

Initial Environmental Examination (IEE) Report  
For  
Hotel Project at Amata Garden Resort, BAGAN

Proposed by Amata International Company Limited

August 2016

Prepared by E Guard Environmental Services Company  
Limited

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## **1. Introduction**

### **1.1 Background of the Study**

The Amata International Company Limited intends to build a hotel with 240 rooms (144 rooms in phase I and 96 rooms in phase II) in New Bagan City. The proposed hotel is aimed to provide 4-star grade hotel services. The proposed hotel is located in Pwa Saw Village, Nyaung-U Township, Nyaung-U District, Myandalay Region, Republic of the Union of Myanmar. The Amata Garden Resort, Bagan will occupy 6.711 acres of the land, which comprised of 0.161 acre of Thamutdarit Block, New Bagan City, Nyaung-U Township and 6.55 acres of Tha Htay Kan Village, Pwa Saw Village Track, New Bagan City, Nyaung-U Township. The proposed project site, Nyaung-U is situated in one of the Central Dry Zone Region of Myanmar. This is an Initial Environmental Examination (IEE) due diligence report for construction of a hotel and its related facilities proposed by Amata International Company Limited named Amata Garden Resort, Bagan.

According to the Environmental Conservation Law, 2012 of the Ministry of Natural Resources and Environmental Conservation (MONREC), the proponents of every development projects in the country have to prepare an Environmental Management Plan (EMP) or Initial Environmental Examination (IEE) or Environmental Impact Assessment (EIA) so as to know impacts on environment and surrounding communities and to find ways to mitigate or minimize these impacts. On behalf of MONREC, the Environmental Conservation Department (ECD) which is one of the six departments under the MONREC, responsible for implementing National Environmental Policy, strategy, framework, planning and action plan for the integration of environmental consideration into the national sustainable development processes. Thus, the proponent has commissioned E Guard Environmental Services Co., Ltd. for environmental studies and to prepare the report that will be submitted to ECD.

The IEE report is prepared to assess the potential impacts of the proposed project and to formulate, implement and monitor the environmental protection measures in the phases of its construction, operation and decommissioning in order to reduce the environmental impacts or have to minimum impacts to the environment and to increase its operating efficiency.

## 1.2 Detail information of the project proponent

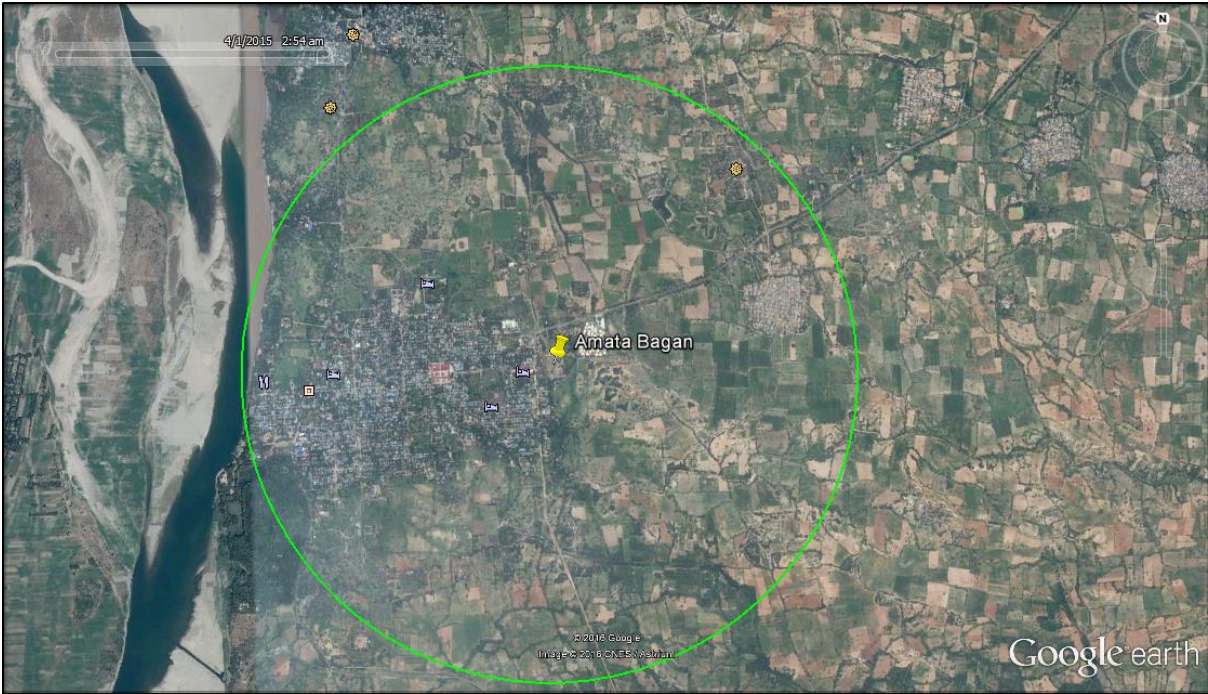
Company Name	-	Amata International Company Limited
Project Name	-	Amata Garden Resort, Bagan
Contact Person	-	Daw Wai Wai, U Kyaw Zayar
Contact Phone number	-	+95 9 73065169, +95 9 250501547
Project Address	-	Thahtaykan Block 1544, Phwar Saw Village, Nuaung U Township
Contact person's email	-	secretary.amata@amataresort.com, kyawzaya.uig@gmail.com

## 1.3 Scope of Study

The scope of study for IEE will vary on the scale and type of the development project. In this IEE, a study was made to cover construction of the hotel and operation of the hotel services. This IEE is based on consideration of resource conservation and pollution abatement such as water pollution, air pollution, solid waste, liquid waste, hazardous waste, noise, dust emission, occupational health and safety and socioeconomic impact. The site survey and field survey were performed by E Guard Environmental Services Company Limited, having experiences in conducting assessments on environmental concerns for various kinds of development projects.

Reconnaissance study was performed by the study teams from E Guard for all site-related environmental issues and baseline data were also collected from possible sources of pollution by using appropriate measuring devices. Data interpretation and analysis were made based on those collected data for the present and future conditions. In this report, recommended mitigation and monitoring measures were also included to mitigate environmental impacts. The environmental site visit was done on 13<sup>th</sup> March 2016, for environmental studies.

According to the EIA procedure of Myanmar, the scope of the study area is not specifically defined for the Environmental Study. It is estimated that there will be not much significant impacts on the environmental and socio-economic factors in accordance with the nature of proposed project. Thus, for the IEE study the area for this project is roughly defined to be the area within 2km radius of the center of the proposed site. This study area would be large enough to cope with most potential environmental and socio-economic impacts of the project construction and operation. Within the study area, available secondary information and primary information collected from field surveys were used for the calculation of cumulative impacts.



**Figure 1. Identification of the Study Area**

## 1.4 Study Team for Environmental Studies

This environmental study is to prepare IEE report for Amata Garden Resort, Bagan is conducted by E Guard Environmental Services Co., Ltd. The team has measured baseline primary data of air quality including ambient air condition, water quality and noise level by using appropriate measuring instruments. Data interpretation and analysis are made based on the collected baseline data and also from secondary for the present and foreseeable conditions and impacts on both socioeconomic and environment. Suitable mitigation measures for impacts are proposed in Environmental Management Plan to reduce to acceptable levels.

### 1.4.1 eGuard Study Team Members' Responsibilities for IEE

#### **U Saw Win (Principal Consultant)**

U Saw Win is the Principal Consultant at E Guard Environmental Sciences Co. Ltd. He has 27 years of professional experience in Forest Department. He also served as Environmentalist at Total Exploration & Production Myanmar, one of the leading Oil and Gas Company in Myanmar for 12 years. U Saw Win oversees all aspects of eGuard's environmental projects, including peer review, quality assurance, budgets and schedules. His professional experience includes Research in Natural Forests Growth and Yield, Air-photo interpretation, Project Formulation and Appraisal, Environmental Consultant, Environmental Management and Sustainable Development, Environmental Impact Assessment, Industry and Environmental Protection, and Life Cycle Assessment.

#### **U Zin Ko Ko Oo (Associate Consultant)**

U Zin Ko Ko Oo is an Associate Consultant, who received his Bachelor Degree in Forestry from the University of Forestry in 2013. He has more than 2years experience in various environmental fields which include reconnaissance surveys, environmental risk assessment and remediation. His responsibilities is concerning with project management and compilation of the report for development of the projects, including public and stakeholder's consultation. He also has experiences in participating in implementation and preparations of EIA reports and RAP reports and also in communication with clients, regulators such as analytical laboratories and water sampling techniques. He is also familiar with conducting social survey.

### U Myatthu Kyaw (Project Associate, Field Survey Expert)

U Myatthu Kyaw is a Project Associate, who received his Bachelor Degree in Forestry from the University of Forestry (Yezin) in September, 2014. He has National Forestry Inventory experiences in MOECAAF from December 2014 to February 2015 and another experience is to cooperate with clients and to measure and interpret environmental qualities including air quality, water quality and also noise level.

