Mitigating Measures	Estimated Budget
<b>Social Issues</b>				
Processing	Residents		Conduct of continuous and meaningful consultation to inform the concerned stakeholders of the proponent's programs in terms of assistance in the improvement of the host communities.	₱ 6,600.00 Meeting with concerned stakeholders

The facility has siltation pond, Discharge Permit is applied, wastewater quality will be tested as per DENR General Effluent Standard DAO 2016-18.

#### 4.0 APPROACH AND SCOPE OF ENVIRONMENTAL MONITORING PROGRAM

##### 4.1 Monitoring

Monitoring shall be undertaken in accordance with the following environmental monitoring program.

<b>Table 7: Summary Matrix on the Approach and Scope of Environmental Monitoring Program</b>					
Sources of Impacts	Parameters Considered	Purpose of Monitoring	Monitoring Methods	Monitoring Locations	Monitoring Frequency
Mineral Processing Operation	pH level, TSS, TDS and oil & grease	To determine if additional environmental control measures are to be adopted to remedy the inadequacy of implemented mitigating measures.	Water sampling	Clear water pond	Quarterly



Sources of Impacts	Parameters Considered	Purpose of Monitoring	Monitoring Methods	Monitoring Locations	Monitoring Frequency
	Volume of slimes impounded in the settling pond.	To determine the volume of slimes collected to schedule the desilting.	Ocular inspection	Settling ponds	Weekly in normal weather and daily during heavy rains
Drainage and Erosion Control	Integrity and effectiveness of drainage and erosion control measures	To determine if the control structures need modification and maintenance.	Ocular inspection	Silt traps and peripheral drainage canals	Weekly in normal weather and daily during heavy rains
	Survival rate of planted trees and other vegetation	To see appropriate care and maintenance	Ocular inspection	Planted saplings	Weekly
Noise	Level of noise generated by plant and equipment.	To determine if the noise level is within safe limits	Noise level monitoring instrument acceptable to DENR shall be used.	Plant site and residential areas.	Quarterly undertaken during daytime and night time
Air Quality	Particulate matter with diameter less than 2.5 µg (PM <sub>2.5</sub> )	To determine if the air quality is within the DENR National Ambient Air Quality Guideline for Criteria Pollutants.	Ambient air sampler or any acceptable instrument shall be used.	Plant site and residential areas	Annual

Sources of Impacts	Parameters Considered	Purpose of Monitoring	Monitoring Methods	Monitoring Locations	Monitoring Frequency
Social Issues	Perception of the residents of the host community about the project.	To get feedbacks from residents and local executives as to their perceptions of the project and its acceptability.	Constant contact with the concerned stakeholders shall be established to gain rapport. Continuous consultation and relationship shall be perpetuated.	Consultations with local officials and residents shall be constantly done.	Quarterly or when there is an urgent need

## 4.2 Research

The proponent in collaboration with the Research and Development company – Homeland Consultancy Services shall undertake research with the initial subject on socio-economics of aggregates processing operations in Palawan.

The initial step is to enter into a Memorandum of Agreement with the company to present a research proposal relating to the above research topic. An initial budget of ₱25,000.00 is set aside for this purpose but may be increased depending on the terms of reference agreed upon in the MOA.

Researches scheduled for implementation by year 2024 are as follows:

Research Project	Targeted Activities	2024			
		Q1	Q2	Q3	Q4
1	Periodic flora and fauna monitoring/assessment – Wildlife and vegetation inventory. Method – transect counts.				
2	Stabilization of siltation pond dikes through biological means – Planting of seedlings in dike areas, to replant due to the damage of typhoon.				
3	Forest rehabilitation trials using endemic and indigenous tree species – still in the seedlings trial.				
4	Siltation rate along ponds and potential uses				

### 4.3 Reporting

The proponent shall form its Mine Rehabilitation Fund Committee (MRFC). The Multi-Partite Monitoring Team (MMT) of the MRFC shall conduct quarterly monitoring on compliances to the EPEP. Immediately after the completion of its monitoring, an exit conference is undertaken wherein the findings of the team is presented, the level of compliance of the proponent is evaluated and a commitment is executed on its unaccomplished obligation towards maintaining the environmental soundness of the sand and gravel operation. Findings of the MMT are presented during the regular quarterly meetings of the MRFC.

The permit holder shall also submit the following reports relevant to its mineral processing operation:

<b>Table 8: Reportorial Requirement</b>		
Report	Time of Submission	Concerned Government Office
Monthly General Accident Report	Monthly	MGB cc DOLE
Monthly Accident and Sickness Report	Monthly	MGB cc DOLE
Annual Report of AEPEP Accomplishment	Annual	MGB
Quarterly Compliance Monitoring Report	Quarterly	MGB
Semi-Annual Report on Mine Wastes and Tailings generated	Semi-Annual	MGB
Semi-Annual Report on Mining Forest Program Accomplishment	Semi-Annual	MGB

Quarterly Report on NGP Accomplishment	Quarterly	MGB
Annual Report on SDMP	Annual	MGB
Quarterly Environmental Expenses Report	Quarterly	MGB
Quarterly Accomplishment Reports on SDMP	Quarterly	MGB
Monthly Report on Production, Sales and Inventory of Non-Metallic Minerals and Employment	Monthly	MGB and EMB
Quarterly Energy Consumption Report	Quarterly	MGB
Integrated Annual Report	Annual	MGB
Self-Monitoring Report	Quarterly	EMB
Compliance Monitoring Report	Semi-Annual	EMB
Social Development Plan	Annual	EMB
Results of Laboratory Analysis (TSS) of water sample taken from the last compartment of the settling ponds	Annual	EMB



## 5.0 TOTAL COST OF ANNUAL EPEP

The total cost of the Annual EPEP to be implemented by the proponent for the year is ₱ 382,000.00 (3% of milling cost).

Listed below is the quarterly breakdown of the budget according to the seven (7) parameters of environmental activities:

Table 9: Breakdown of Annual EPEP Cost											
Parameters and Control Strategies	Unit Measure	Physical Targets					Quarterly Cost (₱)				Annual Cost (₱)
		Q1	Q2	Q3	Q4	Annual	Q1	Q2	Q3	Q4	
1. Water Resource and Quality	Number maintenance conducted	1	1	1	1	4	24,000	24,000	24,000	24,000	96,000
• Maintenance of silt impounding system											
• Implementation of solid waste management program	MRF Maintenance	1	1	1	1	1	2,600	2,600	2,600	2,600	10,400
• Maintenance of hazardous waste storage facility	Number Facility maintained	1	1	1	1	1	3,000	3,000	3,000	3,000	12,000

<ul style="list-style-type: none"> <li>Maintenance of peripheral drainage canal/sump/silt traps</li> </ul>	Number of maintenance conducted	0	2	3	1	6	-	10,000	15,000	5,000	30,000
2. Air Quality											
<ul style="list-style-type: none"> <li>Road Watering</li> <li>Monitoring</li> </ul>	Number conducted	3	1	0	2	2	39,000	13,000	-	26,000	78,000
3. Noise and Vibration											
<ul style="list-style-type: none"> <li>Preventive maintenance of all moving parts of crushing plant and earth-moving equipment</li> </ul>	Equipment maintained	1	1	1	1	4	-	-	-	-	Integrated in plan of operation
4. Conservation Values											
<ul style="list-style-type: none"> <li>Planting of trees (including care and maintenance)</li> </ul>	Number of Tree Planting	1	1	2	1	5	2,000	2,000	4,000	2,000	10,000

<ul style="list-style-type: none"> <li>Housekeepin g within plant compound</li> <li>IEC with host community</li> </ul>	Housekeepin g Conducted	78	78	78	78	312	-	-	-	-	Integrated In plan of operation
	Meetings/ Consultation conducted	1	0	1	0	2	3,300	-	3,300	-	6,600
5. Environmental Research											
<ul style="list-style-type: none"> <li>Flora &amp; Fauna Assessment</li> <li>Other research included in other EPEP activities (i.e. Siltation pond, tree planting)</li> </ul>	Research Done	0	0	0	1	1	-	-	-	25,000	25,000
6. Others											
<ul style="list-style-type: none"> <li>Attendance to MEPEO and PCO training and workshop</li> </ul>	Training/ workshop attended	0	1	0	1	2	-	5,000	-	5,000	10,000

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7. Environmental Monitoring											
<ul style="list-style-type: none"><li>In-House/MMT Monitoring Meeting</li><li>Wastewater Laboratory</li></ul>	Monitoring/ Meeting conducted	1	1	1	1	1	26,000	26,000	26,000	26,000	104,000
Total							99,900	71,600	71,900	104,600	382,000

Percent of AEPEP budget = 3% of milling cost.




**PREPARED BY:**

  
**ENGR. MIGUEL D. RABANG**  
Mining Engineer

PRC License No. – 0001062  
PTR No. – 1402003  
Issued On – January 03, 2020  
Issued At – Puerto Princesa City

CONFORMED:

  
**STEPHEN P. TAN**  
President  
Universal Basalt Aggregates Corp.

## Annex 1 Memorandum of Agreement & 2020 Monitoring Report

### MEMORANDUM OF AGREEMENT

#### KNOW ALL MEN BY THESE PRESENTS:

This Memorandum of Agreement is made and entered into by and between:

**UNIVERSAL BASALT AGGREGATES CORPORATION**, a corporation duly organized and existing under Philippine Laws with principal place of office at Fernandez corner Manalo St., Barangay Tanglaw, Puerto Princesa City, Palawan, represented by its President, **MR. STEPHEN P. TAN**, hereinafter referred to as "**UBAC**";

-and-

**HOMELAND CONSULTANCY SERVICES**, an environmental services consultancy firm with company address located at Kalikasan Homes, Wescom Rd., Barangay San Pedro, Puerto Princesa City, Palawan, represented by **DR. RODOLFO O. ABALUS JR.**, an expert in forestry and environmental science who had worked with various environmental projects, hereinafter referred to as the "**HCS/Contractor**".

#### WITNESSETH:

*Henry*  
**WHEREAS**, UBAC has the authority to process mountain aggregates (Basalt) at Sitio Malbeg, barangay Bacungan, Puerto Princesa City, Palawan through a Mineral Processing Permit AMMP-02-2019-MGBMIMAROPA granted by the Mines and Geosciences Bureau -MIMAROPA Region on January 28, 2019 in accordance with Republic Act 7492, otherwise known as "Philippine Mining Act of 1995".

*J*  
**WHEREAS**, UBAC, in connection with its mineral processing operations, has been granted an Environmental Compliance Certificate (ECC) by the Environmental Management Bureau of the Department of Environment and Natural Resources Office-Regional Office 4B, with Ref. Code: ECC-OL-R4B-2018-0156.

**WHEREAS**, in compliance with the conditions of ECC Ref. Code: ECC-OL-R4B-2018-0156, UBAC desires to conduct Environmental Protection and Enhancement Research and Development activities within its area for mineral processing operations.

*Caro*  
**WHEREAS**, the Contractor represents himself as an expert in biodiversity inventory and monitoring, greenhouse gases inventory, carbon sequestration, forest rehabilitation, ecosystem services valuation, and other forestry and environment-related studies.

**WHEREAS**, the contractor is open to partnership and collaboration with various organizations. It has been a recipient of technical assistance in the conduct of actual researches. As technical services provider related forestry and other environment-related researches and other projects.

**WHEREAS**, driven by their common desire to sustainably manage our natural resources and to maintain ecological balance, Universal Basalt Aggregates Corporation and Homeland Consultancy Services have agreed to jointly implement the

**Collaborative Environmental Protection and Enhancement Research and Development Program.**

**I. PROJECT DESCRIPTION AND OBJECTIVES**

The Province of Palawan harbors various endemic flora and fauna species. Many of which are only confined to its specific natural habitat and cannot be found elsewhere in any habitat in the world. Hence, Palawan's various natural ecosystems need to be carefully managed in order to preserve and protect its biodiversity from any threat of their existence.

Sustainable development is the core principle when it comes to managing our natural resources. Therefore, any actions toward utilization of these resources should be based on sustainability principles.

The environmental protection and enhancement research and development program is a collaborative undertaking between the Palawan State University and the Universal Basalt Aggregates Corporation. It is a research-based endeavor with the goal of characterizing the biological and physical environment, assessment and monitoring, and development of management measures to maintain ecological balance; hence, attaining sustainability.

The following are the specific objectives of the project:

1. Conduct a semi-annual study to monitor flora and fauna within and adjacent to the Basalt Aggregates Project operable areas;
2. Studies on the more effective biological means of stabilizing dikes of siltation ponds and bare slopes;
3. Conduct forest rehabilitation trials using endemic and indigenous tree species on quarried out areas;
4. Conduct trials on agroforestry system combinations as alternative in the rehabilitation of quarried out areas;
5. Assess the socio-economic impacts of the basalt aggregates extraction and processing project to adjacent communities;
6. Determine siltation rate along siltation ponds and explore (research on their uses e.g. soil potting media for seedlings, composting among others) gardening their potential uses; and
7. Rehabilitate quarried-out including selected open and degraded forest areas.

**II. RESPONSIBILITIES OF THE PARTIES**

**UNIVERSAL BASALT AGGREGATES CORPORATION** shall be responsible for the following:

1. Provide the relevant materials, tools and equipment that shall be required by the research team during field works, assessment, and monitoring activities;



2. Provide transportation, housing accommodation and meals to the research team during the actual data gathering, assessment, and monitoring;
3. Shoulder fees for research related laboratory analysis;
4. Provision of field guides and assistants during data gathering, assessment, and monitoring period;
5. Provide health insurance to each member of the research team;
6. Provide financial assistance in the publication of research and assessment outputs; and
7. Issue certificate of recognition to members of the research team.

**Homeland Consultancy Services** shall be responsible for the following:

1. Form a technical team of professionals referred to as the Research Team from various discipline among its manpower who shall carry out the different activities to ensure timely delivery of the report requirement and completion of the Project stipulated in this Agreement.
2. Prepare research, development, monitoring and assessment proposals;
3. The research team shall conduct field work activities related to the prepared and approved research, development, monitoring and assessment proposals.
4. Research team shall ensure timely delivery and submission of at least two (2) copies of research outputs including recommendations to UBAC and concerned decision makers for policy decisions.

III.

### **JOINT RESPONSIBILITIES**

It shall be the responsibility of both Parties to appoint the following point persons for proper coordination and collaboration:

- |           |  |
|-----------|--|
| 1. UBAC : | Rhea Santoninio (Company /consultant)                              |
| 2. HCS :  | Dr. Rodolfo O. Abalus Jr. (University Professor/ Technical Expert) |

To perform all acts or cause all acts to be done as may be necessary to give effect to, fully implement and/or accomplish the objectives of this Agreement, including the execution of documents, Agreements, and/or, instruments, as may be required.

### **IV. DURATION OF AGREEMENT**

This Memorandum of Agreement shall take effect upon signing hereof and will remain in full force and effect for five (5) years until its completion or otherwise superseded by mutual written Agreement of the parties.

### **V. OWNERSHIP AND PUBLICATION**

Intellectual property rights arising from the collaborative efforts under this Agreement shall be recognized as outputs of and jointly owned by two parties namely, UBAC and HCS research team. The Parties reserve the right to use all data and information developed under this Agreement for the enhancement of their respective academic and research programs. Whenever applicable, HCS and the principal authors including the technical professional members shall be

identified, recognized and included in the report. Any and all royalties for the use of such data and information shall accrue to both Parties.

All reports or articles including tri-media presentations using project data and output shall recognize HCS and the principal researchers and authors involved in the project as well as acknowledge UBAC as the source of project funding support.

## **VI. WARRANTIES**

Each Party represents and warrants to the other that:

1. The execution, delivery and performance of this Agreement have been duly authorized by all necessary corporate actions and will not result in any breach or violation of any of its existing charter, documents, contracts, licenses, permits and authorizations;
2. This Agreement, when executed, constitutes a valid and binding obligation on the Parties and shall be enforceable in accordance with its terms; and,
3. All authorizations, licenses, resolutions and consents from their respective charters, principals, office or code of professional responsibility as required by law in respect of the execution and performance of this Agreement have been duly taken, and shall be kept valid and effective by the Parties during the term of this Agreement.



## **VII. WAIVER**

The waiver by a party of a breach of any of the provisions of this Agreement by the other party shall not be construed as a waiver of any succeeding breach of the same or other provisions; nor shall any delay or omission by a party in exercising any right that it may have under this Agreement operate as a waiver of any breach or default by the other party.