### Daw Phyo Khine Zar Wint (Project Associate, EQ Data Measurement and Interpretation)

Daw Phyo Khine Zar Wint has Bachelor of Engineering Degree in Electronic Communication from Taunggyi Technological University and is a technician (data acquisition and solution) with more than 2 years of experience. She specializes in environmental quality assessment such as water quality, air quality, and noise etc. She is also responsible for data analysis and interpretation of environmental baseline data.

### U Sithu Lwin (Surveyor)

U Sithu Lwin is a matriculate and he has more than 2 years of surveyor experience. He specializes in instrumentation and field data collection of environmental condition of the site and measurement of environment baseline data.

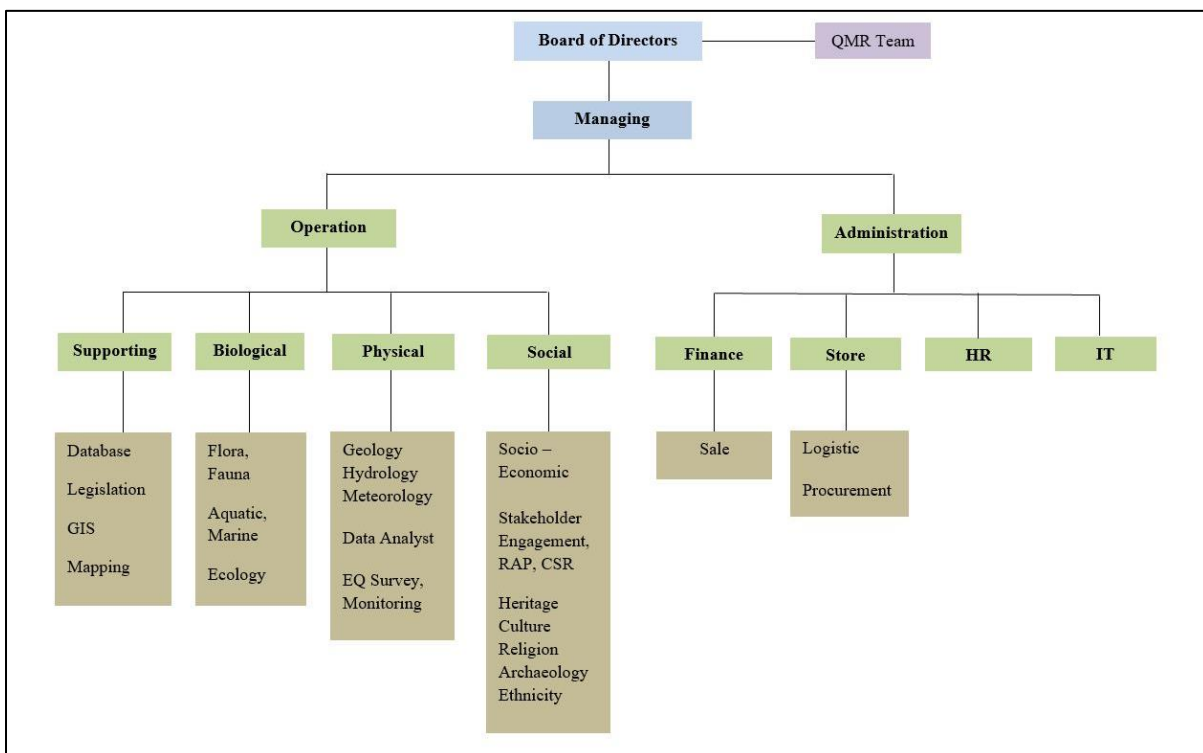


Figure 2. Organization Chart of E Guard (as of 2016)

Full Address of the company conducting IEE is:

E Guard Environmental Services Co., Ltd.  
No. 99, MyaKanThar Lane, NyeinChanYay Street  
10 Miles, Pyay Road, Saw BwarGyi Gone  
Insein Township, Yangon 11011  
Republic of the Union of Myanmar  
Tel: 01 667953, Fax: 01 6667953, Mobile +959 448001676  
URL: [www.eguardservices.com](http://www.eguardservices.com)  
Skype: eguardenvironmental

## 2. Policy, Legal and Institutional Framework

### 2.1 Existing Laws and Regulations concerning with the Environmental Conservation and Hotel Services in Myanmar

The Republic of the Union of Myanmar enacted the Constitution of the Republic Union of Myanmar in 2008. The Constitution requires the Government of Myanmar to protect and conserve the natural environment. Myanmar enacted the Environmental Conservation Law in 2012 and environmental conservation rules and regulations in 2014 that is the main governing law and the Ministry of Natural Resources and Environmental Conservation (MONREC) is the prime governing body of the law enforcement. MONREC is the relevant Ministry that is responsible for environmental management within Myanmar. The others include the constitution (2008), National Environmental Policy (1994), Environmental Conservation Procedures (2015), and Emission Guidelines (2015) to be abided for the formulation of environmental management plan. In the following Table 1, the existing relevant laws and regulations of Myanmar are described.

**Table 1. Existing Relevant Laws and Regulations of Myanmar**

Laws and Regulations	Description
<b>Constitution, 2008</b>	
<b>Section 45</b>	that “the Union shall protect and conserve natural environment.”
<b>Section 390 (b)</b>	Every citizen has the duty to assist the Union carrying out the environmental conservation
<b>National Environmental Policy, 1994</b>	
<i>To achieve harmony and balance between socio-economic, natural resources and environment through the integration of environmental considerations into the development process enhancing the quality of the life of all its citizens.</i>	
<b>Environmental Conservation Law, 2012</b>	
<i>This law concerns for the conservation, management, beneficial use, sustainable use of the environmental natural resources</i>	
<b>Objectives: Section 3</b>	<ul style="list-style-type: none"> <li>a) to enable to implement the Myanmar National Environmental Policy;</li> <li>b) to enable to lay down the basic principles and give guidance for systematic integration of the matters of environmental conservation in the sustainable development process;</li> <li>c) to enable to emerge a healthy and clean environment and to enable to conserve natural and cultural heritage for the benefit of present and future generations;</li> <li>d) to reclaim ecosystems as may be possible which are starting to degenerate and disappear;</li> <li>e) to enable to manage and implement for decrease and loss of natural resources and for enabling the sustainable use beneficially;</li> <li>f) to enable to implement for promoting public awareness and cooperation in educational programmes for dissemination of environmental perception;</li> <li>g) to enable to promote international, regional and bilateral cooperation in the</li> </ul>

Laws and Regulations	Description
	matters of environmental conservation; h) to enable to cooperate with Government departments, Government organizations, international organizations, non-government organizations and individuals in matters of environmental conservation.
<b>Environmental Quality Standards</b>	
<b>Section 10</b>	The Ministry may, with the approval of the Union Government and the Committee, stipulate the following environmental quality standards: a) suitable surface water quality standards in the usage in rivers, streams, canals, springs, marshes, swamps, lakes, reservoirs and other inland water sources of the public; b) water quality standards for coastal and estuarine areas; c) underground water quality standards; d) atmospheric quality standards; e) noise and vibration standards; f) emissions standards; g) effluent standards; h) solid wastes standards; i) other environmental quality standards stipulated by the Union Government.
<b>Monitoring</b>	
<b>Section 13</b>	The Ministry shall, under the guidance of the Committee, maintain a comprehensive monitoring system and implement by itself or in co-ordination with relevant Government departments and organizations in the following matters: b) transport, storage, use, treatment and disposal of pollutants and hazardous substances in industries; c) disposal of wastes come out from exploration, production and treatment of minerals, industrial mineral raw materials and gems; d) carrying out waste disposal and sanitation works; e) carrying out development and constructions; f) carrying out other necessary matters relating to environmental pollution.
<i>Responsibilities of project proponent/business owner for reducing environmental impact</i>	
<b>Section 14</b>	A person causing a point source of pollution shall treat, emit, discharge and deposit the substances which cause pollution in the environment in accord with stipulated environmental quality standards.
<b>Section 15</b>	The owner or occupier of any business, material or place which causes a point source of pollution shall install or use an on-site facility or controlling equipment in order to monitor, control, manage, reduce or eliminate environmental pollution. If it is impracticable, it shall be arranged to dispose the wastes in accord with environmentally sound methods.
<b>Section 16</b>	A person or organization operating business in the industrial estate or business in the special economic zone or category of business stipulated by the Ministry: a) is responsible to carry out by contributing the stipulated cash or kind in the relevant combined scheme for the environmental conservation including the management and treatment of waste; b) shall contribute the stipulated users charges or management fees for the environmental conservation according to the relevant industrial estate, special economic zone and business organization; c) shall comply with the directives issued for environmental conservation according

Laws and Regulations	Description
	to the relevant industrial estate, special economic zone or business.
<b>Environmental Conservation Rules, 2014</b>	
<b>Rule 58</b>	The Ministry shall form the EIA Report Review Body with the experts from the relevant Government departments, organizations.
<b>Rule 59</b>	The Ministry may assign duty to the Department to scrutinize the report of EIA prepared and submitted by any organization or person relating to EIA and report through the EIA Report Review Body.
<b>Rule 61</b>	The Ministry may approve and reply on the EIA report or IEE or EMP with the guidance of the Committee
<b>Myanmar Hotel and Tourism Law, 1993</b>	
<b>Section 3 (b)</b>	b) To enable tourists to observe Myanmar cultural heritage and natural scenic beauty. c) To prevent destruction and damage of Myanmar cultural heritage and natural scenic beauty, due to the hotel and tourism industry. e) To develop technical knowledge relating to hotel and tourism industry and to open up more employment opportunities.
<b>Order for Licensing of Hotel and Lodging-House Business, 2011</b>	
Annexure (A); The minimum standard requirements for the Hotel business	
<i>Location and Building;</i>	
1) Location of the hotel must be suitable for hotel business and the environment must be healthy and hygienic; 2) The building must be in the safety condition and separate with its own stair-case 3) The hotel must be adequately lit and ventilated.	
<i>Bedroom;</i>	
1) All bedrooms must be adequately lit and ventilated; 2) All bedrooms must be built to ensure privacy and safety; All bedrooms must be kept free from mosquitoes, flies and insects; 3) Electric fan or air-conditioner or heater and blanket etc. Must be arranged according to the climate of the place;	
<i>Bath room and Toilet;</i>	
1) A bathroom must be hygienic and adequately lit and ventilated; 2) Shall have toilet, a hand-basin, mirror, shower and bathtub; 3) Shall have water-purified system and hot water/cold water. 4) A toilet must be hygienic and adequately lit and ventilated;	
<i>Dining Room;</i>	
1) Food and beverage provided must be fresh, clean and hygienic; 2) Restaurant and Dining room must be kept clean and hygienic and provide the protective system from mosquito, fly and any insects; 3) Dining room and kitchen must be separate.	
<i>Kitchen;</i>	
1) Arrangements must be made to keep the kitchen clean, hygienic, adequately lit and ventilated to protect from insects and free from bad smell; 2) Food and beverage provided must be fresh, clean and hygienic; 3) Kitchen equipment, crockery and cutlery of the restaurant must be clean and hygienic; 4) A system must be made to provide a sufficient supply of hot and cold running water; 5) Areas for cooking place, washing dishes and for food must be placed separately;	

Laws and Regulations	Description
	6) A system must be made for disposal of leftover food rubbish. 7) There must be adequate store room and refrigerator connected with the kitchen; 8) Finished foods must be stored as warmer for fresh and not poison.
	<i>Security and Fire prevention arrangements;</i> 1) Shall provide arrangement for security of guests and their properties; 2) Shall arrange fire preventive planning in accordance with stipulations of relevant departments; 3) Shall rehears trainings for fire security services 4) If the building is over 3-storeyed shall install emergency exit. 5) The emergency stair must be strong for use actually. Shall arrange prevention and security of worksite for staffs.
<b>The Land Nationalization Act, 1953</b>	
With some exceptions stipulates that all types of agricultural land are owned by the President. Mentions that in case of a breach of the regulations, even the land exempted from government confiscation will be forfeited to the country without compensation. States that the President reserves rights to decide the crops to be grown on agricultural lands.	
<b>Myanmar Citizens Investment Law, 2013</b>	
<b>Law (18); Prohibition</b>	a. Business which can affect the traditional culture Business which can affect the traditional culture and customs of the national races within the Union; b. Business which can affect public's environment, causing noise in the residing area; c. Business which can affect public health; d. Business which can cause damage to the natural environment and ecosystem; e. Business which can affect the land and marine animals, trees, flowers, crops, antique heritage, resources; f. Business which can bring the hazardous or poisonous waste into the Union; The factory which produce or the business which use hazardous chemicals under international agreements.
<b>Foreign Investment Law, 2012</b>	
<b>Section 8</b>	a. To support the primary objectives of the national economic development plan, and for businesses that cannot yet be run by the State and citizens or businesses that have insufficient funds and technology. b. Development of employment activities. 1. Protection and conservation of the environment. q. Appearing the required modern services for the Union and citizens.
<b>Section 9</b>	b. To carry out a joint venture between a foreigner and a citizen or the relevant Government department and organization.
<b>Section 17</b>	a. To abide by the existing laws of the Republic of the Union of Myanmar. b. To carry out the business by forming a company under the existing laws of Myanmar by the investor. h. To carry out not to cause environmental pollution or damage in accord with existing laws in respect of investment business. k. To carry out the systematic transfer of high technology relating to the business which are carried out by the investor to the relevant enterprises, departments or organizations in accord with the contract.

Laws and Regulations	Description
<b>Underground Water Act, 1930</b>	
Protection of underground sources of water supply; This act prohibits sinking of a tube for the purpose of obtaining underground water except under and in accordance with the terms of a license granted by the water officer, Township Officer or sub-divisional officer had power to close a license tube after exercising jurisdiction over the local area concerned and the expense of such closure shall be recoverable from the owner of the tube as if it were an arrear of land-revenue.	
<b>The Social Security Law, 2012</b>	
<b>Section 53 (a)</b>	The employers and workers shall co-ordinate with the Social Security Board or insurance agency in respect of keeping plans for safety and health in order to prevent employment injury, contracting disease and decease owing to occupation and in addition to safety and educational work of the workers and accident at the establishment.
<b>Labor Dispute Settlement Law, 2012 revise version on 1929</b>	
The Pyidaungsu Hluttaw hereby enacts this Law for safeguarding the right of workers or having good relationship between employer and workers and making peaceful workplace or obtaining the rights fairly, rightfully and quickly by settling the dispute of employer and worker justly.	
<b>National Food Law, 1997</b>	
<b>Food Safety Responsibilities</b>	a) Recommendation on imported and exported food b) Post market surveillance (risk assessment) c) HACCO along with general practice for food inspectors and manufactures d) Food safety training for restaurants, street, vendors, etc.
<b>Prevention of Hazard from Chemical and Related Substances Law, 2013</b>	
<b>Food and Environmental Safety Responsibilities</b>	a) Chemical management and storage. b) Registration of chemicals.
<b>World Bank Safeguard and Sustainability Policies, 2010 Appendix A</b>	
<b>OP/BP 4.11 Physical Cultural Resources</b>	To assist in preserving physical cultural resources and avoiding their destruction or damage. Physical cultural resources include resources of archeological, paleontological, historical, architectural, religious (including burial sites), aesthetic, or other cultural significance.

## 2.2 International Guidelines

The following suitable international guidelines and standards will be referred for implementation of the Environmental Management Plan (EMP) of the proposed project.

- World Bank Safeguard Policies;
- The IFC performance standards;
- IFC, Environmental Health and Safety Guideline for Tourism and Hospitality Development

## 2.3 Permits and Status

Currently, Myanmar is under transitional period and so, all the permits are still pending from the previous government and waiting from the new government. For the permit to construct hotel in Bagan City, the land use was already changed to other type of land use for development of the city since the land were bought. There are some limitations in the permit

for building construction in Bagan promulgated by Archaeological Department and City Development Committee such that the height of buildings must not be exceeded than 15 meters (45 feet) and these buildings must be 30 meters (90 feet) far from any temples but hotel construction is totally banned in ancient monument zone and protected zone. The license for selling excise and other liquors is still in progress and that license should be ready before the bar is opened.