## **VIII. AMENDMENTS**

No modifications, amendments or supplements to this Agreement shall be effective for any purpose unless in writing signed by both parties. Waivers, approvals, resolution or consents hereunder by a party shall also be in writing.



## **IX. NOTICE**

Any notice and other communication in connection to this Memorandum of Agreement shall be in writing and shall be served by personal delivery or by sending it by facsimile or prepaid post to the addresses of the parties specified in this Agreement, or as notified by either party to the other from time to time.

## **X. RELATIONSHIP OF PARTIES**

This Agreement does not constitute a partnership Agreement or create an employer-employee relationship, joint venture or agency relationship between the Parties. No Party shall hold itself out contrary to the terms of this Agreement. It is



specifically understood that each Party is an independent entity and shall not be considered an employer, employee, agent or representative of the other. Each Party and/or its employees may not bind any other Party to any obligation or contract except as may be provided under this Agreement

#### **XI. DISCLAIMER**

The Parties are entering into this Agreement while wishing to maintain their own separate missions, mandates, and their own accountabilities. Nothing in this Agreement shall be construed as superseding or interfering in any way with other agreements or contracts entered into between the parties, either prior to or subsequent to the signing of the Agreement.

#### **XII. DISPUTE RESOLUTION**

The parties shall, at all times, use their best efforts to resolve any dispute which may arise between or among them under or in relation to this Memorandum of Agreement and the Project amicably, in good faith, with dispatch, with no party resorting to public disclosure or ventilation of such differences. A party shall not start court proceedings against any other party in respect of a controversy or dispute arising out of this Memorandum of Agreement without first seeking an amicable resolution of the dispute. If the dispute cannot be amicably settled, then suit shall be brought in the proper courts of the Philippines.

#### **XIII. MISCELLANEOUS**

Any provision of this Agreement found to be prohibited by law shall be ineffective to the extent of such prohibition without invalidating the remainder of this Agreement. This Agreement represents the entire Agreement of the parties and may not be amended except in writing signed by each party hereto. Each party to this Agreement warrants to the other that it is duly organized and existing and each signatory hereto represents to the other party that it has full right and authority to enter into and consummate this Agreement and all related documents.

#### **XIV. GOVERNING LAW**

This Agreement shall be governed by and construed in accordance with the laws of the Republic of the Philippines.

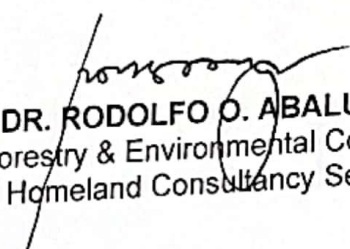
#### **XV. GOVERNING LAW AND VENUE OF ACTION**

This Agreement shall be governed in all respects by Philippine laws. Any conflicts arising in connection with this Agreement shall be settled amicably of best efforts.

IN WITNESS WHEREOF, the parties hereby affix their signatures this  
in Puerto Princesa City, Palawan, Philippines.

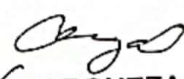


**MR. STEPHEN P. TAN**  
President  
Universal Basalt Aggregates  
Corporation



**DR. RODOLFO O. ABALUS, JR.**  
Forestry & Environmental Consultant  
Homeland Consultancy Services

Witness:



**JOHN U. ORQUEZA**  
Registered Forester  
Kalikasan Homes, Puerto Princesa City



# ACKNOWLEDGMENT

REPUBLIC OF THE PHILIPPINES)

PUERTO PRINCESA CITY) SS  
PALAWAN

BEFORE ME, a Notary Public, for and in the Province of Palawan, this  
MAY 1 Day of MAY, 2020, personally appeared:

NAME	I.D.	Date/Place of Issue
STEPHEN P. TAN	O11-99-096424	10/29/2017, Puerto Princesa City
RODOLFO O. ABALUS, JR.	D11-06-002379	08/31/2018, Puerto Princesa City

All known to me to be the same persons who executed the foregoing instrument, and acknowledged to me that the same is their own free and voluntary act and deed.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my notarial seal on the date and at the place first above written.

Doc. No. 295  
Page No. 60  
Book No. 6xxx111  
Series of 2020.

NOTARY PUBLIC  
ATTY. MA. BUN CONSEJO LIMNARRAZIO  
NOTARY PUBLIC  
UNTIL DECEMBER 31, 2022  
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DN, 1-2-2020-PTO.PRIN-CITY  
TIN NO. 198-380-519 (ROLL NO. 21529)

*Caro*

*Quen*



# **FLORA AND FAUNA ASSESSMENT**

## **A Terrestrial Ecology Monitoring Midyear 2023 Report**



**UNIVERSAL BASALT AGGREGATES CORPORATION**

**Barangay Bacungan, Puerto Princesa City**

Flora and Fauna Assessment of the Mineral Processing Area  
of the Universal Basalt Aggregates Corporation

A Terrestrial Ecology Monitoring  
Midyear 2023 Report

Homeland Consultancy and Environmental Services

Technical Consultants

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Team Member

Bacungan, Puerto Princesa City  
June 2023



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## Acronyms and Abbreviations

CLUP	Comprehensive Land-use Plan
DBH	Diameter at Breast Height
DENR	Department of Environment and Natural Resources
DP	Decreasing Population
DPWH	Department of Public Works and Highways
ECC	Environmental Compliance Certificate
EEZ	Exclusive Economic Zone
EMP	Environmental Management Plan
EN	Endangered
GDP	Gross Domestic Products
GPS	Global Positioning System
GNP	Gross National Products
IBA	Important Bird Areas
IUCN	International Union for the Conservation of Nature
LC	Less Concern
mAsl	meters Above sea level
NE	Not Evaluated
NGO	Non-Government Organizations
NT	Near Threatened
PPC	Puerto Princesa City
SEC	Securities and Exchange Commission
SP	Stable Population
UBAC	Universal Basalt Aggregates Corporation
UV	Utility Vehicle
VU	Vulnerable



## Executive Summary

Universal Basalt Aggregates Corporation is registered with the Securities and Exchange Commission and is engaged in the manufacturing, trading, import and export of article of concrete, cement, plaster, and other aggregates. It is the Palawan's largest producer of construction aggregates - primarily crushed stone, sand and gravel. The company is envisioned to deliver high quality aggregates and superior construction work performance in the entire province with mission to create long-term benefits for customers, employees, suppliers and impact the community it serves. It currently operates an area in barangay Bacungan for the basalt aggregates extraction with careful and complete environmental compliance; hence, subscribing to the precepts of sustainable development.

This 2023 Mid-year Assessment Report was conducted with the main intent of monitoring the flora and fauna of the Universal Basalt Corporation's mineral processing areas in barangay Bacungan, Puerto Princesa City. This is particularly to identify the flora and fauna species within and adjacent areas of the UBAC quarry project; assess the biodiversity of these areas based on their species and population structural parameters; assess the impacts of basalt aggregates quarry activities and operations to the ecology of the site; determine the conservation status of flora and fauna in the sites; and recommend flora and fauna conservation and protection measures. Permanent sampling sites and transect lines were located on the ground representing various vegetation cover such as forest cover between secondary, brushland, and grassland areas.

The general vegetation cover is described as a grassland with sparsely distributed pioneer species at early stage of succession. Impact of Typhoon Odette that struck Palawan in December 17, 2021 is still evident by the presence of several trees felled in the site. The grassland area with dominating clumps of *S. lumampao* has now recovered from impact brought by typhoon Odette.

The overall flora species identified within the UBAC quarry sites and adjacent areas were eleven (11) trees and thirty (30) understorey plants. All the tree species encountered belong to eleven (11) different families as follows: Anacardiaceae, Apocynaceae, Burseraceae, Euphorbiaceae, Fabaceae, Guttiferae, Lecythidaceae, Moraceae, Rubiaceae, Rutaceae, and Verbenaceae. On the other hand, understorey species were represented by nineteen (19) families to include Anacardiaceae, Araceae, Araliaceae, Arecaceae, Asteraceae, Burseraceae, Ebenaceae, Euphorbiaceae, Fabaceae, Guttiferae, Lecythidaceae, Leeaceae, Malvaceae, Meliaceae, Moraceae, Myrtaceae, Rubiaceae, Ulmaceae, and Verbenaceae.

*Acacia mangium* had the highest importance value of 67.78% followed by *B. pterita*, *M. indica*, *A. scholaris*, *C. asperum*, *M. multiglandulosa*, and *G. benthamii* with values of 51.09%, 29.44%, 23.01%, 22.88%, 22.01%, and 21.65%, respectively. *Artocarpus blancoi*, *C. chinensis*, *V. parviflora*, and *T. stenantha* had the least importance value ranging from 14.23% to 19.29%.

The tree species diversity of the areas assessed were low based on the computed Shannon's diversity index ( $H' = 2.07$ ). The diversity index for understorey vegetation on the other hand was equivalent to  $H' = 2.61$ , which is described as moderately diverse. These results imply that the area had a low tree species composition and number of individuals as they were periodically utilized for

agriculture through kaingin by nearby farming communities, being classified alienable and disposable lands. The moderate diversity index for understorey vegetation indicates an active natural regeneration in the area is taking place. If left untouched, the area can be reverted to its natural state as a forest gradually after series of seral stages in the succession process.

Among the species identified, majority (88%) are non-endemic while only twelve percent (12%) are endemic to the Philippines. Forty-seven percent (47%) are in stable population while only *Vitex parviflora* is categorized under decreasing population (3%). Majority of the species (50%) have unknown population trend. Fifty-three percent (53%) of the flora species are in the least concern category. Further, 41% of the species are yet to be evaluated. Only *Diospyros pilosanthera* and *V. parviflora* were classified as endangered and vulnerable (3%), respectively.

A total of sixteen (16) species of fauna were documented during the survey within and at adjacent areas of quarry sites. Of this total, thirteen (13) are avifauna species such as *Bubulcus coromandus*, *Caprimulgus macrurus*, *Centropus sinensis*, *Corvus enca*, *Kittacincla nigra*, *Aethopyga shelleyi*, *Trichastoma cinereiceps*, *Alophoixus frater*, *Amauromis phoenicurus*, *Orthotomus sericeus*, *Zosterornis hypogrammicus*, *Turnix suscitator*, and *Mixornis gularis*. Two of the fauna species are classified under herpetofauna to include *Eutropis multifasciata* and *Ingerophrynus philippinus*. The *Sundasciurus steerii* was the only mammal observed in the study site.

The overall diversity index for the study site was computed at  $H' = 2.72$  which is moderately diverse based on Fernando's diversity scale. The results of the study imply that the monitoring sites were disturbed environment and majority were grassland dominated by *S. lumampao*. New regenerations in the understorey level are however ready to restore cleared or disturbed areas in the site through natural regeneration. The area serves as sources of Buho by the nearby households both for livelihood and personal uses.

All fauna species recorded during the monitoring at UBAC quarry areas and surrounding habitat were classified as least concern under the International Union for the Conservation of Nature (IUCN) Red list category. Majority or 56% of the fauna species are non-endemic to the country. Forty-four percent (464%) of the remaining species are Philippine endemics. Majority (88%) of these fauna species are in stable while the remaining thirteen percent (13%) have decreasing population trend. All of the species encountered are under least concerned conservation status.

Recommendations to improve the environmental conditions in the site include: improvement of impounding dam by increasing its area size to contain bigger volume of runoff; plant indigenous fruits and forest trees along banks of impounding dam and available parts of the area which will not be devoted for quarry; adopt a planting design which is a mixture of various indigenous/endemic fruits and forest trees; conduct brushing and other care and maintenance activities regularly on planted areas; in the establishment and maintenance of agroforestry or reforestation areas to rehabilitate denuded forests, consider other fruit trees to be planted in addition to recommended indigenous fruit-bearing species; and continued massive awareness through Information, Education and Communication (IEC) campaign regarding biodiversity protection.

# I. Introduction

## A. Rationale

Spatial development in the province of Palawan is anchored on the framework called the Environmentally Critical Areas Network (ECAN), the main strategy of the Strategic Environmental Plan (SEP) under Republic Act 7611 that was made into law in 1992. This aims to attain sustainable development in the province that complements both economic development and natural resource conservation, where development activities support environmental protection.

An environmental protection and enhancement research and development program has been developed as a collaborative undertaking between the Homeland Consultancy Services and the Universal Basalt Aggregates Corporation. It is a research-based endeavor with the goal of characterizing the biological and physical environment, their periodic assessment and monitoring, and the development of management measures to maintain ecological balance to attain sustainability.

This document contains first part (January to June) of the semi-annual report for year 2023 re: the flora and fauna assessment within and adjacent to the Mineral Processing Area of the Universal Basalt Aggregates Corporation in barangay Bacungan, Puerto Princesa City.

## B. Objectives

The main intent of this assessment is to monitor the flora and fauna of the Universal Basalt Corporation's mineral processing areas in barangay Bacungan, Puerto Princesa City.

Specifically, it attempted to:

1. Identify the flora and fauna species within and adjacent areas of the UBAC quarry project;
2. Assess the biodiversity of these areas based on their species and population structural parameters;
3. Assess the impacts of basalt aggregates quarry activities and operations to the ecology of the site;
4. Determine the conservation status of flora and fauna in the sites; and
5. Recommend flora and fauna conservation and protection measures.

## II. Methodology

### A. Brief Background of the Mineral Processing Area of the UBAC

Universal Basalt Aggregates Corporation is registered with the Securities and Exchange Commission and is engaged in the manufacturing, trading, import and export of article of concrete, cement, plaster, and other aggregates. The Company is one of Palawan's largest producer of construction aggregates - primarily crushed stone, sand and gravel. The company's vision is to deliver high quality aggregates and superior construction work performance in the entire province of PALAWAN with mission to create long-term benefits for customers, employees, suppliers and impact the community we serve.

The Company started in 2011. In the absence of good quality aggregates in Palawan, the company desired to satisfy the demand of the market in terms of quality and volume to capture the booming infrastructure in Puerto Princesa City and Palawan. It started to invest in several equipment, surplus dump trucks and constructed a crushing plant in Municipality of Aborlan, Palawan. The market boomed and the demand for aggregates in the infrastructure industry are met little by little.

By 2013, the Company decided to move the crushing plant in Montible as it is closer to the City where the bulk of demands are located. This enabled the company's operations to be more efficient, saving fuel cost and having a better quality of aggregates in Montible Area, and effective. With the continuous demand and booming of infrastructure industry in the Province, having 17 quarry permits is not enough to provide and cope up with the large demand. The Company considered to go into mountain quarry. It hired a geologist to scout the province and locate the area of large deposits of BASALT - high class A aggregates.

In 2015, the research led the company to barangay Bacungan area, which according to the geologist, has large deposits of basalt. With this, the Company started acquiring property to ensure the resources of aggregates for more than 30 years. During this time, UBAC was formed to seize the opportunity to bid in government infrastructure projects as sub-contractors with triple A contractors from DPWH District 1 to 3.

Currently, the company continues to negotiate for government infrastructure projects of more than PhP 300,000,000.00. The Company is also on its final stage of securing government permits for the Mountain Quarry in Barangay Bacungan, Puerto Princesa City, Palawan where a European Brand Crushing Plant will be constructed. The Company assures to meet the gap of supply and demand in the province and to elude from the importation of aggregates from other provinces.

The project site is accessible from Manila to Puerto Princesa City through a more or less one (1) hour flight by a commercial airplane or a twenty-eight (28) hour-ride through a commercial boat. From Puerto Princesa City proper, the area can be reached at about thirty (30) minutes land travel via private vehicle (UV) to the North. Figure 1 shows the location of the project site in barangay Bacungan, Puerto Princesa City.

## **B. Assessment of Floral Components**

### **1. Permanent Sampling Sites**

Permanent sampling sites were located on the ground with the purpose of assessing or monitoring the flora components of the different forest and other vegetated ecosystems within and adjacent to the UBAC quarry sites (Figure 2). Three (3) sampling sites representing various vegetation cover such as forest cover between secondary, brushland, and grassland areas were identified, mapped, and marked on the ground.

### **2. Permanent Transect Lines and Sampling Plot**

Three (3) permanent transect lines were established within and adjacent to the quarry sites (Figure 2). For each sampling site, a transect line was established with a width of 10 meters and a length equivalent to that of the length of the quarry area. Contiguous plots of 10 m x 20 m in size were laid within each transect.