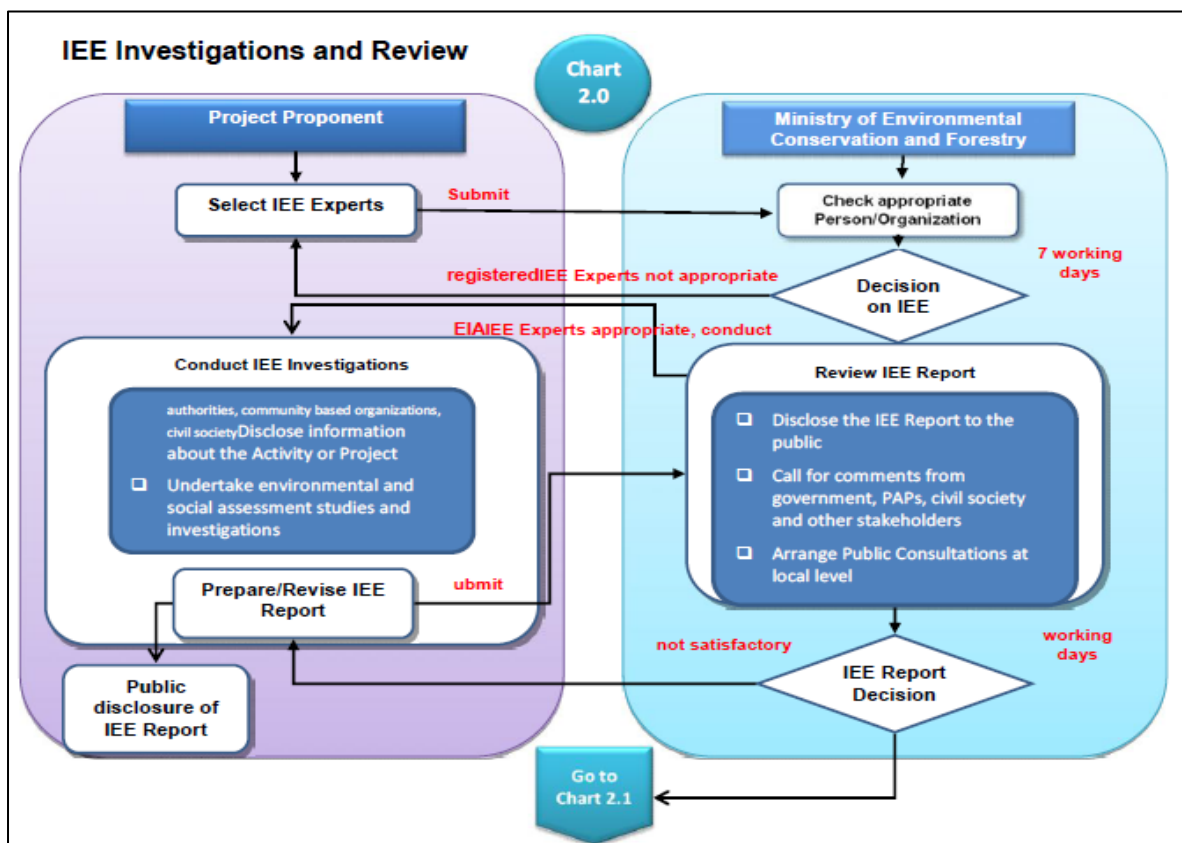
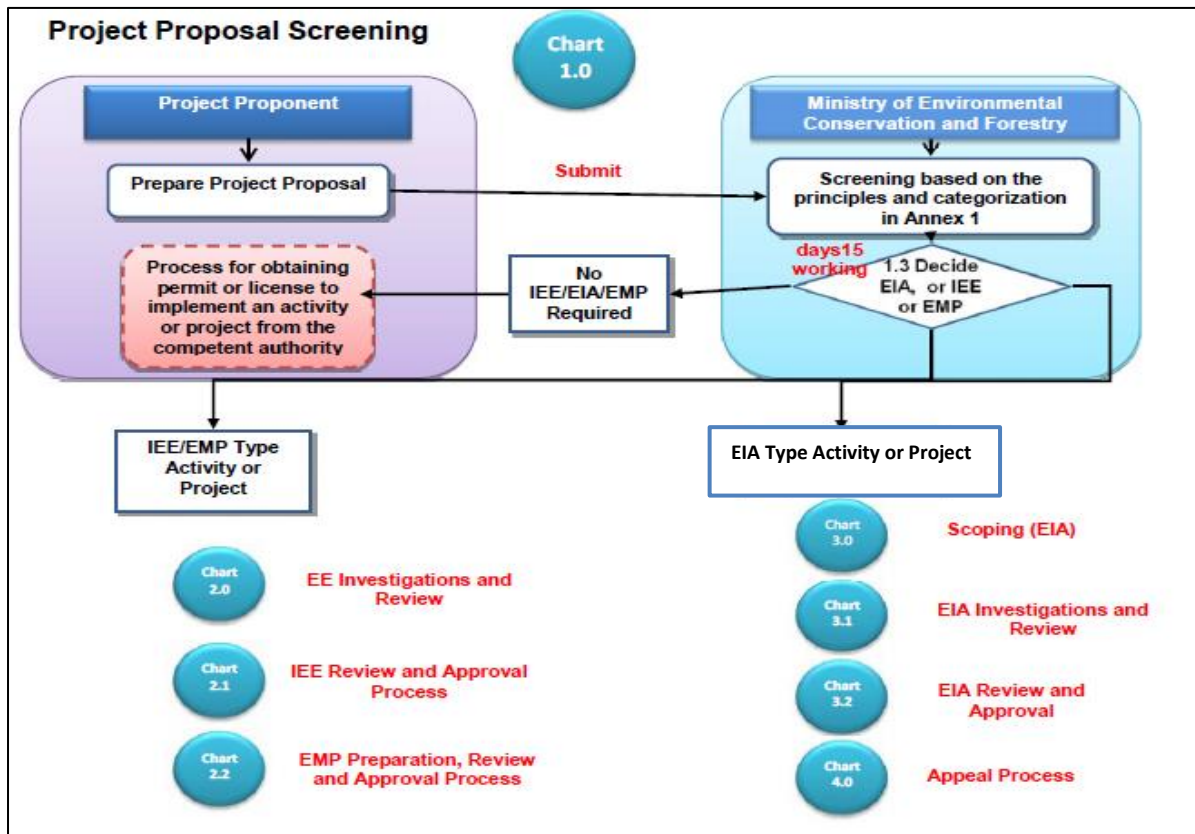
**Table 2. Relevant Law and Regulations for License and Permitting for Hotel Services**

Laws and Regulations	Description
<b>The Protection and Preservation of Cultural Heritage Regions Law, 1998</b>	
<b>Applying for Prior Permission, Scrutinizing and Issuing</b>	
<b>Section 15</b>	A person desirous of carrying out one of the following shall abide by the provisions of their existing laws and also apply in accordance with the stipulations to the Department to obtain prior permission under this Law:- a) renovation of a building other than an ancient monument or extension of the boundary of its enclosure in the ancient monumental zone or the ancient site zone; b) within the protected and preserved zone, constructing, extending, renovating a building other than a hotel, motel, guest house, lodging house or industrial building or extending the boundary of its enclosure; c) digging well, pond and fish breeding pond or extending the same within the cultural heritage region.
<b>The Myanmar Tourism Law, 1990</b>	
<b>Application for License</b>	
<b>Section 6</b>	A person desirous of operating any of the following businesses of tourism industry for international tourists or foreign visitors shall apply for a license to the Directorate in the prescribed form:- a) Tourist Enterprise; b) Hotel Business; c) Lodging-House Business; d) Tourist Transport Business; e) Tour Guide Business; f) Businesses, prescribed from time to time as a Tourism Industry by the commission
<b>Section 7</b>	The Directorate may prescribe the types of business to be operated under a license for domestic tourists among the businesses contained in Section 6.
<b>Duties and Rights of License Holder</b>	
<b>Section 9</b>	The license-holder shall abide by the conditions contained in the license.
<b>Section 10</b>	The license-holder shall abide by the order, notification and directives issued from time to time by the Commission or the Directorate.
<b>Procedure relating to the Myanmar Tourism Law, 1990</b>	
<b>Requirements for a License to operate a hotel</b>	
<b>Section 8</b>	1) License issued by the township municipal concerned if it is a lodging-house. 2) Registered in accordance with the Myanmar Company Act if it is a limited company or joint-venture. 3) Certificate of the standard of health hygiene for the hotel or lodging-house by the

Laws and Regulations	Description
	department concern.
<b>Myanmar Hotel and Tourism Law, 1993</b>	
<b>Functions and Duties of the Ministry</b>	
<b>Section 6</b>	The functions and duties of the Ministry are as follows: - e) permitting, causing alterations to be made or refusing a project proposal applied for in order to obtain prior permission by a person desirous of operating a hotel business or a lodging-hose business; f) determining the type, classification or business requirements for each hotel business or lodging house business.
<b>Functions and Duties of the Directorate</b>	
<b>Section 7</b>	The functions and duties of the Directorate are as follows: - b) forming License Scrutiny Bodies in order to scrutinize cases of applications for license and determining the functions and duties thereof; c) issuing license, refusing to issue license; revoking the license subject to a time limit or cancelling the license.
<b>Application for Prior Permission</b>	
<b>Section 8</b>	A Government Department, Government Organization, an organization in joint-venture with the Government, Municipality, Co-operative Society, other organization or person desirous of operating a hotel business or lodging-house business shall, before commencing implementation of the project proposal apply for prior permission to the Ministry in the manner prescribed.
<b>The Burma Excise Act, 1917</b>	
<b>Licenses, Permits And Passes</b>	
<b>Section 28</b>	1) The authority which granted any license, permit or pass under this act may cancel or suspend it in such circumstances as may be prescribed by rule in that behalf. 2) When a license, permit or pass held by any person is cancelled under sub-section (1) any other license, permit or pass granted to such person under this act or under any other law for the time being in force relating to excise-revenue or opium shall be liable to cancellation.
<b>Building Regulations, 2014</b>	
The developer should follow the instructions made by concerned departments for the following activities: installation of electrical meters, installation of transformers, emergency exits, to develop systems for disposal of sewage and waste, fire safety system and matters relating to road and bridges.	

### 2.3.1 Environmental Compliance Certificate Processes

The following flow chart indicate the processes for getting certificate of Environmental Compliance.