#### **a. Data Gathered**

Characterization of the sites within the UBAC mineral processing area were done along the established transect lines. The species composition under each 10 m x 20 m plot were identified, classified, and recorded. Trees with 5 cm diameter at breast height (DBH) and above were measured, identified, and recorded.

A subplot of 1 x 1 m size randomly located was established per plot. All plants with DBH below 5 cm were identified and counted inside subplots.

Coordinates of several location points along transect were recorded through the Global Positioning System (GPS). Data gathered were translated in the map through Geographic Information System software. The coordinates of the 3 sampling sites and established plots were shown in Table 1.

Table 1. Coordinates of three (3) transect lines and plots at UBAC quarry sites.

<b>Transect</b>	<b>Plot</b>	<b>Northing</b>	<b>Easting</b>
1	1	683985	1096040
	2	683935	1096048
	3	683885	1096055
	4	683835	1096064
	5	683785	1096071
	6	683735	1096079
	7	683685	1096086
2	1	683324	1095998
	2	683374	1095987
	3	683424	1095976
	4	683474	1095965
	5	683524	1095953
	6	683574	1095932
	7	683624	1095926
	8	683674	1095925
3	1	683841	1095629
	2	683791	1095638
	3	683741	1095647
	4	683691	1095656
	5	683641	1095666
	6	683591	1095675
	7	683541	1095684
	8	683491	1095693
	9	683441	1095703
	10	683391	1095712
	11	683341	1095722



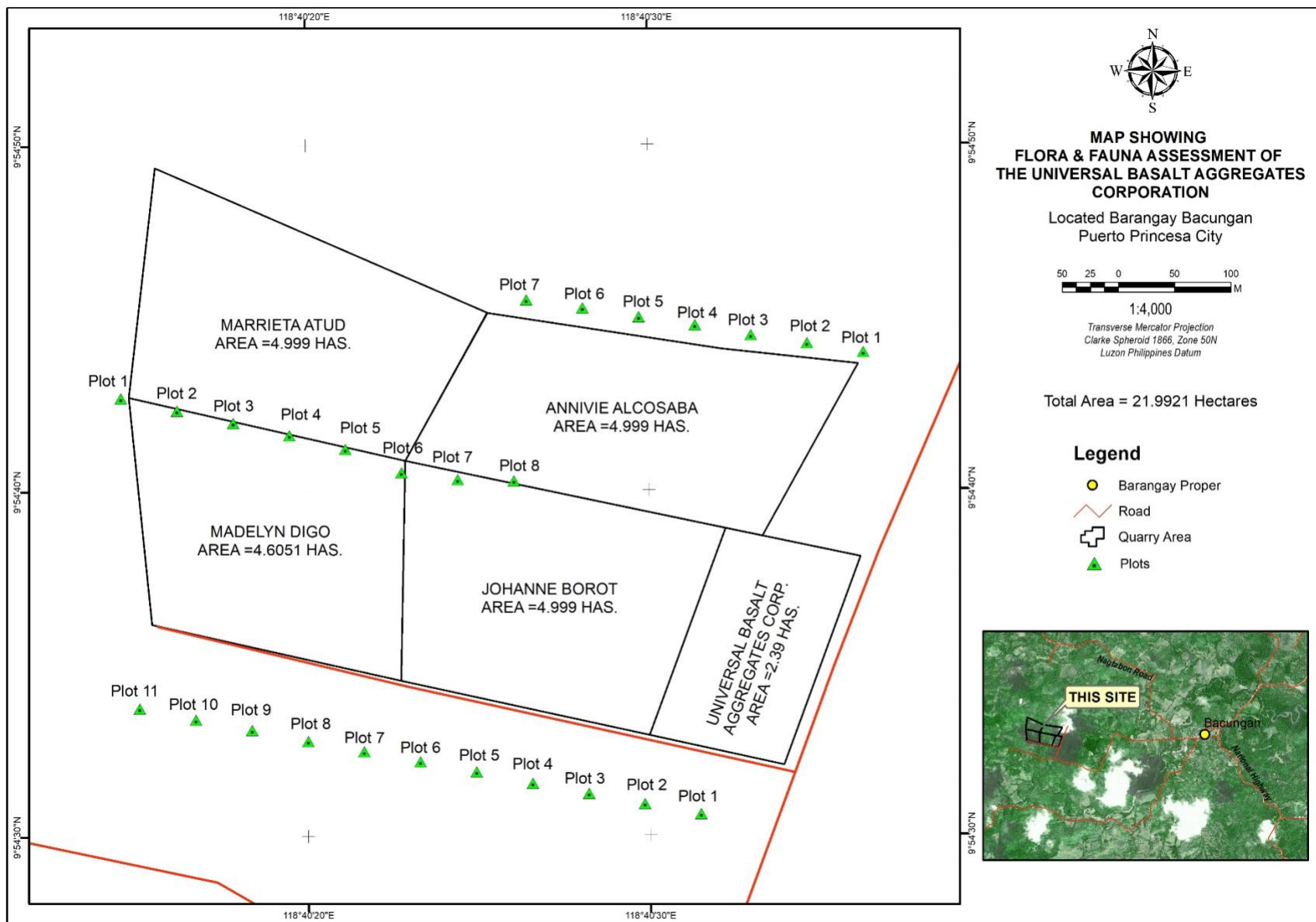


Figure 1. Location map of the UBAC project site in Bacungan, Puerto Princesa City.

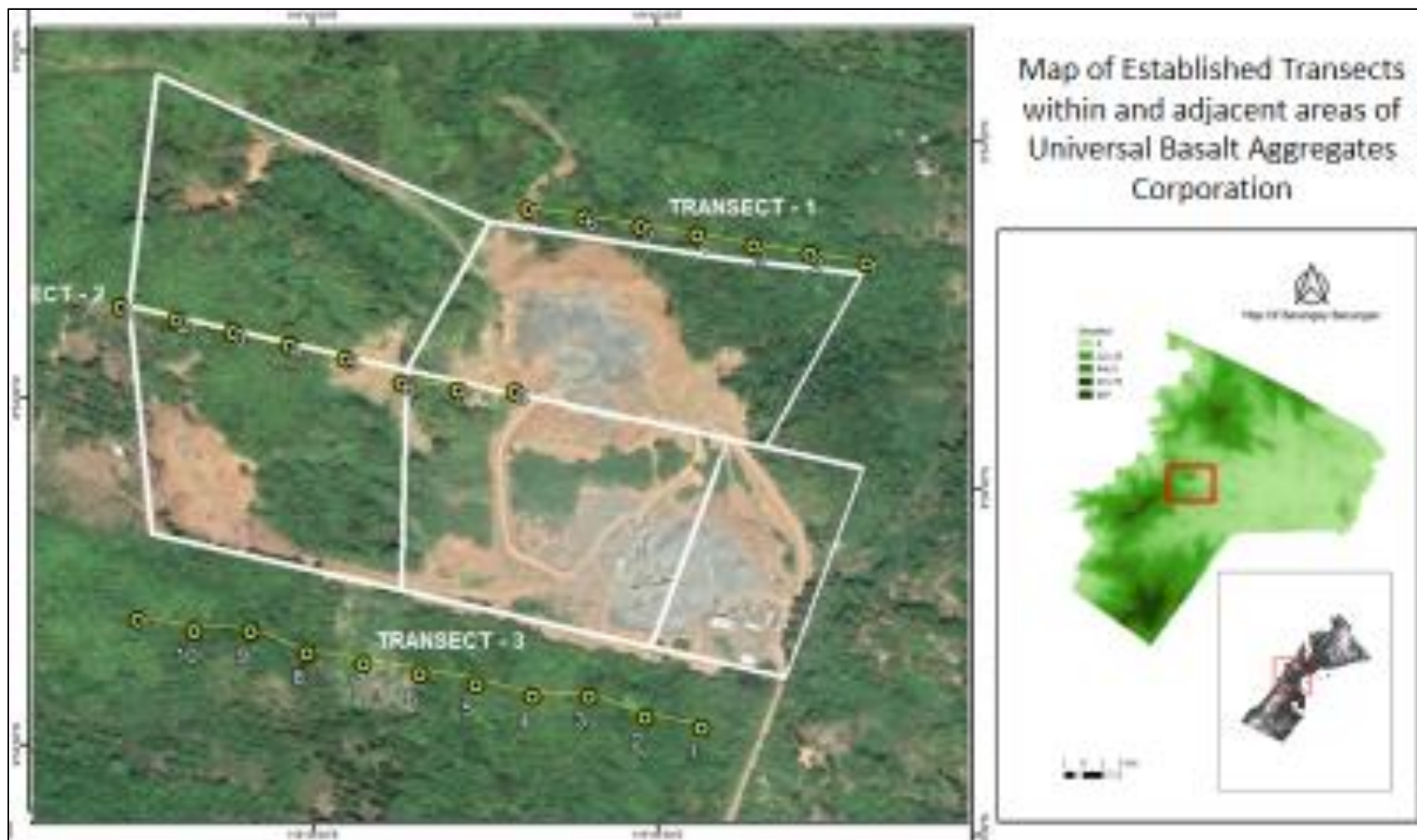


Figure 2. Map of the established transects for flora assessment at the UBAC quarry sites in Bacungan, Puerto Princesa City.

## b. Data Analysis

The flora species were identified and classified according to their species, genus, and families. The vegetational structure of the study sites were analyzed with the application of generally accepted standard indicators to include species composition and population count, species richness, density, frequency, dominance, abundance, importance value, diversity indices, impacts of basalt aggregates quarry operations and conservation status.

Importance value and species diversity index were determined based on the following equations:

### b.1 Relative Dominance

Relative dominance is the number of individuals per area as a percent of the number of individuals of all species (Equation 1).

$$\text{Relative Dominance} = \frac{a}{\sum BA} \times 100 \quad \text{Equation 1}$$

Where:  $a$  - Basal area of a species  
 $\sum BA$  - Summation of basal area of all species within a community

### b.2 Relative Frequency

Relative frequency is the percent of inventory points occupied by species A as a percent of the occurrence of all species (Equation 2).

$$\text{Relative Frequency} = \frac{NP}{TP} \times 100 \quad \text{Equation 2}$$

Where:  $NP$  - Number of plots that a species was observed  
 $TP$  - Total number of sample plots

### b.3 Relative density

Relative density is the total number of individuals of a species as a percent of the total individuals of all species (Equation 3).

$$\text{Relative Density} = D \times 100 \quad \text{Equation 3}$$

---


$$\sum DS$$

Where: D - Number of individuals of a species  
 - Total individuals of all species

#### b.4 Importance Value

Importance value is a measure of how dominant a species is in a given community. The importance value is the sum of these three measures, and can range from 0 to 300. A high importance value indicates that Species A is well represented in the stand because of some combination of a) a large number of individuals of Species A compared with other species in the stand, or b) a smaller number of individuals of Species A, but the trees are large compared with others in the stand.

$$\text{Importance Value} = RDo + RF + RDe \quad \text{Equation 4}$$

Where: RDo - Relative dominance  
 RF - Relative frequency  
 RDe - Relative density

#### b.5 Diversity Index

Diversity index (Equation 5) also known as phylogenetic indices or phylogenetic metrics is a quantitative measure that reflects how many different types of species there are in a community and that can simultaneously take into account the phylogenetic relations of the individuals distributed among those types, such as richness, divergence or evenness. The Shannon's diversity index was applied in this assessment as shown in the below equation (Equation 5).

$$H' = - \sum_{i=1}^S (P_i * \ln P_i) \quad \text{Equation 5}$$

Where: H' = the Shannon diversity index  
 P<sub>i</sub> = fraction of the entire population made up of species i  
 S = number of species encountered  
 $\sum$  = sum from species 1 to species S

The estimated Shannon's diversity indices were rated based on the Fernando diversity scale as shown in Table 2.

Table 2. Fernando diversity scale.

Shannon's Diversity Index (H')	Rating
1.0-1.99	Very low
2.0 - 2.49	Low
2.5-2.99	Moderate
3.0 - 3.49	High
> 3.5	Very high

## **b.6 Conservation Status**

The conservation status of flora found in the sites were determined based on the International Union for the Conservation of Nature (IUCN) red list and the Department Administrative Order 2017-11 or the updated national list of threatened plants and their categories.

## **C. Assessment of Faunal Components**

### **1. Population Survey and Density Estimates**

The assessment of faunal component within and adjacent habitat types including the early stage of regeneration, brushland and grassland of UBAC Mineral processing sites was conducted to determine the faunal wildlife structure. The study also aimed to determine the impacts of quarrying activities on fauna at the various forest ecosystems adjacent to the area of operations.

Following the 3 transects established for flora, fauna species were observed along the strip with wider width of 50 meters. All stations including the starting point of the transect line were marked by ribbons in every 50 meters interval, equivalent to the center of plots established for flora. The stations were marked using Global Positioning System (GPS) as permanent reference of the location for fauna sampling sites and location in maps (Table 1). Each transect was surveyed by 2 persons equipped with binoculars, GPS, steel tape, field guides, field notes, and other materials for the assessment.

Beginning at 0600 hour to 1000 hour and 1500 hour to 1800h in a fair day, avifauna were observed through transect walk and point count methods (Buckland et al, 2001: Mallari et al., 2011) (Lee & Marsden, 2008: Mallari et al., 2011). The birds were recorded based on direct observation, bird-calls (vocalization) and traces. The final species identification and classification were referred to field guides and literatures.

For mammals, the survey was conducted from 0800 hour to 2000 hour. The capture technique using live traps and direct observation were used during the survey. Number of individuals observed and activities (e.g., resting, foraging) within transect were recorded, including the signs (e.g., tracks,

marks, and droppings) as indicators of animal presence in the area. Informal ethno survey or community interviews were also conducted to determine the past and present observation on wildlife in the study sites.

The herpetofauna species were observed through a more purposive search beyond the standardized method due to their highly cryptic and difficulty of searching them. The survey was conducted from 0600 hour to 2200 hour. The direct observation and the opportunistic search methods were conducted within the established transects.

Fine mist nets were installed for proper documentation of birds and bats species present in the sampling sites. Collection of samples for mammals and herpetofauna using live traps were also done for proper documentation. The faunal species recorded were properly identified, classified and documented. The captured species were immediately released after the identification and photo documentation. Proper handling of species were practiced during the process and captured species were immediately released after the identification and photo documentation. No specimen collection done because it is not necessary in the study.

The Shannon Diversity Index (H) was used to calculate population density, abundance and richness of the species. This is an information statistic index, which means through assumptions based on the input information that all species are represented in a sample and that they are randomly sampled. Further, this is the mathematical measure of species diversity in a given community of fauna in the sampling sites. This provides more information about the community composition than simply species richness that also take the relative abundances of different species into account.

In the Shannon's diversity index, the p is the proportion (n/N) of individuals of one particular species found (n) divided by the total number of individuals found (N), ln is the natural log,  $\Sigma$  is the sum of the calculations, and s is the number of species.

$$H' = -\sum_{i=1}^s (p_i \cdot \ln p_i)$$

Where:

H	-	Shannon Diversity index
p <sub>i</sub>	-	proportion of individuals
ln	-	Natural Lag
$\Sigma$	-	Sum of the calculation
s	-	number of species present in the sampling sites

The estimated Shannon's diversity indices for fauna species identified were rated based on the Fernando diversity scale (Table 2).

## **2. Fauna Species Endemicity and Conservation Status**

The endemicity, conservation status and population status of the fauna species were determined based on the Department of Environment and Natural Resources (DENR) Department Administrative Order 2017-11 and the International Union for the Conservation of Nature (IUCN) Red List category. The endemicity was computed by its percentage against the Non-endemic.

## **3. Environment Management and Conservation**

Recording the conservation status of plants based on assessment by the IUCN, leads to identification in the IUCN Red List of those species that require high priority in conservation efforts (Siti et al. 2017). The result of the assessment provides recommendations to help achieve the goals of conserving and protecting biodiversity of terrestrial ecology within and adjacent areas of UBAC Mineral Processing.

The study report can be used for future planning of the company as part of their comprehensive Environmental Management Plan (EMP) and in compliance with the conditions set forth in the Environmental Compliance Certificate (ECC) issued by Department of Environment and Natural Resources (DENR).



### III. Results and Discussion

#### A. Vegetation Structure

##### 1. General cover description of sites along transects

The general vegetation cover is described as a grassland with sparsely distributed pioneer species at early stage of succession. Transect 1 is covered by residual exotic tree species such as Mahogany (*Swietenia macrophylla*) and *Acacia mangium* including pioneer tree species at early succession stage. The rest of the area at transect 1 is dominated by Buho (*Schizostachyum lumampao*). Majority of Transect 2 is covered by *S. lumampao* while the remaining part located on the eastern side is still an active quarry site. Transect 3 on the other hand is a former kaingin area which is undergoing natural regeneration. The details of description per plot for each transect were shown in Table 3 while a general view of the quarry sites at four cardinal directions including adjacent areas were shown in Figure 3.

Table 3. General description of ground cover of sampling plots and transects.

Transect	Plot	General description
1	1	Early stage of regeneration
	2	Early stage of regeneration
	3	Early stage of regeneration with Buho
	4	Early stage of regeneration with Buho
	5	Grassland dominated by Buho
	6	Grassland dominated by Buho
	7	Grassland dominated by Buho
2	1	Grassland dominated by Buho
	2	Grassland dominated by Buho
	3	Grassland dominated by Buho
	4	Grassland dominated by Buho
	5	Open area (creek)
	6	Open area (creek)
	7	Active Quarry Site
	8	Active Quarry Site
3	1	Grassland dominated by Buho
	2	Early Second Growth
	3	Grassland dominated by Buho (Creek)
	4	Grassland dominated by Buho
	5	Grassland dominated by Buho
	6	Old kaingin in fallow period
	7	Old kaingin in fallow period
	8	Creek with dominating vegetation of Buho impaired by typhoon
	9	Early second Growth vegetation
	10	Emergence of young regeneration
	11	Emergence of young regeneration



**North Side**



**East Side**



**West Side**



**South Side**

Figure 3. General view of quarry sites and adjacent areas.

## 2. Species Composition

### a. Tree species

Eleven (11) tree species were encountered within the three (3) transects with a total of 23 individuals as shown in Table 4. A three (3) new species not covered in the previous assessment reports were captured at Transect 2 as a result of a few meters adjustment of the transect location. These three (3) new species include Dita (*Alstonia scholaris*), Antipolo (*Artocarpus blancoi*), and Citrus (*Citrus chinensis*). Six (6) tree species were encountered at Transect 3, namely Mango (*Mangifera indica*), Pagsahingin (*Canarium asperum*), Alim (*Melanolepis multiglandulosa*), Mangium (*Acacia mangium*), Basa (*Tarenna stenantha*), and Mulawin (*Vitex parviflora*). At Transect 1, only two (2) tree species were encountered, namely Bunog (*Garcinia benthamii*) and Balitantan (*Barringtonia pterita*).

*Acacia mangium* was the most dominant among the trees encountered with seven (7) individuals (35%). This was followed by *Barringtonia pterita* with five (5) individuals (25%). *Canarium asperum* and *Melanolepis multiglandulosa* had two (2) individuals each (10%) while the remaining four (4) species to include *Garcinia benthamii*, *Mangifera indica*, *Tarenna stenantha*, and *Vitex parviflora* had one (1) individual each. The rest of the species such as *M. indica*, *A. scholaris*, *A. blancoi*, *T. stenantha*, *C. chinensis*, and *V. parviflora* had one (1) individual each.

Table 4. Tree species encountered within transects.

No.	Family Name	Scientific Name	Common Name	Distribution (No. of Individuals)		
				T1	T2	T3
1	Anacardiaceae	<i>Mangifera indica</i>	Mango	-	-	1
2	Apocynaceae	<i>Alstonia scholaris</i>	Dita	-	1	-
3	Burseraceae	<i>Canarium asperum</i>	Pagsahingin	-	-	2
4	Euphorbiaceae	<i>Melanolepis multiglandulosa</i>	Alim	-	-	2
5	Fabaceae	<i>Acacia mangium</i>	Mangium	-	-	7
6	Guttiferae	<i>Garcinia benthamii</i>	Bunog	1	-	-
7	Lecythidaceae	<i>Barringtonia pterita</i>	Balitantan	5	-	-
8	Moraceae	<i>Artocarpus blancoi</i>	Antipolo	-	1	-
9	Rubiaceae	<i>Tarenna stenantha</i>	Basa	-	-	1
10	Rutaceae	<i>Citrus chinensis</i>	Citrus	-	1	-
11	Verbenaceae	<i>Vitex parviflora</i>	Mulawin	-	-	1
<b>Subtotal</b>				<b>6</b>	<b>3</b>	<b>14</b>
<b>Total</b>				<b>23</b>		

### b. Tree diameter and basal area

Majority (75%) of the diameter sizes of trees encountered are small sizes that ranged from 6.4 to 20.5 cm. DBH as shown in Table 5. This was followed by a DBH class of 28.4 to 43.4 cm, comprising twenty percent (20%) of the total number of trees recorded. The *M. indica* was the only tree with the biggest diameter (5%) at 81.1cm DBH in the site. The existence of this tree including that of the *G. benthamii* imply their importance as food source which make the area a feeding ground for several fauna species roaming the place including humans especially those living nearby.

The trees encountered along transects had a total basal area of 1,520.22 cm<sup>2</sup>. Among the tree species, *A. mangium* had the highest (29.01%) at 441.08 cm<sup>2</sup> which was attributed to its number of individuals and diameter sizes. This was followed by *M. indica*, *A. scholaris*, *G. benthamii*, and *A. blancoi* with 254.78 cm<sup>2</sup> (16.76%), 157.08 cm<sup>2</sup> (10.33%), 136.35 cm<sup>2</sup> (8.97%), and 100.53 cm<sup>2</sup> (6.61%); respectively. The rest of the trees had estimated basal area ranging from 23.56 cm<sup>2</sup> (1.55%) to 89.54 cm<sup>2</sup> (10.13%).

Table 5. Diameter and basal area of trees.

No.	Family Name	Scientific Name	DBH (cm)	Basal Area (cm <sup>2</sup> )	Percentage (%)
Transect 1					
1	Lecythidaceae	<i>Barringtonia pterita</i>	14.5	45.55	3.00
2	Lecythidaceae	<i>Barringtonia pterita</i>	7.6	23.88	1.57
3	Lecythidaceae	<i>Barringtonia pterita</i>	6.4	20.11	1.32
4	Lecythidaceae	<i>Barringtonia pterita</i>	20.5	64.40	4.24
5	Guttiferae	<i>Garcinia benthamii</i>	43.4	136.35	8.97
6	Lecythidaceae	<i>Barringtonia pterita</i>	12.4	38.96	2.56
7	Rutaceae	<i>Citrus chinensis</i>	8	25.13	1.65
Transect 2					
8	Moraceae	<i>Artocarpus blancoi</i>	32	100.53	6.61
9	Apocynaceae	<i>Alstonia scholaris</i>	50	157.08	10.33
Transect 3					
7	Anacardiaceae	<i>Mangifera indica</i>	81.1	254.78	16.76
8	Burseraceae	<i>Canarium asperum</i>	17.8	55.92	3.68
9	Burseraceae	<i>Canarium asperum</i>	10.5	32.99	2.17
10	Euphorbiaceae	<i>Melanolepis multiglandulosa</i>	11.5	36.13	2.38
11	Euphorbiaceae	<i>Melanolepis multiglandulosa</i>	12.6	39.58	2.60
12	Fabaceae	<i>Acacia mangium</i>	8.5	26.70	1.76
13	Rubiaceae	<i>Tarenna stenantha</i>	7.5	23.56	1.55
14	Fabaceae	<i>Acacia mangium</i>	8.6	27.02	1.78
15	Fabaceae	<i>Acacia mangium</i>	35.4	111.21	7.32
16	Fabaceae	<i>Acacia mangium</i>	28.4	89.22	5.87
17	Fabaceae	<i>Acacia mangium</i>	33.5	105.24	6.92
18	Fabaceae	<i>Acacia mangium</i>	17.4	54.66	3.60
19	Fabaceae	<i>Acacia mangium</i>	8.6	27.02	1.78
20	Verbenaceae	<i>Vitex parviflora</i>	7.7	24.19	1.59
Total				1,520.22	100.00

### c. Understory vegetation

The understory vegetation are those trees with DBH of less than 5 cm including shrubs, herbs and other ground cover plants. Table 6 shows the different understory vegetation observed within the areas assessed. Of the thirty (30) identified understory species of plants in the quarry sites and their adjacent areas, six (6) of them belong to the family Moraceae such as *Ficus septica*, *Ficus fiskei*, *Ficus nota*, *Artocarpus blancoi*, *Ficus variegata*, and *Streblus asper*. This was followed by family Euphorbiaceae with three (3) species such as *B. rhamnoides*, *M. multiglandulosa*, and *M. tanarius*. Plant families that had two (2) species each include Anacardiaceae, Asteraceae,

Ebenaceae, and Lecythidaceae. The rest of the remaining families had one (1) species each to include Araceae, Araliaceae, Arecaceae, Burseraceae, Fabaceae, Guttiferae, Leeaceae, Malvaceae, Meliaceae, Myrtaceae, Rubiaceae, Ulmaceae, and Verbenaceae. Most of these encountered plants are pioneer species which thrive after cultivation while leaving the soil at rest for certain period (fallow) or for next season of planting. These results indicate that the areas are usually cleared for agricultural purposes as indicated by their sizes and species types.

On a per transect distribution of understorey plants as shown in Table 7, Transect 2 had the highest number of individuals (71 or 37%) distributed to fourteen (14) plant species such as *A. macrorrhios*, *P. nodosa*, *C. odorata*, *B. balsamifera*, *C. asperum*, *B. rhamnoides*, *G. sepium*, *B. pterita*, *S. macrophylla*, *F. fiskei*, *S. asper*, *A. blancoi*, *F. variegata*, and *M. citrifolia*. This was followed by Transect 3 with 66 individuals (35%) with seventeen (17) species to include *M. indica*, *B. arborescens*, *C. rumphiana*, *C. odorata*, *C. asperum*, *D. pyrrhocarpa*, *D. pilosanthera*, *M. multiglandulosa*, *M. tanarius*, *G. sepium*, *B. pterita*, *B. acutangula*, *L. congesta*, *F. septica*, *S. asper*, *T. decorticala*, and *T. orientalis* Blume. Transect 1 on the other hand had a total of fifty-three (53) individuals distributed to eleven (11) species. Plant species recorded within the transect include *Polyscias nodosa*, *Canarium asperum*, *Garcinia benthamii*, *Barringtonia acutangula*, *Barringtonia pterita*, *Kleinhovia hospita*, *Ficus septica*, *Ficus fiskei*, *Ficus nota*, *Streblus asper*, and *Vitex parviflora*.

Table 6. Understorey vegetation within the UBAC quarry sites and adjacent areas.

No.	Family Name	Scientific Name	Common Name
1	Anacardiaceae	<i>Mangifera indica</i>	Mango
2	Anacardiaceae	<i>Buchanania arborescens</i>	Balinghasai
3	Araceae	<i>Alocasia macrorrhios</i>	Badyang
4	Araliaceae	<i>Polyscias nodosa</i>	Malapapaya
5	Arecaceae	<i>Caryota rumphiana</i>	Takipan
6	Asteraceae	<i>Chromolaena odorata</i>	Hagonoy
7	Asteraceae	<i>Blumea balsamifera</i>	Sambong
8	Burseraceae	<i>Canarium asperum</i>	Pagsahingin
9	Ebenaceae	<i>Diospyros pyrrhocarpa</i>	Anang
10	Ebenaceae	<i>Diospyros pilosanthera</i>	Bolong eta
11	Euphorbiaceae	<i>Breynia rhamnoides</i>	Matanghipon
12	Euphorbiaceae	<i>Melanolepis multiglandulosa</i>	Alim
13	Euphorbiaceae	<i>Macaranga tanarius</i>	Binunga
14	Fabaceae	<i>Glyrecidia sepium</i>	Kakauate
15	Guttiferae	<i>Garcinia benthamii</i>	Bunog
16	Lecythidaceae	<i>Barringtonia pterita</i>	Balitanan
17	Lecythidaceae	<i>Barringtonia acutangula</i>	Putat
18	Leeaceae	<i>Leea congesta</i>	Lee asp.
19	Malvaceae	<i>Kleinhovia hospita</i>	Tanag
20	Meliaceae	<i>Swietenia macrophylla</i>	Mahogany
21	Moraceae	<i>Ficus septica</i>	Hawili
22	Moraceae	<i>Ficus fiskei</i>	Is-is
23	Moraceae	<i>Streblus asper</i>	Kalios
24	Moraceae	<i>Ficus nota</i>	Tibig
25	Moraceae	<i>Artocarpus blancoi</i>	Antipolo
26	Moraceae	<i>Ficus variegata</i>	Tangisang bayawak



27	Myrtaceae	<i>Tristania decorticala</i>	Malabayabas
28	Rubiaceae	<i>Morinda citrifolia</i>	Bangkoro
29	Ulmaceae	<i>Trema orientalis</i> Blume	Anabiong
30	Verbenaceae	<i>Vitex parviflora</i>	Mulawin

Table 7. Understorey vegetation distribution at UBAC quarry and adjacent sites.

No.	Scientific Name	Distribution			No. of Indiv.
		T1	T2	T3	
1	<i>Mangifera indica</i>			4	4
2	<i>Buchanania arborescens</i>			1	1
3	<i>Alocasia macrorrhizos</i>		8		8
4	<i>Polyscias nodosa</i>	2	3		5
5	<i>Caryota rumphiana</i>			5	5
6	<i>Chromolaena odorata</i>		12	7	19
7	<i>Blumea balsamifera</i>		5		5
8	<i>Canarium asperum</i>	6	5	3	14
9	<i>Diospyros pyrrhocarpa</i>			1	1
10	<i>Diospyros pilosanthera</i>			3	3
11	<i>Breynia rhamnoides</i>		1		1
12	<i>Melanolepis multiglandulosa</i>			3	3
13	<i>Macaranga tanarius</i>			3	3
14	<i>Glyrecidia sepium</i>		1	1	2
15	<i>Garcinia benthamii</i>	1			1
16	<i>Barringtonia pterita</i>	13	8	4	25
17	<i>Barringtonia acutangula</i>	9		3	12
18	<i>Leea congesta</i>			2	2
19	<i>Kleinhovia hospita</i>	5			5
20	<i>Swietenia macrophylla</i>		3		3
21	<i>Ficus septica</i>	7		14	21
22	<i>Ficus fiskei</i>	3	6		9
23	<i>Streblus asper</i>	3	6	9	18
24	<i>Ficus nota</i>	2			2
25	<i>Artocarpus blancoi</i>		1		1
26	<i>Ficus variegata</i>		1		1
27	<i>Tristania decorticala</i>			1	1
28	<i>Morinda citrifolia</i>		11		11
29	<i>Trema orientalis</i> Blume			2	2
30	<i>Vitex parviflora</i>	2			2
<b>Total</b>		<b>53</b>	<b>71</b>	<b>66</b>	<b>190</b>

#### d. Overall species composition

The overall flora species identified within the UBAC quarry sites and adjacent areas were eleven (11) trees and thirty (30) understorey plants. All the tree species encountered belong to eleven (11) different families as follows Anacardiaceae, Apocynaceae, Burseraceae, Euphorbiaceae, Fabaceae, Guttiferae, Lecythidaceae, Moraceae, Rubiaceae, Rutaceae, and Verbenaceae. On the other hand, understorey species were represented by nineteen (19) families to include Anacardiaceae, Araceae, Araliaceae, Arecaceae, Asteraceae, Burseraceae, Ebenaceae, Euphorbiaceae, Fabaceae, Guttiferae, Lecythidaceae, Leeaceae, Malvaceae, Meliaceae, Moraceae, Myrtaceae, Rubiaceae, Ulmaceae, and Verbenaceae. The summary of trees and understorey species at UBAC quarry sites and adjacent areas is shown in Table 8. Figure 4 shows some of the understorey species encountered along transects.

Table 8. Summary of trees and understorey plant species at UBAC quarry sites and adjacent areas.