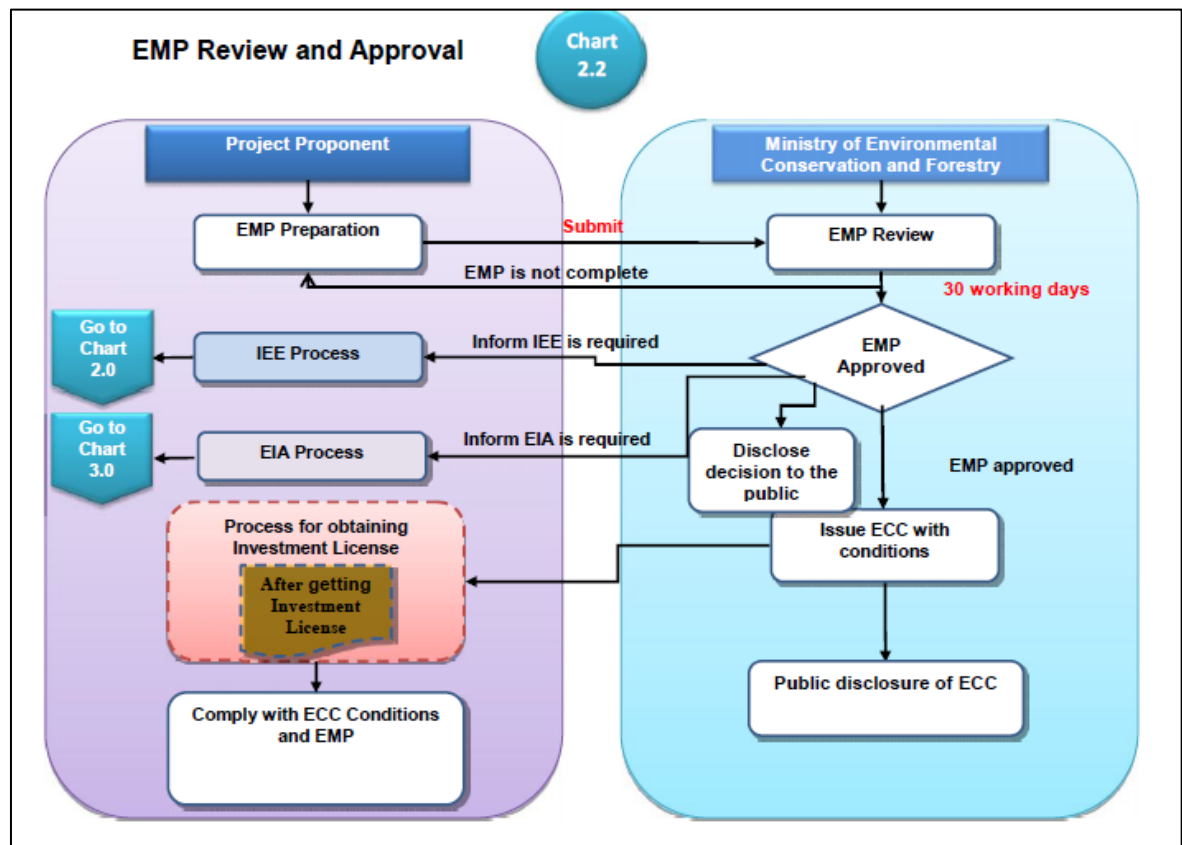
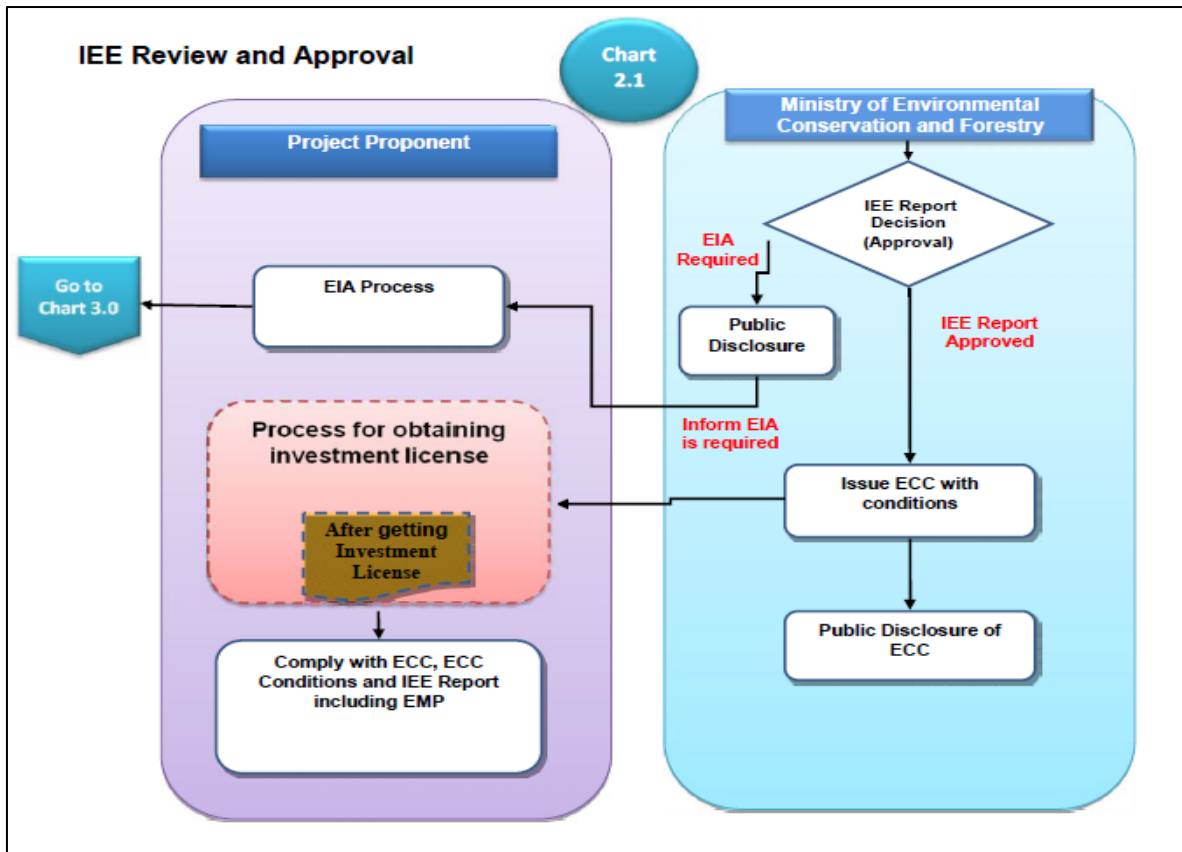


Figure 3. Process Flow Chart for IEE

### **3. Project Description, Objectives and its requirements**

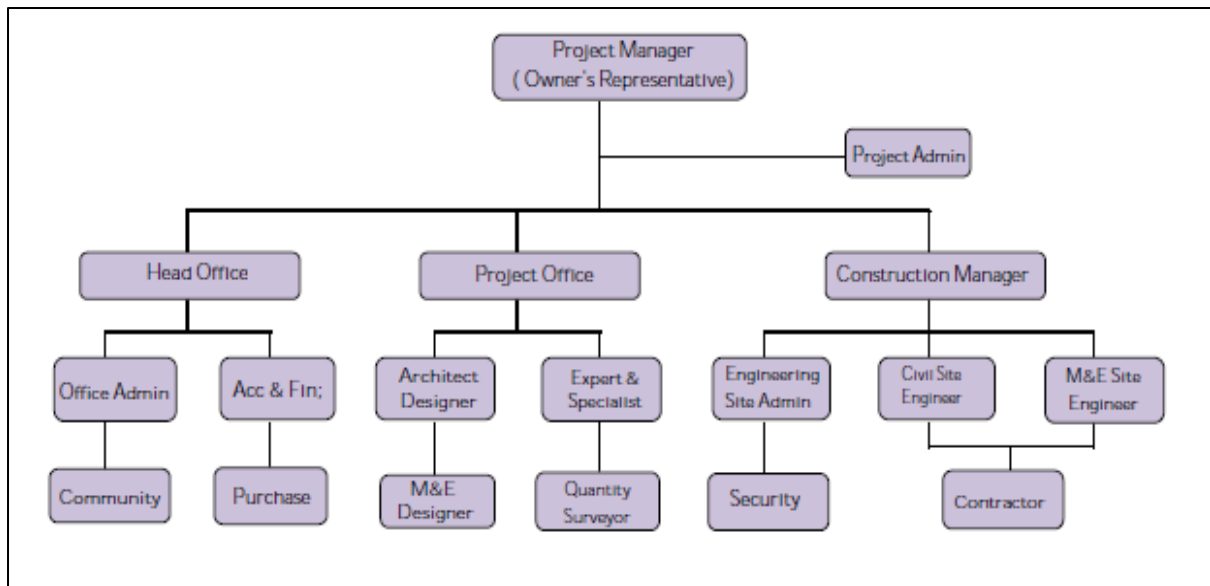
#### **3.1 History of Land**

The Amata International Company Limited will occupy 6.711 acres of land to construct hotel with international standard of 4-star hotel services in Bagan, Ancient City, named Amata Garden Resort, Bagan. The total area of the land utilized is 6.711 acres comprising. Among them, 6.55 acres of the land is located in Tha Htay Kan Village, Pwa Saw Village Track, New Bagan City and 0.161 acre of the land is located in Thamutdarit Block, Kyan Sittar Quarter, New Bagan City. The whole land, however, is in New Bagan City. That means about 97.5% of the hotel area is in Tha Htay Kan Village and only 2.5% of the hotel area is in the Thamutdarit Block. The foremost owners of the 97.5% of the hotel area are farmers from Tha Htay Kan Village and Pwa Saw Village. When tracking about history of the land, it was heard from elder villagers that these proposed areas of 6.55 acres were owned by five famers; one (U Tin Aung) from Tha Htay Kan Village and other four (U Nyun Hlaing, U Htun Thein, U Aye Phay and U Htun Sein) from Pwa Saw Village. Nonetheless, the exact data concerning how many acres of land in possession by those famers were not clearly known. Around 1990, anyhow, U Khin Maung Maung, a business man, the second owner of the land, bought this land from the farmers with the purpose to construct a brick making factory. This land use pattern of the land was already changed from farm land to other development use according to the provision of La/Na-39 by Settlement and Land Recorded Department (SLRD). And then, U Win Aung, Managing Director of Amata International Company Limited bought again from U Khin Maung Maung in 2007. Then finally, this land was transferred to Amata International Company Limited as company's possession by U Aung Win in 23<sup>rd</sup> February 2016.