No.	Family Name	Scientific Name	Common Name
Trees			
1	Anacardiaceae	<i>Mangifera indica</i>	Mango
2	Apocynaceae	<i>Alstonia scholaris</i>	Dita
3	Burseraceae	<i>Canarium asperum</i>	Pagsahingin
4	Euphorbiaceae	<i>Melanolepis multiglandulosa</i>	Alim
5	Fabaceae	<i>Acacia mangium</i>	Mangium
6	Guttiferae	<i>Garcinia benthamii</i>	Bunog
7	Lecythidaceae	<i>Barringtonia pterita</i>	Balitantan
8	Moraceae	<i>Artocarpus blancoi</i>	Antipolo
9	Rubiaceae	<i>Tarenna stenantha</i>	Basa
10	Rutaceae	<i>Citrus chinensis</i>	Citrus
11	Verbenaceae	<i>Vitex parviflora</i>	Mulawin
Understorey			
1	Anacardiaceae	<i>Mangifera indica</i>	Mango
2	Anacardiaceae	<i>Buchanania arborescens</i>	Balinghasai
3	Araceae	<i>Alocasia macrorrhizos</i>	Badyang
4	Araliaceae	<i>Polyscias nodosa</i>	Malapapaya
5	Arecaceae	<i>Caryota rumphiana</i>	Takipan
6	Asteraceae	<i>Chromolaena odorata</i>	Hagonoy
7	Asteraceae	<i>Blumea balsamifera</i>	Sambong
8	Burseraceae	<i>Canarium asperum</i>	Pagsahingin
9	Ebenaceae	<i>Diospyros pyrrhocarpa</i>	Anang
10	Ebenaceae	<i>Diospyros pilosanthera</i>	Bolong eta
11	Euphorbiaceae	<i>Breynia rhamnoides</i>	Matanghipon
12	Euphorbiaceae	<i>Melanolepis multiglandulosa</i>	Alim
13	Euphorbiaceae	<i>Macaranga tanarius</i>	Binunga
14	Fabaceae	<i>Glyrecidia sepium</i>	Kakauate
15	Guttiferae	<i>Garcinia benthamii</i>	Bunog
16	Lecythidaceae	<i>Barringtonia pterita</i>	Balitantan
17	Lecythidaceae	<i>Barringtonia acutangula</i>	Putat
18	Leeaceae	<i>Leea congesta</i>	Lee asp.
19	Malvaceae	<i>Kleinhovia hospita</i>	Tanag

20	Meliaceae	<i>Swietenia macrophylla</i>	Mahogany
21	Moraceae	<i>Ficus septica</i>	Hawili
22	Moraceae	<i>Ficus fiskei</i>	Is-is
23	Moraceae	<i>Streblus asper</i>	Kalios
24	Moraceae	<i>Ficus nota</i>	Tibig
25	Moraceae	<i>Artocarpus blancoi</i>	Antipolo
26	Moraceae	<i>Ficus variegata</i>	Tangisang bayawak
27	Myrtaceae	<i>Tristania decorticala</i>	Malabayabas
28	Rubiaceae	<i>Morinda citrifolia</i>	Bangkoro
29	Ulmaceae	<i>Trema orientalis Blume</i>	Anabiong
30	Verbenaceae	<i>Vitex parviflora</i>	Mulawin

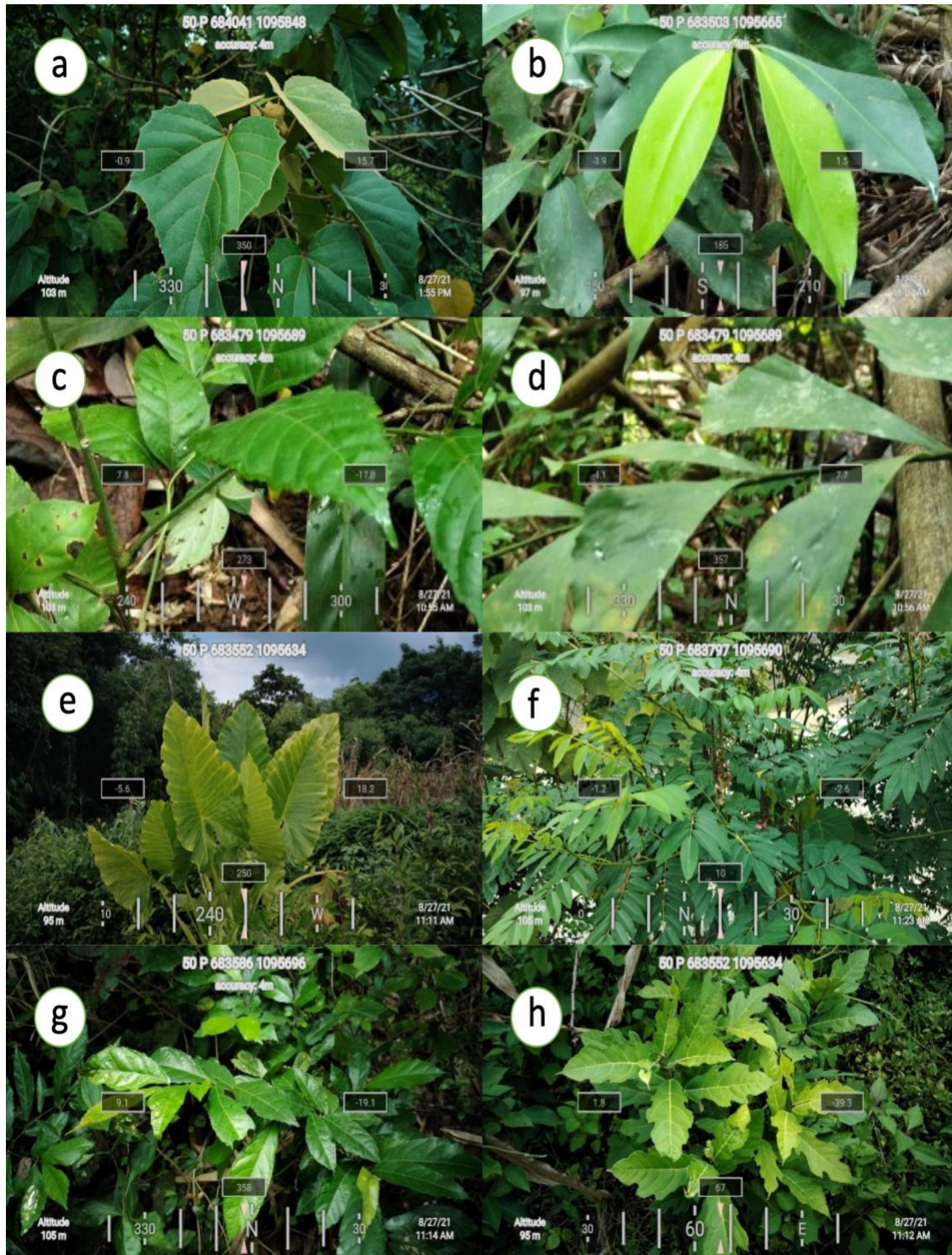


Figure 4. The documented flora species in sampling sites. a.) *Melanolepis multiglandulosa*, b.) *Garcinia benthamii*, c.) *Leea congesta*, d.) *Caryota rumphiana*, e.) *Alocasia macrorrhizos*, f.) *Gliricidia sepium*, g.) *Streblus asper* and h.) *Ficus fiskei*.



### 3. Importance Value

The importance value was computed based from the estimated relative dominance, relative density, and relative frequency for the documented tree species within and adjacent to the UBAC quarry areas. Results revealed that *A. mangium* had the highest importance value of 67.78% as shown in Figure 5, with relative dominance, density, and frequency of 29.01%, 30.43%, and 8.33%; respectively. This was followed by *B. pterita*, *M. indica*, *A. scholaris*, *C. asperum*, *M. multiglandulosa*, and *G. benthamii* with values of 51.09%, 29.44%, 23.01%, 22.88%, 22.01%, and 21.65%, respectively. *Artocarpus blancoi*, *C. chinensis*, *V. parviflora*, and *T. stenantha* had the least importance value ranging from 14.23% to 19.29%. A more detailed presentation of estimated basal area, relative dominance, relative density, relative frequency, and importance value is shown Table 9.

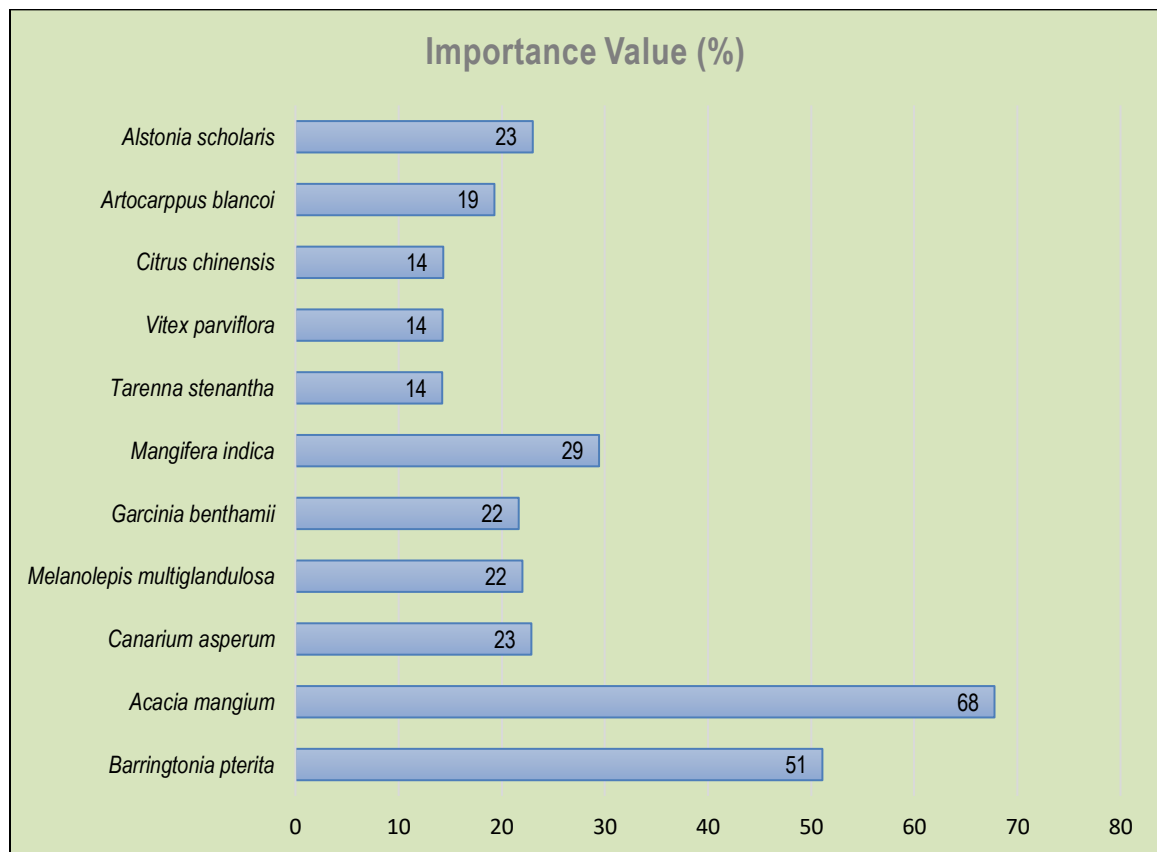


Figure 5. Tree importance value within and adjacent areas of the UBAC mineral extraction site.

### 4. Species Diversity Index

The tree species diversity of the areas assessed were low based on the computed Shannon's diversity index ( $H' = 2.07$ ) (Figure 6) and Fernando's diversity scale (Table 2). The diversity index for understorey vegetation on the other hand was equivalent to  $H' = 2.61$ , which is described as moderate diversity. These results imply that the area had a low tree species composition and number of individuals as they were periodically utilized for agriculture through kaingin by nearby farming



communities, being classified alienable and disposable lands. The moderate diversity index for understorey vegetation indicates an active natural regeneration in the area is taking place. If left untouched, the area can be reverted to its natural state as a forest gradually after series of seral stages in the succession process. Tables 10 and 11 show the detailed estimate of tree and understorey diversity indices of the monitoring areas.

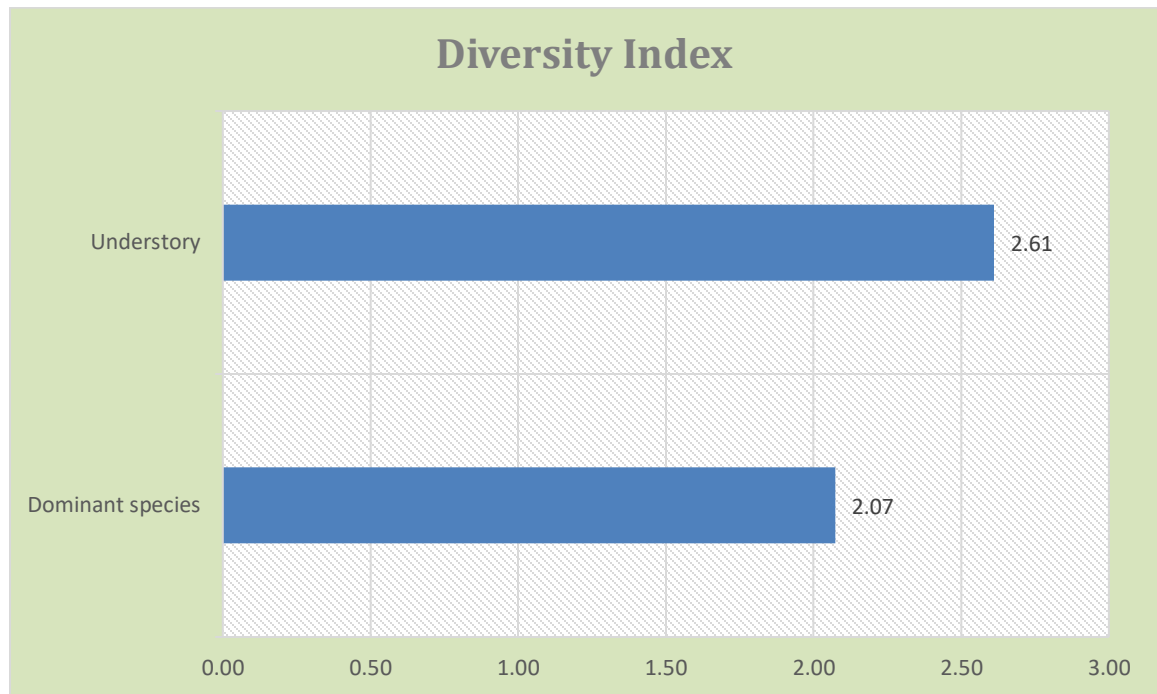


Figure 6. Diversity index of flora species within and adjacent areas of the UBAC mineral extraction site.

Table 9. Importance value of trees at UBAC quarry sites and adjacent areas.

Species	Scientific Name	No. of Individuals	Basal Area (cm <sup>2</sup> )	Relative Dominance (%)	Relative Density (%)	Relative Frequency (%)	Importance Value (%)
1. Mangium	<i>Acacia mangium</i>	7	441.08	29.01	30.43	8.33	67.78
2. Balitantan	<i>Barringtonia pterita</i>	5	192.89	12.69	21.74	16.67	51.09
3. Mango	<i>Mangifera indica</i>	1	254.78	16.76	4.35	8.33	29.44
4. Dita	<i>Alstonia scholaris</i>	1	157.08	10.33	4.35	8.33	23.01
5. Pagsahingin	<i>Canarium asperum</i>	2	88.91	5.85	8.70	8.33	22.88
6. Alim	<i>Melanolepis multiglandulosa</i>	2	75.71	4.98	8.70	8.33	22.01
7. Bunog	<i>Garcinia benthamii</i>	1	136.35	8.97	4.35	8.33	21.65
8. Antipolo	<i>Artocarpus blancoi</i>	1	100.53	6.61	4.35	8.33	19.29
9. Citrus	<i>Citrus chinensis</i>	1	25.13	1.65	4.35	8.33	14.33
10. Mulawin	<i>Vitex parviflora</i>	1	24.19	1.59	4.35	8.33	14.27
11. Basa	<i>Tarenna stenantha</i>	1	23.56	1.55	4.35	8.33	14.23
<b>Total</b>		<b>23.00</b>	<b>1520.22</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>300.00</b>

Table 10. Diversity index of tree species encountered.