Then, the remaining area of 0.161 acre (currently proposed for entrance road to the hotel) falling in the area of New Bagan City. Firstly, acquisition of the land was done by the government in order to make development of the city and provide land tenure grant to the residents of that area. Then, U Khin Maung Maung bought the land tenure grant from the first grant holder. Then, U Win Aung brought 0.161 acres again from U Khin Maung Maung in the same year and transferred to Amata International Company Limited in the same year in the same day.

### 3.2 Project Description

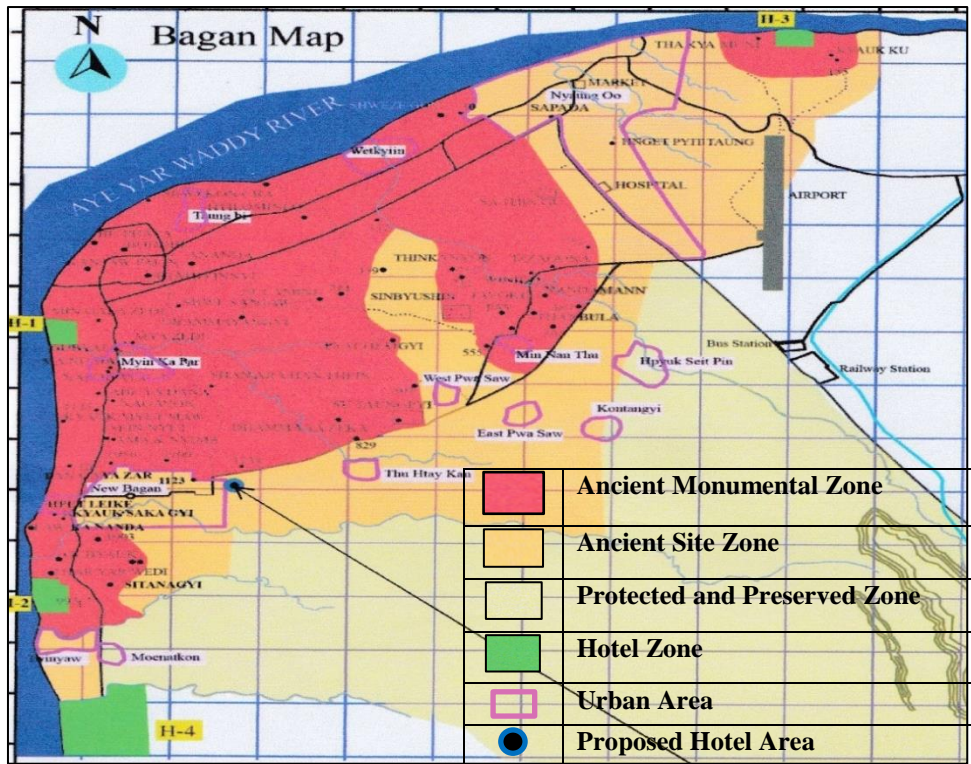
The Amata International Company Limited has transferred the Plot-1544, Oo-Paing numbers 7/6 and 7/7, Tha Htay Kan Village, Pwa Saw Village Track, New Bagan City (village area) and Oo-Paing number 97, plot number 9, Thamutdarit Block, Kyan Sitthar Quarter, New Bagan City, Nyaung-U Township, Nyaung-U District (city area) from U Win Aung to carry out hotel business. The authorized capital investment is 15,344,798 USD. The project’s target business involves mainly hotel services. The project will not only provide employment opportunities for the people but also contribute government with revenues and taxes.



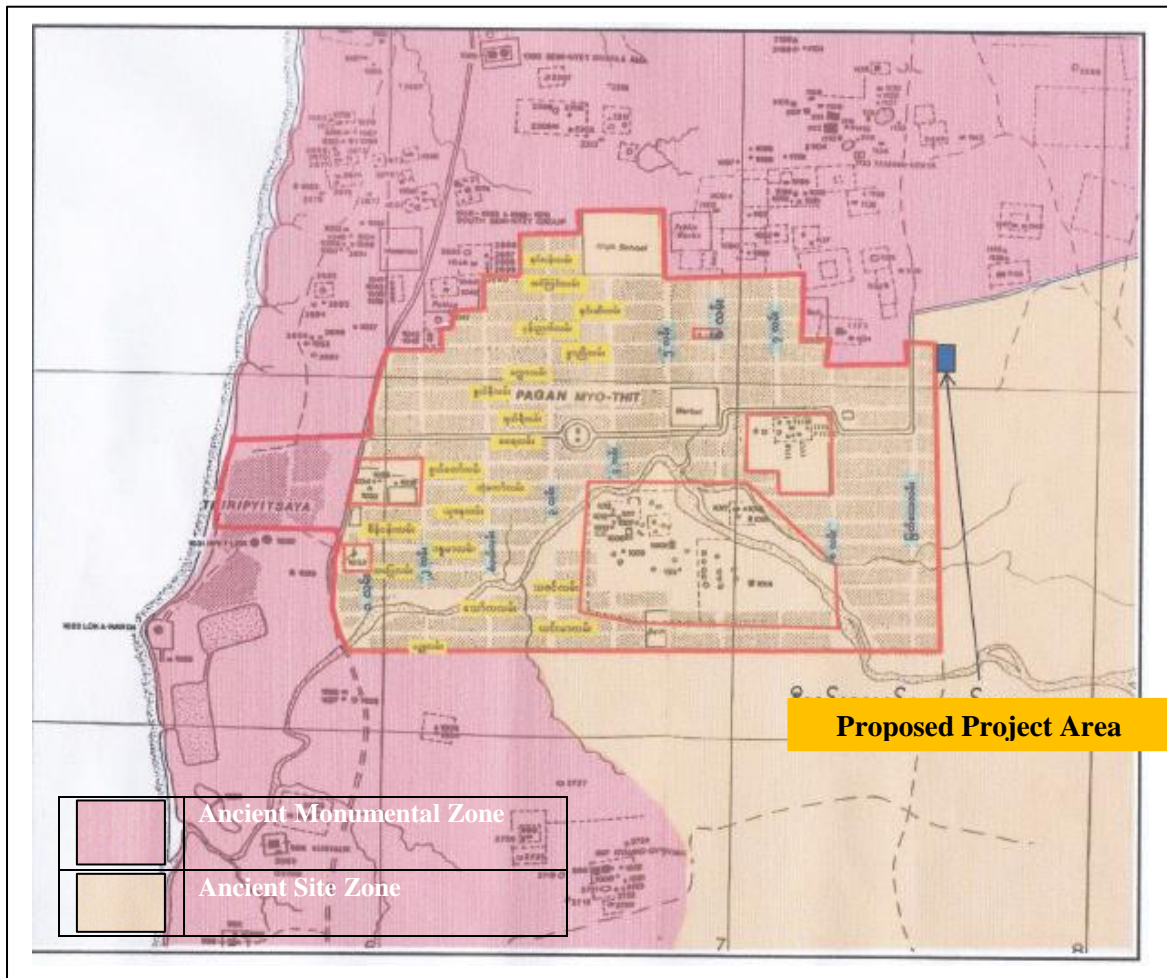
**Figure 4. Organization Chart of the Proponent (for construction phase)**

### 3.3 Location of the Project

Amata Garden Resort, Bagan is located near the New Bagan City, Nyaung-U Township, Nyaung-U District, Mandalay Region, the Republic of the Union of Myanmar at the coordinates of 21° 8' 0.74" N Latitude and 94° 52' 17.52" E Longitude and covering a total land area of 6.711 Acres, falling in the Ancient Site Zone (AZ). About 2.5% (0.161 acre) of the hotel area is located in Thamutdarit block and about 97.5% (6.55 acres) is in Tha Htay Kan Village. However, the project area is totally fall under New Bagan City.



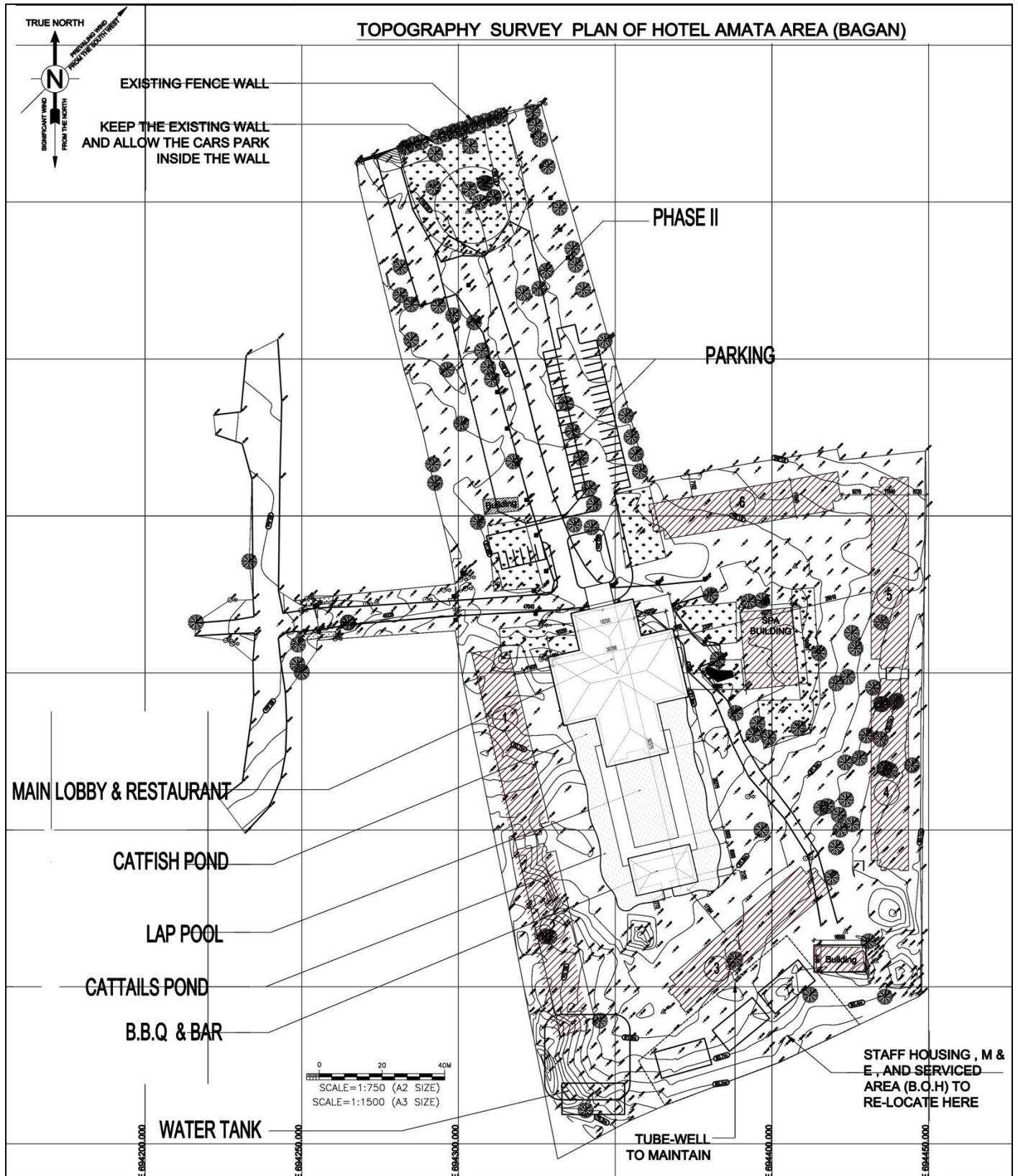
**Figure 5. Location Map of the Proposed Hotel Area**



**Figure 6. Location of the Proposed Project Area with New Bagan City**



**Figure 7. Location of the Proposed Hotel on Google Map**



**Figure 8. Layout Master Plan**



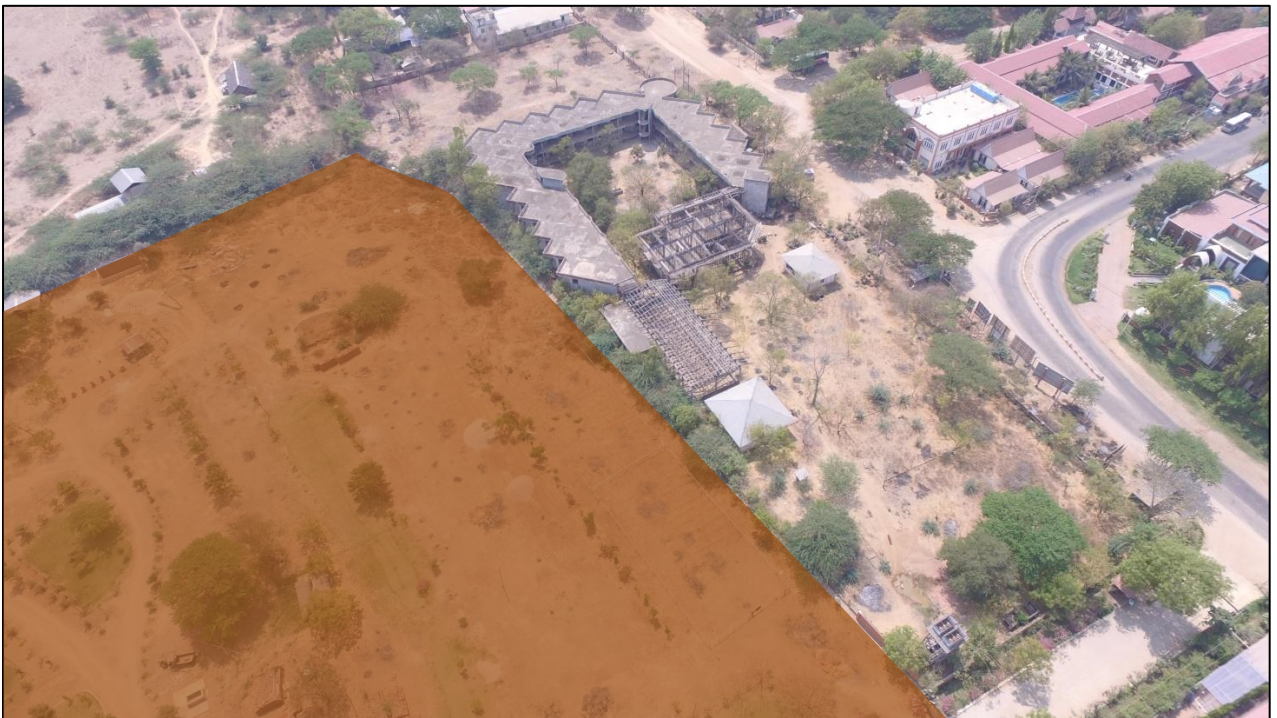
**Figure 9. Current Situation of the Project**



**Figure 10. Proposed Main Lobby, Restaurant and Ponds Areas**



**Figure 11. Phase II and Surroundings of the Hotel**





**Figure 12. Aerial photos Showing Current Condition of Construction Site**

### 3.4 Project Component

#### 3.4.1 Construction Phase

The construction phase has planned into two phases according to investor plan. Phase I will include construction of six hotel buildings, each will be two-storey with a total of 144 guest rooms, construction of the spa building, construction of the lap pool and lotus pond and renovation of lobby and restaurant. The time taken for the phase I is estimated to be one and half years. In the phase II, there will be only one hotel building, two-storey with 96 rooms.

Construction division of Amata International Co., Ltd. will take care of constructing all buildings. All building materials include wood and brick with reinforce concrete (RC) type in order to withstand earthquakes. Hotel buildings are planned to be equipped with up-to-date electrical and communication system, fire protection system including fire extinguishers and fire hoses to be installed in all buildings and air conditioning system with environmental friendly refrigerants.

Amata Hotel Group ( Bagan Project )															
24 units x 6 nos =144 units ( 2 ) Storeyed Building Time Schedule															
Item No	Description	Time Schedule Month												Remark	
		1	2	3	4	5	6	7	8	9	10	11	12		
<b>A</b>	<b>Sub-Structure Work</b>														
1	Site preparations ( Soil Test )														
2	Earth Work & Foundation Work														
<b>B</b>	<b>Structure Work</b>														
1	Column for Footing to Ground Floor with Ground Beam														
2	Ground Floor Concrete work (Including M & E Piping work)														
3	Steel Structure work (Product & Fixing )														
4	Column Concrete Work for Ground to 1st Floor														
5	1st Floor Slab Concrete work (Including M & E Piping work)														
6	Column Concrete Work for 1st Floor to 2nd Floor														
<b>C</b>	<b>Brick Work &amp; Chawket install</b>														
1	Ground Floor														
2	1 st Floor														
<b>D</b>	<b>Wall Piping Work for M &amp; E</b>														
1	Ground Floor														
2	1 st Floor														
<b>E</b>	<b>Plaster Work For Internal Wall</b>														
1	Ground Floor														
2	1 st Floor														
<b>F</b>	<b>Plaster Work For External Wall &amp; Scaffolding work</b>														
	Scaffolding Work														
	Plastering Work														
<b>G</b>	<b>Roof Truss &amp; Roofing work</b>														
	Column , Truss ,Rafter , Purlin														
	OSB , Asian Theat														
<b>H</b>	<b>Floor Topping Work</b>														
1	Ground Floor														
2	1 st Floor														
<b>I</b>	<b>Flooring Work</b>														
1	Ground Floor														
2	1 st Floor														



### 3.4.2 Operation Phase

During operation phase of the hotel will include operation of 4-star grade hotel services, and will include the following components.

no.	Component	Area ( sq. m )	Remark
a	Hotel Buildings	8400.00	144 rooms
b	Kitchen Rooms	149.00	Main =122.5sqm, BBQ =26.5sqm
c	Restaurants	544.00	Main = 452sqm, B.B.Q = 92sqm
d	Lobby	198.00	
e	Staff Quarters & Back Office	2266.00	
f	Spa Room	395.00	To renovate existing spa building
g	Pools	864.00	Deck=448 sqm , Pool=-416.68 sqm
h	Car Parking	1000.00	
<b>Sub Total</b>		<b>13816.00</b>	
i	Hotel Building	5344.00	96 rooms (Phase II)
j	Landscaping and other utility	7998.00	Including Phase I and Phase II
Total Land Area		<b>27158.00</b>	<b>6.711 acres</b>

During operation phase, the utilities will be included,

- (a) Laundry room - 1 room
- (b) Wastewater treatment plants (12 for hotel buildings, 1 for kitchen, another one for lobby- **Totally 14**)
- (c) Toilet - 25 rooms
- (d) Staff House - existing one and new one will be constructed and plan to give accommodation for 24 staff. *(It is planned to employ 75% of the local people and so, for the local people, accommodation was not required.)*
- (e) Canteen - 1 room
- (f) Generator house - 1 room

### **Occupancy Rate**

The occupancy rate for Amata Garden Resort, Bagan during hotel operation phase is estimated as 60% in high season and 15% in low season.