Species	Scientific Name	No. of Individuals	P <sub>i</sub>	ln P <sub>i</sub>	-(P <sub>i</sub> * ln P <sub>i</sub> )
1. Alim	<i>Melanolepis multiglandulosa</i>	2	0.09	-2.44	-0.21
2. Antipolo	<i>Artocarpus blancoi</i>	1	0.04	-3.14	-0.14
3. Balitantan	<i>Barringtonia pterita</i>	5	0.22	-1.53	-0.33
4. Basa	<i>Tarenna stenantha</i>	1	0.04	-3.14	-0.14
5. Bunog	<i>Garcinia benthamii</i>	1	0.04	-3.14	-0.14
6. Citrus	<i>Citrus chinensis</i>	1	0.04	-3.14	-0.14
7. Dita	<i>Alstonia scholaris</i>	1	0.04	-3.14	-0.14
8. Mangium	<i>Acacia mangium</i>	7	0.30	-1.19	-0.36
9. Mango	<i>Mangifera indica</i>	1	0.04	-3.14	-0.14
10. Mulawin	<i>Vitex parviflora</i>	1	0.04	-3.14	-0.14
11. Pagsahingin	<i>Canarium asperum</i>	2	0.09	-2.44	-0.21
<b>Total</b>		<b>23</b>	<b>1.00</b>	<b>-29.55</b>	<b>2.07</b>

Table 11. Diversity index of understory vegetation.

No.	Common Name	Scientific Name	Number of Individuals	P <sub>i</sub>	ln P <sub>i</sub>	- (P <sub>i</sub> * ln P <sub>i</sub> )
1	Mango	Mangifera indica	4	0.02	-3.86	-0.08
2	Balinghasai	Buchanania arborescens	1	0.01	-5.25	-0.03
3	Badyang	Alocasia macrorrhizos	8	0.04	-3.17	-0.13
4	Malapapaya	Polyscias nodosa	5	0.03	-3.64	-0.10
5	Takipan	Caryota rumphiana	5	0.03	-3.64	-0.10
6	Hagonoy	Chromolaena odorata	19	0.10	-2.30	-0.23
7	Sambong	Blumea balsamifera	5	0.03	-3.64	-0.10
8	Pagsahingin	Canarium asperum	14	0.07	-2.61	-0.19
9	Anang	Diospyros pyrrocarpa	1	0.01	-5.25	-0.03
10	Bolong eta	Diospyros pilosanthera	3	0.02	-4.15	-0.07
11	Matanghipon	Breynia rhamnoides	1	0.01	-5.25	-0.03
12	Alim	Melanolepis multiglandulosa	3	0.02	-4.15	-0.07
13	Binunga	Macaranga tanarius	3	0.02	-4.15	-0.07
14	Kakauate	Glycidia sepium	2	0.01	-4.55	-0.05
15	Bunog	Garcinia benthamii	1	0.01	-5.25	-0.03
16	Balitantan	Barringtonia pterita	25	0.13	-2.03	-0.27
17	Putat	Barringtonia acutangula	12	0.06	-2.76	-0.17
18	Lee asp.	Leea congesta	2	0.01	-4.55	-0.05
19	Tanag	Kleinhovia hospita	5	0.03	-3.64	-0.10
20	Mahogany	Swietenia macrophylla	3	0.02	-4.15	-0.07
21	Hawili	Ficus septica	21	0.11	-2.20	-0.24
22	Is-is	Ficus fiskei	9	0.05	-3.05	-0.14
23	Kalios	Streblus asper	18	0.09	-2.36	-0.22
24	Tibig	Ficus nota	2	0.01	-4.26	-0.04
25	Antipolo	Artocarpus blancoi	1	0.01	-3.26	-0.02
26	Tangisang bayawak	Ficus variegata	1	0.01	-2.26	-0.01
27	Malabayabas	Tristania decorticata	1	0.01	-1.26	-0.01
28	Bangkoro	Morinda citrifolia	11	0.06	-0.26	-0.02
29	Anabiong	Trema orientalis Blume	2	0.01	0.74	0.01
30	Mulawin	Vitex parviflora	2	0.01	1.74	0.02
Total			190	1.00	-94.42	2.61

## 5. Conservation status

The conservation status of the flora species was determined based on DENR Administrative Order 2017-11 and IUCN Red List Category. Table 12 shows the conservation status of flora species encountered. Among the species identified, majority (88%) are non-endemic while only twelve percent (12%) are endemic to the Philippines. Forty-seven percent (47%) are in stable population while only *Vitex parviflora* is categorized under decreasing population (3%). Majority of the species (50%) have unknown population trend. Fifty-three percent (53%) of the flora species are in the least concern category. Further, 41% of the species are yet to be evaluated. Only *Diospyros pilosanthera* and *V. parviflora* were classified as endangered and vulnerable (3%), respectively. Figure 7 presents the conservation status distribution of the flora species encountered within the UBAC monitoring sites.

Table 12. Conservation status of flora species identified based on DENR-DAO 2017-11.

No.	Common/ Local Name	Scientific Name	IUCN Red List Category		
			Endemicity	Population Trend	IUCN Status
1	Alim	<i>Melanolepis multiglandulosa</i>	Non endemic	Unknown	Not evaluated
2	Anabiong	<i>Trema orientalis</i> Blume	Endemic	Unknown	Not Evaluated
3	Anang	<i>Diospyros pyrrhocarpa</i>	Non endemic	Unknown	Not evaluated
4	Antipolo	<i>Artocarpus blancoi</i>	Non endemic	Stable	Least Concern
5	Badyang	<i>Alocasia macrorrhizos</i>	Endemic	Stable	Least Concern
6	Balinghasai	<i>Buchanania arborescens</i>	Non endemic	Stable	Not Evaluated
7	Balitantan	<i>Barringtonia pterita</i>	Non endemic	Unknown	Not Evaluated
8	Bangkoro	<i>Morinda citrifolia</i>	Non-endemic	Unknown	Not Evaluated
9	Basa	<i>Tarenna stenantha</i>	Non-endemic	Unknown	Not Evaluated
10	Binunga	<i>Macaranga tanarius</i>	Non endemic	Unknown	Not evaluated
11	Bolong eta	<i>Diospyros pilosanthera</i>	Non endemic	Unknown	Endangered
12	Bunog	<i>Garcinia benthamii</i>	Non endemic	Stable	Not evaluated
13	Citrus	<i>Citrus chinensis</i>	Non endemic	Unknown	Least Concern
14	Dita	<i>Alstonia scholaris</i>	Non endemic	Unknown	Least Concern
15	Hagonoy	<i>Chromolaena odorata</i>	Non endemic	Stable	Least Concern
16	Hawili	<i>Ficus septica</i>	Non endemic	Stable	Least Concern
17	Is-is	<i>Ficus fiskei</i>	Non endemic	Stable	Least Concern
18	Kakauate	<i>Glycidia sepium</i>	Non endemic	Stable	Not evaluated
19	Kalios	<i>Streblus asper</i>	Non-endemic	Unknown	Least Concern
20	Lee asp.	<i>Leea congesta</i>	Non endemic	Unknown	Not Evaluated
21	Mahogany	<i>Swietenia macrophylla</i>	Non endemic	Unknown	Not evaluated
22	Malabayabas	<i>Tristania decorticala</i>	Non endemic	Stable	Least Concern
23	Malapapaya	<i>Polyscias nodosa</i>	Non endemic	Stable	Least Concern
24	Mangium	<i>Acacia mangium</i>	Non endemic	Unknown	Least Concern
25	Mango	<i>Mangifera indica</i>	Non endemic	Stable	Least Concern
26	Matanghipon	<i>Breynia rhamnoides</i>	Non endemic	Unknown	Not evaluated
27	Mulawin	<i>Vitex parviflora</i>	Non-endemic	Decreasing	Vulnerable
28	Pagsahingin	<i>Canarium asperum</i>	Non endemic	Unknown	Not evaluated
29	Putat	<i>Barringtonia acutangula</i>	Non endemic	Unknown	Least Concern
30	Sambong	<i>Blumea balsamifera</i>	Non endemic	Stable	Least Concern
31	Takipan	<i>Caryota rumphiana</i>	Non endemic	Stable	Least Concern
32	Tanag	<i>Kleinhovia hospita</i>	Non endemic	Stable	Least Concern
33	Tangisang bayawak	<i>Ficus variegata</i>	Endemic	Stable	Least Concern
34	Tibig	<i>Ficus nota</i>	Endemic	Stable	Least Concern

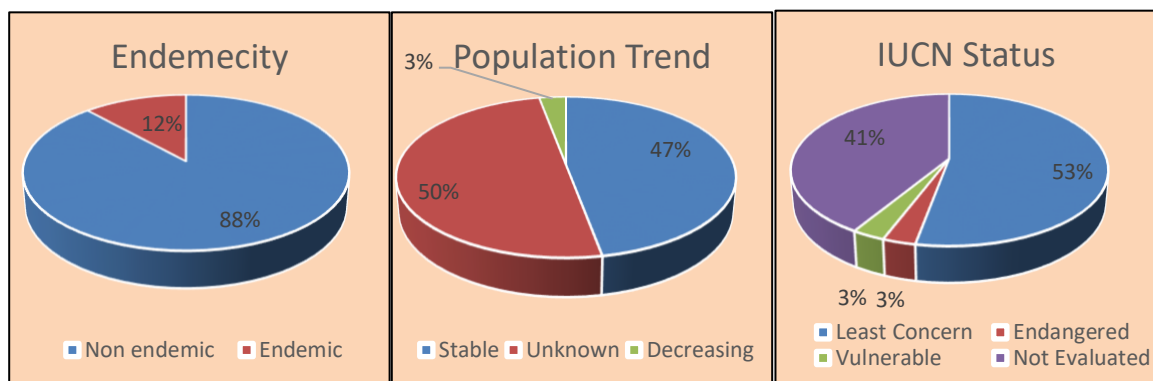


Figure 7. Conservation status of flora species of UBAC quarry sites and adjacent

## B. Fauna Structure

Results of the fauna survey within the UBAC quarry sites and adjacent areas were presented below.

### 1. Fauna Species Composition

A total of sixteen (16) species of fauna were documented during the survey within and at adjacent areas of quarry sites as shown in Table 13. Of this total, thirteen (13) are avifauna species such as *Bubulcus coromandus*, *Caprimulgus macrurus*, *Centropus sinensis*, *Corvus enca*, *Kittacincla nigra*, *Aethopyga shelleyi*, *Trichastoma cinereiceps*, *Alophoixus frater*, *Amauromis phoenicurus*, *Orthotomus sericeus*, *Zosterornis hypogrammicus*, *Turnix suscitator*, and *Mixornis gularis* (Figure 8).

Two of the fauna species are classified under herpetofauna to include *Eutropis multifasciata* and *Ingerophrynus philippinus*. The *Sundasciurus steerii* was the only mammal observed in the study site. Figure 8 shows the summary of fauna species composition of the monitoring sites while Figures 9 and 10 show photographs of several fauna species encountered during the survey.

Table 13. Fauna species found within the UBAC quarry sites and adjacent areas.

Order	Family Name	Scientific Name	Common Name
Avifauna	Ardeidae	<i>Bubulcus coromandus</i>	Eastern Cattle Egret
	Caprimulgidae	<i>Caprimulgus macrurus</i>	Large-tailed Nightjar
	Cuculidae	<i>Centropus sinensis</i>	Greater coucal
	Corvidae	<i>Corvus enca</i>	Slender-billed crow
	Muscicapidae	<i>Kittacincla nigra</i>	White-vented shama
	Nectariniidae	<i>Aethopyga shelleyi</i>	Lovely Sunbird
	Pellorneidae	<i>Trichastoma cinereiceps</i>	Ashy-headed Babbler
	Pycnonotidae	<i>Alophoixus frater</i>	Palawan bulbul
	Rallidae	<i>Amauromis phoenicurus</i>	White-breasted waterhen
	Sylviidae	<i>Orthotomus sericeus</i>	Rufuos-tailed Tailorbird
	Zosteropidae	<i>Zosterornis hypogrammicus</i>	Palawan striped babbler
	Turnicidae	<i>Turnix suscitator</i>	Barred-buttonquail
	Timaliidae	<i>Mixornis gularis</i>	Pin-striped Tit babbler
Herpetofauna	Scincidae	<i>Eutropis multifasciata</i>	Common Mabuya
	Bufonidae	<i>Ingerophrynus philippinus</i>	Philippine Toad
Mammals	Sciuridae	<i>Sundasciurus steerii</i>	Southern Palawan Tree Squirrel



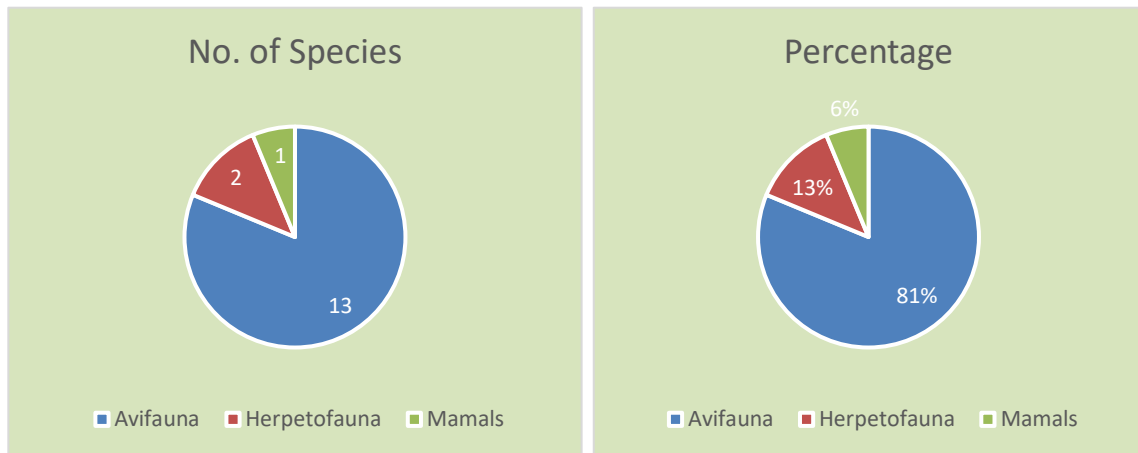


Figure 8. Summary of fauna species composition.

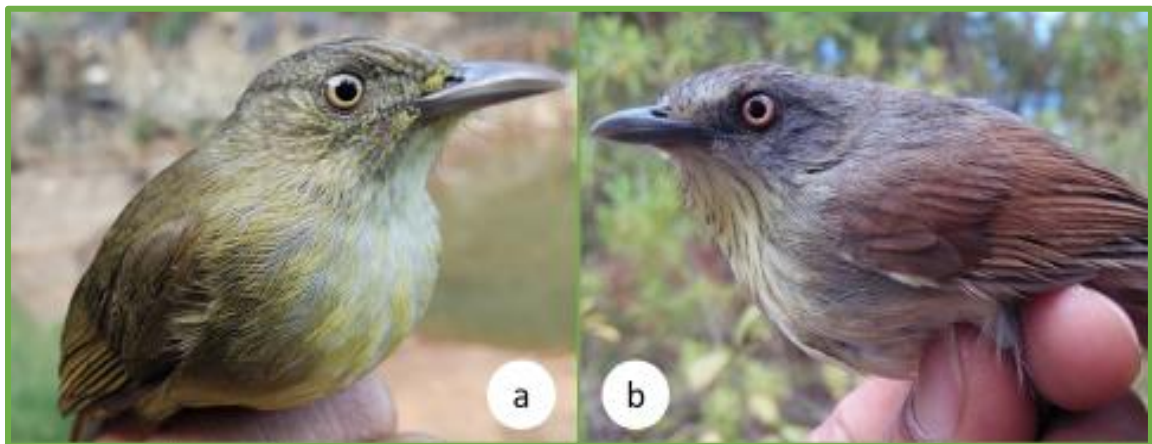


Figure 9. Avifauna species documented at UBAC quarry and adjacent areas: a) Palawan bulbul (*Alophoixus frater*), b) Pin-striped Tit babbler (*Mixornis gularis*).

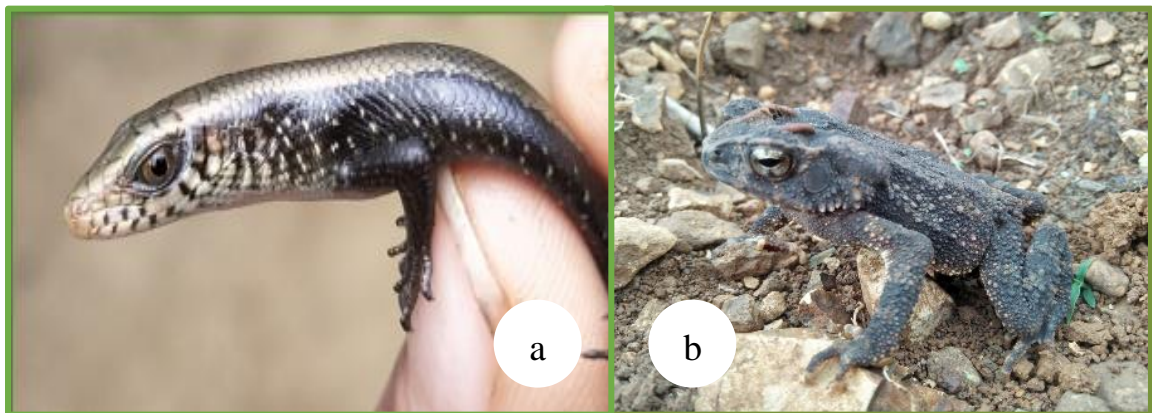


Figure 10. The a) Common Mabuya (*Eutropis multifasciata*) and b) Philippine Toad (*Ingerophrynus philippinicus*) found in the UBAC quarry sites.

## 2. Fauna Species Distribution

There were forty-one (41) individuals of fauna observed within the three (3) permanent transect lines established as shown in Table 14. Thirty-four (34) of these individuals belong to thirteen (13) species of birds to include *B. coromandus*, *C. macrurus*, *C. sinensis*, *C. enca*, *K. nigra*, *A. shelleyi*, *T. cinereiceps*, *A. frater*, *A. phoenicurus*, *O. sericeus*, *Z. hypogrammicus*, *T. suscitor* and *M. gularis*. Alongside with these, three (3) individuals under two (2) species of herpetofauna such as *E. multifasciata* and *I. philippinus* and only one (1) individual (*S. steerii*) under order Mammalia were also observed in the study site. Transect 1 had the highest number of individuals (18) followed by Transect 3 with seventeen (17) while Transect 2 had the least with six (6).

Table 14. Distribution and number of individuals of fauna species encountered.

Order	Family Name	Scientific Name		Number of Individuals			
				1	2	3	Total
Avifauna	Ardeidae	<i>Bubulcus coromandus</i>	Eastern Cattle Egret	2	1	1	4
	Caprimulgidae	<i>Caprimulgus macrurus</i>	Large-tailed Nightjar	1	1	1	3
	Cuculidae	<i>Centropus sinensis</i>	Greater coucal	1	0	1	2
	Corvidae	<i>Corvus enca</i>	Slender-billed crow	1	0	1	2
	Muscicapidae	<i>Kittacincla nigra</i>	White-vented shama	1	0	1	2
	Nectariniidae	<i>Aethopyga shelleyi</i>	Lovely Sunbird	1	1	1	3
	Pellorneidae	<i>Trichastoma cinereiceps</i>	Ashy-headed Babbler	1	0	1	2
	Pycnonotidae	<i>Alophoixus frater</i>	Palawan bulbul	2	1	1	4
	Rallidae	<i>Amauromis phoenicurus</i>	White-breasted waterhen	1	0	1	2
	Sylviidae	<i>Orthotomus sericeus</i>	White-breasted waterhen	1	1	1	3
	Zosteropidae	<i>Zosterornis hypogrammicus</i>	Rufous-tailed Tailorbird	0	0	1	1
	Turnicidae	<i>Turnix suscitor</i>	Palawan striped babbler	1	1	1	3
	Timaliidae	<i>Mixornis gularis</i>	Barred-buttonquail	2	0	1	3
Herpetofauna	Scincidae	<i>Eutropis multifasciata</i>	Pin-striped Tit babbler	1	0	2	3
	Bufonidae	<i>Ingerophrynus philippinus</i>	Common Mabuya	1	0	1	2
Mammals	Sciuridae	<i>Sundasciurus steerii</i>	Philippine Toad	1	0	1	2
Total				18	6	17	41

## 3. Diversity Index

The overall diversity index for the study site was computed at  $H' = 2.72$  (Table 15) which is moderately diverse based on Fernando's diversity scale (Table 2). The results of the study imply that the monitoring sites were disturbed environment and majority were grassland dominated by *S. lumampao*. New regenerations in the understorey level are however ready to restore cleared or disturbed areas in the site through natural regeneration. The area serves as sources of Buho by the nearby households both for livelihood and personal uses.

Table 15. Overall Diversity index of fauna species within the UBAC area.

Common Name	Scientific Name	Shannon Diversity Index			
		No. of Indiv.	Pi	Inpi	Pilnpi
Eastern Cattle Egret	<i>Bubulcus coromandus</i>	4	0.10	-2.33	-0.23
Large-tailed Nightjar	<i>Caprimulgus macrurus</i>	3	0.07	-2.61	-0.19
Greater coucal	<i>Centropus sinensis</i>	2	0.05	-3.02	-0.15
Slender-billed crow	<i>Corvus enca</i>	2	0.05	-3.02	-0.15
White-vented shama	<i>Kittacincla nigra</i>	2	0.05	-3.02	-0.15

Lovely Sunbird	<i>Aethopyga shellei</i>	3	0.07	-2.61	-0.19
Ashy-headed Babbler	<i>Trichastoma cinereiceps</i>	2	0.05	-3.02	-0.15
Palawan bulbul	<i>Alophoixus frater</i>	4	0.10	-2.33	-0.23
White-breasted waterhen	<i>Amauromis phoenicurus</i>	2	0.05	-3.02	-0.15
Rufous-tailed Tailorbird	<i>Orthotomus sericeus</i>	3	0.07	-2.61	-0.19
Palawan striped babbler	<i>Zosterornis hypogrammicus</i>	1	0.02	-3.71	-0.09
Barred-buttonquail	<i>Turnix suscitator</i>	3	0.07	-2.61	-0.19
Pin-striped Tit babbler	<i>Mixornis gularis</i>	3	0.07	-2.61	-0.19
Common Mabuya	<i>Eutropis multifasciata</i>	3	0.07	-2.61	-0.19
Philippine Toad	<i>Ingerophrynus philippinicus</i>	2	0.05	-3.02	-0.15
Southern Palawan Tree Squirrel	<i>Sundasciurus steerii</i>	2	0.05	-3.02	-0.15
<b>Total</b>		<b>41</b>	<b>1.00</b>	<b>-45.20</b>	<b>2.72</b>

#### 4. Conservation Status

All fauna species recorded during the monitoring at UBAC quarry areas and surrounding habitat were classified as Least concern under the International Union for the Conservation of Nature (IUCN) Red list category (Table 16). Majority or 56% of the fauna species are non-endemic to the country (Figure 11). Forty-four percent (46%) of the remaining species are Philippine endemics. Majority (88%) of these fauna species are in stable while the remaining thirteen percent (13%) have decreasing population trend. All of the species encountered are under least concerned conservation status.

Table 16. Conservation status of fauna species found within the UBAC quarry sites and adjacent areas.

Common Name	Scientific Name	IUCN Red List Category		
		Endemicity	Population Trend	Red List Status
Eastern Cattle Egret	<i>Bubulcus coromandus</i>	Non Endemic	Stable	Least Concern
Large-tailed Nightjar	<i>Caprimulgus macrurus</i>	Non Endemic	Stable	Least Concern
Greater coucal	<i>Centropus sinensis</i>	Non Endemic	Stable	Least Concern
Slender-billed crow	<i>Corvus enca</i>	Non Endemic	Stable	Least Concern
White-vented shama	<i>Kittacincla nigra</i>	Endemic	Decreasing	Least Concern
Lovely Sunbird	<i>Aethopyga shellei</i>	Endemic	Stable	Least Concern
Ashy-headed Babbler	<i>Trichastoma cinereiceps</i>	Endemic	Decreasing	Least Concern
Palawan bulbul	<i>Alophoixus frater</i>	Endemic	Stable	Least Concern
White-breasted waterhen	<i>Amauromis phoenicurus</i>	Non Endemic	Stable	Least Concern
Rufous-tailed Tailorbird	<i>Orthotomus sericeus</i>	Non Endemic	Stable	Least Concern
Palawan striped babbler	<i>Zosterornis hypogrammicus</i>	Endemic	Stable	Least Concern
Barred-buttonquail	<i>Turnix suscitator</i>	Non Endemic	Stable	Least Concern
Pin-striped Tit babbler	<i>Mixornis gularis</i>	Non Endemic	Stable	Least Concern
Common Mabuya	<i>Eutropis multifasciata</i>	Non Endemic	Stable	Least Concern
Philippine Toad	<i>Ingerophrynus philippinicus</i>	Endemic	Stable	Least Concern
Southern Palawan Tree Squirrel	<i>Sundasciurus steerii</i>	Endemic	Stable	Least concern

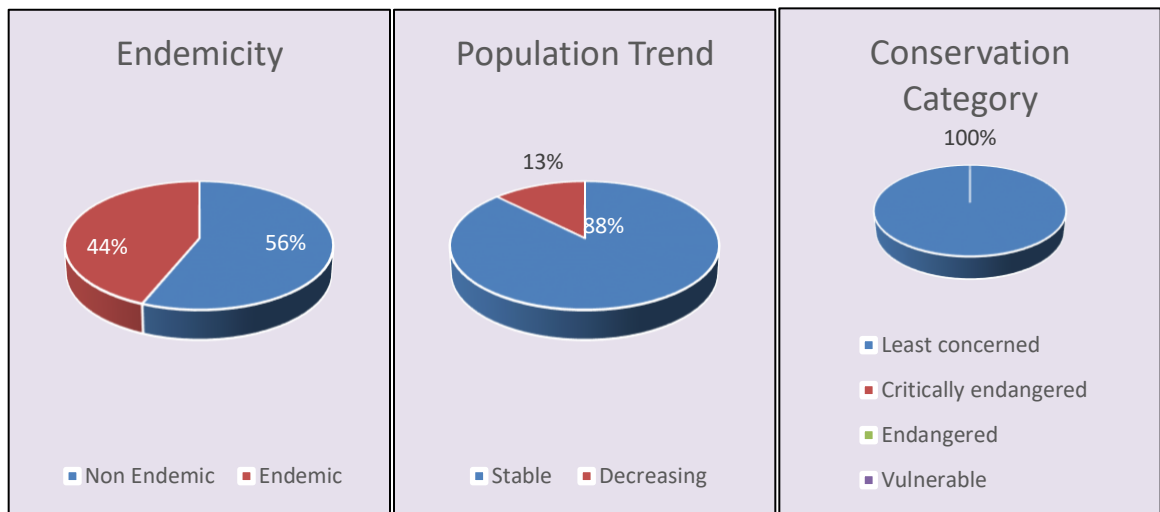


Figure 11. Endemicity and population trend of fauna species of UBAC quarry sites and adjacent areas.

## IV. Recommendations

The following are the recommendations based on the results of the assessment:

1. Improvement of impounding dam by increasing its area size to contain bigger volume of runoff. This will permit more sediments to settle which are carried through runoff water during storm event before reaching the creek leading to other adjacent areas.
2. Plant indigenous fruits and forest trees along banks of impounding dam and available parts of the area which will not be devoted for quarry. This is to increase land cover, reduce erosion, conserve indigenous and endemic flora, and provide habitat for fauna species.
3. In planting trees, adopt a planting design which is a mixture of various indigenous/endemic fruits and forest trees. Avoid planting the same species in a single area to encourage/increase biodiversity.
4. Conduct brushing and other care and maintenance activities regularly on planted areas to maintain their vigor and ensure success of rehabilitation.
5. In the establishment and maintenance of agroforestry or reforestation areas to rehabilitate denuded forests, consider other fruit trees to be planted in addition to recommended indigenous fruit-bearing species such as Aratiles (*Muntingia calabura*), Makopa (*Syzygium malaccense*), Wild Rambutan (*Nephelium lappaceum*), Kandis (*Garcinia parviflora*), Bayabas (*Psidium guajava*), Binuang (*Otomeles sumatrana*).
6. A continued massive awareness through Information, Education and Communication (IEC) campaign regarding biodiversity protection and conservation must be conducted particularly within the concerned communities.



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Republic of the Philippines  
Department of Environment and Natural Resource  
**ENVIRONMENTAL MANAGEMENT BUREAU**  
1515 L and S Building, Roxas Boulevard, Pasay City  
Telephone No. (02) 400-5960 Fax No. (02) 400-5960  
mimaropa@emb.gov.ph and emb\_mimaropa@yahoo.com  
Visit us at <http://www.mimaropa.emb.gov.ph/>

**ENVIRONMENTAL COMPLIANCE CERTIFICATE**  
(Issued under Presidential Decree 1586)  
**ECC-OL-R4B-2018-0156**

THIS IS TO CERTIFY THAT THE PROPONENT, **UNIVERSAL BASALT AGGREGATES CORP.**, represented by its **President, Mr. STEPHEN TAN**, is granted this Environmental Compliance Certificate (ECC), for the proposed **CRUSHING PLANT** located at Malbeg, Brgy. Bacungan, Puerto Princesa City, Palawan, by the Department of Environment and Natural Resources (DENR), through the Environmental Management Bureau (EMB).

SUBJECT ONLY to the conditions and restrictions set in this ECC and in the attached document labelled as Annexes A and B.

This Certificate is issued with the following details:

**PROJECT DESCRIPTION**

This ECC covers the proposed **CRUSHING PLANT** having a processing rate of **850,000 metric tons per year** and total land area of **23,931 square meters** located at Malbeg, Brgy. Bacungan, Puerto Princesa City, Palawan.

Project's facilities and structures enumerated to wit:

**Crushing plant;** Two (2) modular cone, modular dust suppression system, jaw crusher; vibrating feeder, sizing screen, belt conveyors, siltation pond, garbage segregation area, powerhouse, admin building, motor pool facility, spare parts room and bunkhouse.

The project shall operate and maintain its facilities and amenities as contained in the submitted **Initial Environmental Examination Checklist (IEEC) Report and Environmental Management Plan (EMP)**.

This Certificate is issued in compliance with the requirements of Presidential Decree No. 1586, and in accordance to DENR Administrative Order (D.A.O.) No. 2003-30. Non-compliance with any of the provisions of this Certificate shall be a sufficient cause for the cancellation of this Certificate and/or imposition of a fine in an amount not to exceed Fifty Thousand Pesos (P50,000.00) for every violation thereof without prejudice to imposition of fines and penalties under other environmental laws. The EMB, however, is not precluded from reevaluating and correcting any deficiencies or errors that may be found after issuance of this Certificate.

Issued at EMB-R4B, 1515 L and S Building, Roxas Boulevard, Pasay City this October 18, 2018.

Recommending Approval:

  
**Buena Fe A. Rioflorida**  
Chief, Clearance & Permitting Division

Approved:


  
**Maria Socorro A. Abu**  
OIC-Regional Director



Environmental Compliance Certificate  
CRUSHING PLANT  
MALBEG, BACUNGAN Puerto Princesa City, Palawan  
UNIVERSAL BASALT AGGREGATES CORP



Annex 3 – Permit to Operate

 Department of Environment and Natural Resources  
Environmental Management Bureau  
Region Office No. IV - B MIMAROPA

RECEIVED  
March 6, 2020  
2:27 PM

Permit No:	2020-POA-D-0453-109
Valid Date:	Jan-21-2025
Permit Date:	Jan-22-2020

Republic Act No. 8749: Philippine Clean Air Act of 1999

**PERMIT TO OPERATE**

**Air Pollution Source and/or Control Installations**

Pursuant to Rule XIX, Part IV, of the Implementing Rules and Regulations of the Clean Air Act (RA 8749) this Permit to Operate is hereby issued to:

**UNIVERSAL BASALT AGGREGATES CORPORATION**

for the emission, discharge or release of air pollutants from the following installations processes or activities:

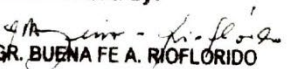
Crushing Plant with a production capacity of 850,000 MT/year composed of One (1) unit 250 TPH Jaw Crusher; Two (2) units 200 TPH Cone Crusher; One (1) unit 20 TPH Belt Conveyor; Six (6) units 70 TPH Belt Conveyor and Five (5) units 200 TPH Belt Conveyor individually provided with Conveyor Covers; One (1) unit 900 kW MITSUBISHI (SN:28445) Diesel-fired Generator Set with Exhaust/Stack; One (1) unit 640 kW GB POWER (SN: 41236130) Diesel-fired Generator Set with Exhaust/ Stack and; One (1) unit Fuel Storage Tank.

located at:

**Malbeg, Brgy. Bacungan, Puerto Princesa City, Palawan**

and is issued subject to the following conditions hereto attached.

**Recommended by:**

  
**ENGR. BUENA FE A. RIOFLORIDO**  
Chief, Clearance and Permitting Division

**Approved by:**

  
**ATTY. MICHAEL DRAKE P. MATIAS**  
Regional Director



UNIVERSAL BASALT AGGREGATES CORPORATION  
Malbeg, Brgy. Bacungan, Puerto Princesa City, Palawan  
2020-POA-D-0453-1092

### CONDITIONS

1. This Permit is issued for the permittee to operate its Crushing Plant with a production capacity of 850,000 MT/year composed of One (1) unit 250 TPH Jaw Crusher, Two (2) units 200 TPH Cone Crusher, One (1) unit 20 TPH Belt Conveyor, Six (6) units 70 TPH Belt Conveyor and Five (5) units 200 TPH Belt Conveyor individually provided with Conveyor Covers; One (1) unit 900 kW MITSUBISHI (SN:28445) Diesel-fired Generator Set with Exhaust/Stack; One (1) unit 640 kW GB POWER (SN: 41236130) Diesel-fired Generator Set with Exhaust/ Stack and; One (1) unit Fuel Storage Tank.
2. This Permit is subject for payment of the following fees:

Fee	Amount (pesos)	Date	O.R. Number
Permit Fee	21,950.00	Jul-16-2019	2301208
Additional Permit Fee	8,000.00	Dec-20-2019	0848657
Filing Fee	600.00	Jul-16-2019	2301208
P.D. 1856	20.00	Jul-16-2019	2302966

3. Unless suspended or sooner revoked by this office, this Permit shall be valid for a period of five (5) years from the date of its issuance, as indicated by the issue and expiry dates on the previous page of the Permit.
4. During this period of validity, the Bureau may modify the Permit by amending any existing condition or imposing any new or additional condition, subject to the provisions of Rule XIX of the Implementing Rules and Regulations (IRRs) of Republic Act 8749 (RA 8749).
5. An application for renewal of this Permit shall be filed not less than thirty (30) days before the expiry date indicated on the previous page of the Permit.
6. The previous page of this Permit shall be posted in a conspicuous location at the premises, and shall be adequately framed or otherwise protected against damage.
7. The operation of any installation, process or activity at this establishment that produces, generates, captures, treats, reduces, controls, emits, releases or disperses air pollutants without a valid Permit to Operate, or in violation of any of the conditions of this Permit, shall be subject to penalties of not less than ten thousand (PhP 10,000.00) pesos and not more than one hundred thousand (PhP 100,000.00) pesos, pursuant to Rule LVI of the Implementing Rules and Regulations of RA 8749.
8. The Crushing Plant with a production capacity of 850,000 MT/year shall be maintained and operated by the permittee so that emissions of air pollutants are kept at a practicable minimum. The permittee shall be responsible for ensuring that any emissions of air pollutants therefrom, including fugitive or uncontrolled emissions or releases of air pollutants from abnormal or unexpected events, do not cause air pollution in the surrounding air environment or have adverse effects on persons in that environment.

ATTY. MICHAEL DRAKE P. MATIAS  
Regional Director



UNIVERSAL BASALT AGGREGATES CORPORATION  
Malibeu, Brgy. Bacungan, Puerto Princesa City, Palawan  
2020-POA-D-0453-1092

9. Without limiting the generality of the previous condition, the permittee shall ensure that the emissions from the permitted installations and processes comply with
- The National Emission Standards for Source Specific Air Pollutants as specified in Rule XXV of the IRRs of RA 8749.
  - The National Ambient Air Quality Standards for Source Specific Air Pollutants from Industrial Sources/Operations as specified in Rule XXVI of the IRRs of RA 8749; and
  - The emission limits specified in Permit condition No. 15.

Otherwise, any exceedance of the above-mentioned standards shall be subject to the imposition by the Pollution Adjudication Board (PAB) of fine of not more than One Hundred Thousand Pesos (PhP 100,000.00) for every day of violation until such time that the standards have been complied with.

10. The permittee shall submit notarized Self-Monitoring Reports to this office in accordance with DENR Administrative Order No. 27 (Series of 2003) and any written instructions in a quarterly basis on or before the following filing dates:

1 <sup>st</sup> Quarter SMR (January to March)	15 <sup>th</sup> day of April
2 <sup>nd</sup> Quarter SMR (April to June)	15 <sup>th</sup> day of July
3 <sup>rd</sup> Quarter SMR (July to September)	15 <sup>th</sup> day of October
4 <sup>th</sup> Quarter SMR (October to December)	15 <sup>th</sup> day of January

11. The permittee shall at all times have an appointed or designated Pollution Control Officer (PCO) who shall be the day-to-day point of contact between the Bureau and the establishment. The permittee shall ensure that the PCO is familiar with the operations and activities undertaken at the establishment, and the relevant emission sources and air pollution control devices and equipment. The permittee shall give the PCO the necessary authority to take or to direct corrective action in the event that results in excessive emissions or emissions that do not comply with relevant Permit conditions, emission standards or ambient air quality standards.

12. The permittee shall report in writing to the Bureau any malfunction, accident, breakdown, leak, spill or other abnormal or unexpected event which results in emissions to atmosphere that do not comply with relevant Permit conditions, emission standards or ambient air quality standards, or in any other abnormal or unexpected releases of air pollutants. The report shall indicate the nature of the accident or event, its impact to emissions, the time period involved, and any actions or measures taken to control the emissions or releases, remedy any air pollution problems that may have occurred, and minimize the probability of a reoccurrence of the event or the release.

13. The permittee shall at all times allow authorized or accredited officers of the Department or the Bureau entry to the establishment to conduct inspections, gather information, test emissions or take samples. The permittee and its personnel shall not obstruct such officer in the performance of these functions, and shall furnish any information or materials requested by them that is reasonable for them to have. The permittee shall obey any lawful instruction or direction given by an authorized or accredited officer of the Department or the Bureau at all times.

14. The permittee shall not make or allow any alterations or modifications to operations, activities, installations, processes, plant or equipment at the establishment that might substantially change the nature or quantity of the associated emissions without obtaining the approval of this office, including the obtaining of any necessary Permit to Operate.

ATTY. MICHAEL DRAKE P. MATIAS  
Regional Director

UNIVERSAL BASALT AGGREGATES CORPORATION  
Malbong Brgy. Bacungan, Puerto Princesa City, Palawan  
2020-POA-D-0453-1092

#### SPECIFIC CONDITIONS

15. The permittee shall ensure that the concentrations of the emissions from the stacks serving the generator sets described in this permit shall not exceed the following limits:
  - (a) Nitrogen Oxides: : 2000 milligrams per cubic meter, corrected to 25 degrees Celsius, one atmospheric pressure and a dry gas basis expressed as NO<sub>2</sub>;
  - (b) Carbon Monoxide: : 500 milligrams per cubic meter, corrected to 25 degrees Celsius, one atmospheric pressure and a dry gas basis expressed as CO;
  - (c) Sulfur Oxides: 700 milligrams per cubic meter, corrected to 25 degrees Celsius, one atmospheric pressure and a dry gas basis expressed as SO<sub>2</sub> and;
  - (d) Particulates: 150 milligrams per cubic meter, corrected to 25 degrees Celsius, one atmospheric pressure and a dry gas basis.
16. The permittee shall provide and maintain emission sampling ports, sampling platforms and safe access to those sampling ports and platforms for all stacks of the air pollution source equipment involved for testing.
17. Without the prejudice to the regular monitoring by this office, the permittee should conduct emission testing of One (1) 900 kW MITSUBISHI (SN:28445) Diesel-fired Generator Set with Exhaust/Stack and One unit 640 kW GB POWER (SN: 41236130) Diesel-fired Generator Set with Exhaust/ Stack within three (3) months after the issuance of this permit. Thereafter emission tests should be conducted at an annual interval (once a year). The Emission Test Reports should be submitted to this office for evaluation of compliance with the emission standards within thirty (30) days after the completion of the activity. All source testing should be conducted in accordance with the Bureau-approved methods of sampling for each parameter measured as stipulated in the Implementing Rules and Regulations of the Philippine Clean Air Act of 1999.
18. The permittee shall ensure that the operation of the facility must not exceed the following limits of the National Ambient Air Quality Standards for Source Specific Air Pollutants from Industrial Sources/Operations:
  - (a) sulfur dioxide: 340 micrograms per cubic meter for an average sampling time of sixty (60) minutes;
  - (b) particulates: 200 micrograms per cubic meter for an average sampling time of sixty (60) minutes; and
  - (c) nitrogen dioxide: 260 micrograms per cubic meter for an average sampling time of sixty (60) minutes.
19. Without prejudice to the monitoring undertaken by EMB, the permittee shall sample during actual process operations and analyze the parameters stated in the previous condition in the ambient air quality of the area within the calendar year of the issuance of this permit in accordance with the methods specified in the IRR of RA 8749. The stations established for the monitoring should comply with siting criteria for point source ambient air quality monitoring. The report of the said monitoring shall form part and shall be included in the quarterly SMRs to be submitted as required in Condition No. 10 of this permit. This requirement shall be repeated at semi-annual interval (twice a year).
20. The permittee should ensure that any stack tests by an accredited third party tester and should be witnessed by at least one (1) representative from this office in order to observe and audit the test, ensure it is conducted appropriately and confirm that the source or process is operating at a representative or agreed rate or load during the actual test and/or audit. The test and/or audit plan should be submitted to this office one (1) month prior to the scheduled date of the test for review, evaluation, and approval by this office.

ATTY. MICHAEL DRAKE P. MATIAS  
Regional Director



Annex 4 – Lease Contract

**LEASE CONTRACT**

**KNOW ALL MEN BY THESE PRESENTS:**

This CONTRACT OF LEASE is made and executed at the City of \_\_\_\_\_, this day of \_\_\_\_\_, 20\_\_\_\_, by and between:

**JOHANNE BOROT**, of legal age, Single, Filipino, and with residence and postal address at **FERNANDEZ, BGY. TANGLAW, PUERTO PRINCESA CITY**, hereinafter referred to as the **LESSOR**.

**-AND-**

**UNIVERSAL BASALT AGGREGATES CORP.**, represented by **STEPHEN TAN**, with office and postal address at **SOUTH TRIANGLE, QUEZON CITY**, hereinafter referred to as the **LESSEE**.

**WITNESSETH; That**

**WHEREAS**, the **LESSOR** is the owner of THE LEASED PREMISES, a property situated at **(BACUNGAN, PUERTO PRINCESA CITY)**;

**WHEREAS**, the **LESSOR** agrees to lease-out the property to the **LESSEE** and the **LESSEE** is willing to lease the same;

**NOW THEREFORE**, for and in consideration of the foregoing premises, the **LESSOR** leases unto the **LESSEE** and the **LESSEE** hereby accepts from the **LESSOR** the **LEASED** premises, subject to the following:

**TERMS AND CONDITIONS**

**1. PURPOSES:** That premises hereby leased shall be used exclusively by the **LESSEE** for **CRUSHING FACILITY** purposes only and shall not be diverted to other uses. It is hereby expressly agreed that if at any time the premises are used for other purposes, the **LESSOR** shall have the right to rescind this contract without prejudice to its other rights under the law.

**2. TERM:** This term of lease is for **TEN (10) YEAR**. from (\_\_\_\_\_) to (\_\_\_\_\_) inclusive. Upon its expiration, this lease may be renewed under such terms and conditions as may be mutually agreed upon by both parties, written notice of intention to renew the lease shall be served to the **LESSOR** not later than seven (7) days prior to the expiry date of the period herein agreed upon.

**3. RENTAL RATE:** The annual rental rate for the leased premises shall be in **PESOS: AMOUNT IN WORDS (P 50,000.00)**, Philippine Currency. All rental payments shall be payable to the **LESSOR**.

**4. DEPOSIT:** That the **LESSEE** shall deposit to the **LESSOR** upon signing of this contract and prior to move-in an amount equivalent to the rent for **THREE (3) MONTHS** or the sum of **PESOS: AMOUNT IN WORDS (P 150,000.00)**, Philippine Currency. wherein the two (2) months deposit shall be applied as rent for the 11th and 12th months and the remaining one (1) month deposit shall answer partially for damages and any other obligations.

**5. DEFAULT PAYMENT:** In case of default by the **LESSEE** in the payment of the rent, such as when the checks are dishonored, the **LESSOR** at its option may terminate this contract and eject the **LESSEE**. The **LESSOR** has the right to padlock the premises when the **LESSEE** is in default of payment for One (1) month and may forfeit whatever rental deposit or advances have been given by the **LESSEE**.

**6. SUB-LEASE:** The **LESSEE** shall not directly or indirectly sublet, allow or permit the leased premises to be occupied in whole or in part by any person, firm or corporation, neither shall the **LESSEE** assign its rights hereunder to any other person or entity and no right of interest thereto or therein shall be conferred on or vested in anyone by the **LESSEE** without the **LESSOR'S** written approval.

**7. PUBLIC UTILITIES:** The **LESSEE** shall pay for its electric, water, dues and other public services and utilities during the duration of the lease.



**8. FORCE MAJEURE:** If whole or any part of the leased premises shall be destroyed or damaged by fire, flood, lightning, typhoon, earthquake, storm, riot or any other unforeseen disabling cause of acts of God, as to render the leased premises during the term substantially unfit for use and occupation of the LESSEE, then this lease contract may be terminated without compensation by the LESSOR or by the LESSEE by notice in writing to the other.

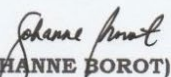
**9. LESSOR'S RIGHT OF ENTRY:** The LESSOR or its authorized agent shall after giving due notice to the LESSEE shall have the right to enter the premises in the presence of the LESSEE or its representative at any reasonable hour to examine the same or make repairs therein or for the operation and maintenance of the building or to exhibit the leased premises to prospective LESSEE, or for any other lawful purposes which it may deem necessary.

**10. EXPIRATION OF LEASE:** At the expiration of the term of this lease or cancellation thereof, as herein provided, the LESSEE will promptly deliver to the LESSOR the leased premises with all corresponding keys and in as good and tenable condition as the same is now, ordinary wear and tear expected devoid of all occupants, movable furniture, articles and effects of any kind. Non-compliance with the terms of this clause by the LESSEE will give the LESSOR the right, at the latter's option, to refuse to accept the delivery of the premises and compel the LESSEE to pay rent therefrom at the same rate plus Twenty Five (25) % thereof as penalty until the LESSEE shall have complied with the terms hereof. The same penalty shall be imposed in case the LESSEE fails to leave the premises after the expiration of this Contract of Lease or termination for any reason whatsoever.

**11. JUDICIAL RELIEF:** Should any one of the parties herein be compelled to seek judicial relief against the other, the losing party shall pay an amount of One Hundred (100) % of the amount claimed in the complaint as attorney's fees which shall in no case be less than P50,000.00 pesos in addition to other cost and damages which the said party may be entitled to under the law.


12. This **CONTRACT OF LEASE** shall be valid and binding between the parties, their successors-in-interest and assigns.

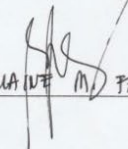
**IN WITNESS WHEREOF,** parties herein affixed their signatures on the date and place above written.

  
(JOHANNE BOROT)  
LESSOR

  
(STEPHEN TAN)  
LESSEE

Signed in the presence of:



  
MEE AUAWE M. FARRD

**ACKNOWLEDGEMENT**

Republic of the Philippines)  
\_\_\_\_\_) S.S

**PUERTO PRINCESA CITY**  
BEFORE ME, personally appeared:

Name

CTC Number

Date/Place Issued

**JOHANNE BOROT**

**STEPHEN TAN**

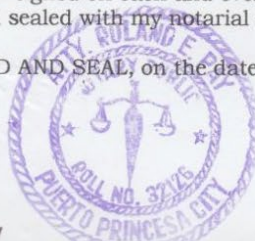
Known to me and to me known to be the same persons who executed the foregoing instrument and acknowledged to me that the same is their free and voluntary act and deed.

This instrument consisting of \_\_\_\_ page/s, including the page on which this acknowledgement is written, has been signed on each and every page thereof by the concerned parties and their witnesses, and and sealed with my notarial seal.

WITNESS MY HAND AND SEAL, on the date and place first above written.

Notary Public

Doc. No. 390;  
Page No. 79;  
Book No. Chon



  
**ATTE. ROLAND E. PAY**  
NOTARY PUBLIC  
UNTIL DEC. 31, 2019  
PTR NO. 4974343 / 01-03-2018  
IBP NO. 1028675 / 10-09-2017  
ROLL NO. 32126  
MCLE COMPLIANCE NO. V-0026136/11-30-2017