## 3.5 Utilities

### 3.5.1 Construction Phase

#### 3.5.1.1 Water Supply

The water requirement for the all construction activities and workers except drinking water will be supported from the existing tube wells; one installed 6-inch diameter (Ø) pipe and

another three installed 2-inch diameter (Ø) pipe. The drinking water for the onsite workers will be supported from outsources as purified water. There is one ground tank existing at the center of the hotel area and one overhead tank near the staff quarter. This tank is meant for temporary storage of water during primary stage of construction. After some part of construction phase, this tank will be demolished and it will be replaced by a pond.

### **3.5.1.2 Employment**

For the construction phase, the proponent aimed to hire subcontractor and it is estimated that 150 persons (both skilled and unskilled) will be employed.

### **3.5.1.3 Electricity Supply**

The electricity supply for construction phase will be from the national grid and one emergency generators will be installed as standby.

## **3.5.2. Operation Phase**

### **3.5.2.1 Water Supply and Requirement**

There are the same water supply sources for operation phase as the construction phase. These wells are meant for use in washing, bathing, cooking, gardening, toilets water and other cleaning activities. Drinking water as purified water will be outsourced. There is a plan to construct a big ground level tank with a capacity of 31,200 gallons (size of ground level tank 16'x24'x13'). This ground level tank is meant for guest only. It is planned to install wastewater treatment system for wastewater and grey water. The treated water will be used in gardening, vehicles washing and watering to the roads not to be dusty. The chemical used for treating pond water is liquid chlorine so as to clean up the water and these water will be reserved as standby for firefighting in case of fire.

The water requirement for the operation phase is listed as shown in below.

1. Guests	=	31,200 Gallons	(145.70m <sup>3</sup> )
2. Staffs & B.O.H	=	6,000 Gallons	(28.02 m <sup>3</sup> )
3. Fire Fighting ( <i>reserved</i> )	=	12,000 Gallons	(56.04 m <sup>3</sup> )
4. Landscape Irrigation	=	19,200 Gallons	(89.66 m <sup>3</sup> )
5. Raw Water ( <i>reserved</i> )	=	12,000 Gallons	(56.04 m <sup>3</sup> )
<b>Total water storage</b>	=	<b>80,400 Gallons</b>	<b>(375.47 m<sup>3</sup>)</b>

*Water Consumption by the guests-* At first, the hotel will be operated with 144 rooms (Phase I). Let's say 2 guests in a room and so, total guests during operation phase with

60% occupancy rate of high season will be 174 guests. The hotel was estimated to supply 70 gallons of water (approximately 0.33 m<sup>3</sup>) per capita per night. So, total water requirement for 60% occupancy will be 12,200 gallons (approximately 56.94 m<sup>3</sup>) per night.

For low season with 15% occupancy rate, totally 43 guests will stay in the hotel. And so, total water requirement for low season will be 3,000 gallons (approximately 14.00 m<sup>3</sup>) of water per night.

After phase II construction was finished, the hotel will operate with 240 rooms with 60% occupancy rate in high season and so, 288 guests will occupy at the hotel. Thus, the water consumption after phase II constructed will be increased to 20,200 gallons (94.10 m<sup>3</sup>) per night. During low season, the water consumption will be only 5,040 gallons (23.52 m<sup>3</sup>) per night.

During full capacity of hotel's operation, other uses (water) for the hotel will include 3000 gallons (14 m<sup>3</sup>) of water per night will be required for the kitchen, 4000 gallons (18.67 m<sup>3</sup>) of water per night will be used for the laundry, and 1500 gallons (7 m<sup>3</sup>) of water will be used in spa.

#### ***3.5.2.2 Employment***

Hotel employees will be 120 – 150 during the operation phase. Most of the employees and workers will be local people for both construction and operation phases.

#### ***3.5.2.3 Energy Requirement***

There will be two vehicles and one (200 kVA) generator. It is estimated that the use of diesel will be 3000 gallons per year. It is also estimated that the use of petrol will be 100 gallons per year. This petrol will be used for grass cutters and motorbikes.

**Table 3. Annual Fuel Consumption**

No.	Particular	Quantity (no.)	Consumption (gallon)	Duration	Remark
1.	Vehicles	2	960	8 months	High Season
	Vehicles	2	240	4 months	Low Season
2	Generator	1	1600	8 months	High Season
	Generator	1	200	4 Months	Low Season
<b>Total</b>			<b>3000</b>	<b>Annually</b>	

#### 3.5.2.4 Electricity Supply

The electricity supply during full operation will be from the national grid. There will be one transformer 315 kVA near the second entrance. There will be one standby 200 kVA generators for backup in case of power cut.

**Table 4. Annual Electricity Requirement**

No.	Duration	Consumption (unit)	Remark
1.	8 months	1440	High Season
	4 months	240	Low Season
<b>Total</b>		<b>1680</b>	
		<b>147840</b>	<b>Annually</b>

(Note: 368 kVA = 1 unit \* 80 \* 1.1 = 88 units)

### 3.6 Fire Prevention and Protection Management

All buildings should be designed, constructed, and operated in full compliance with local building codes, local fire department regulations, local legal/insurance requirements, and in accordance with an internationally accepted life and fire safety (L&FS) standard (IFC). The proponent should prepare a Life and Fire Safety Master Plan identifying major fire risks, applicable codes, standards and regulations, and mitigation measures. The Master Plan should be prepared by a suitably qualified professional, and adequately cover, but not be limited to, the issues addressed briefly in the following points.

**The suitably qualified professional** selected to prepare the Master Plan is responsible for a detailed treatment of the following illustrative, and all other required, issues.

Fire prevention addresses the identification of fire risks and ignition sources, and measures needed to limit fast fire and smoke development. These issues include:

- Fuel load and control of combustibles
- Ignition sources
- Interior finish flame spread characteristics

- Interior finish smoke production characteristics
- Human acts, and housekeeping and maintenance

Means of Egress includes all design measures that facilitate a safe evacuation by residents and/or occupants in case of fire or another emergency, such as:

- Clear, unimpeded escape routes
- Accessibility to the impaired/ handicapped
- Marking and signing
- Emergency lighting

Detection and Alarm Systems encompass all measures, including communication and public address systems needed to detect a fire and alert:

- Building staff
- Emergency response teams
- Occupants
- Civil defense

Compartmentation involves all measures to prevent or slow the spread of fire and smoke, including:

- Separations
- Fire walls
- Floors
- Doors
- Dampers
- Smoke control systems

#### Fire Suppression and Control

Fire suppression and control includes all automatic and manual fire protection installations, such as:

- Automatic sprinkler systems
- Manual portable extinguishers
- Fire hose reels

#### Emergency Response Plan

An Emergency Response Plan is a set of scenario-based procedures to assist staff and emergency response teams during real life emergency and training exercises. This chapter of the Fire and Life Safety Master Plan should include an assessment of local fire prevention and suppression capabilities.

#### Operation and Maintenance

Operation and Maintenance involves preparing schedules for mandatory regular maintenance and testing of life and fire safety features to ensure that mechanical,

electrical, and civil structures and systems are at all times in conformance with life and fire safety design criteria and required operational readiness.

For the fire safety and firefighting, the proponent planned to install 26 fire hydrants and 48 foam-type fire extinguishers to be installed. Fire alarm systems and smoke detectors will be installed in all buildings. As the project area is located in the Central Dry Zone of Myanmar, the proponent should strictly follow the guidelines from the Fire Services Department for fire safety and international standard of Life and Fire Safety Requirements.

## 4. Description of the Environment

### 4.1 Methodology for Data Collection and Analysis

The following is the methodology used for data collection and analysis in order to prepare this IEE report;

Onsite Baseline Data Measurement – Environmental baseline parameters such as air quality, noise and water quality of the existing project are measured on site before the start of the project activities. Air quality (concentration of SO<sub>2</sub>, NO<sub>2</sub>, CO and CO<sub>2</sub> in the ambient air) and noise are measured at the project location with the relevant devices with frequencies according to the Standard Operating Procedures. Water samples are collected and some parameters of water quality are measured on site and some parameters are sent to respective laboratories and results are mentioned in this Chapter. The baseline environmental quality for the study period of 15<sup>th</sup> March 2016 had been assessed within the proposed project site.

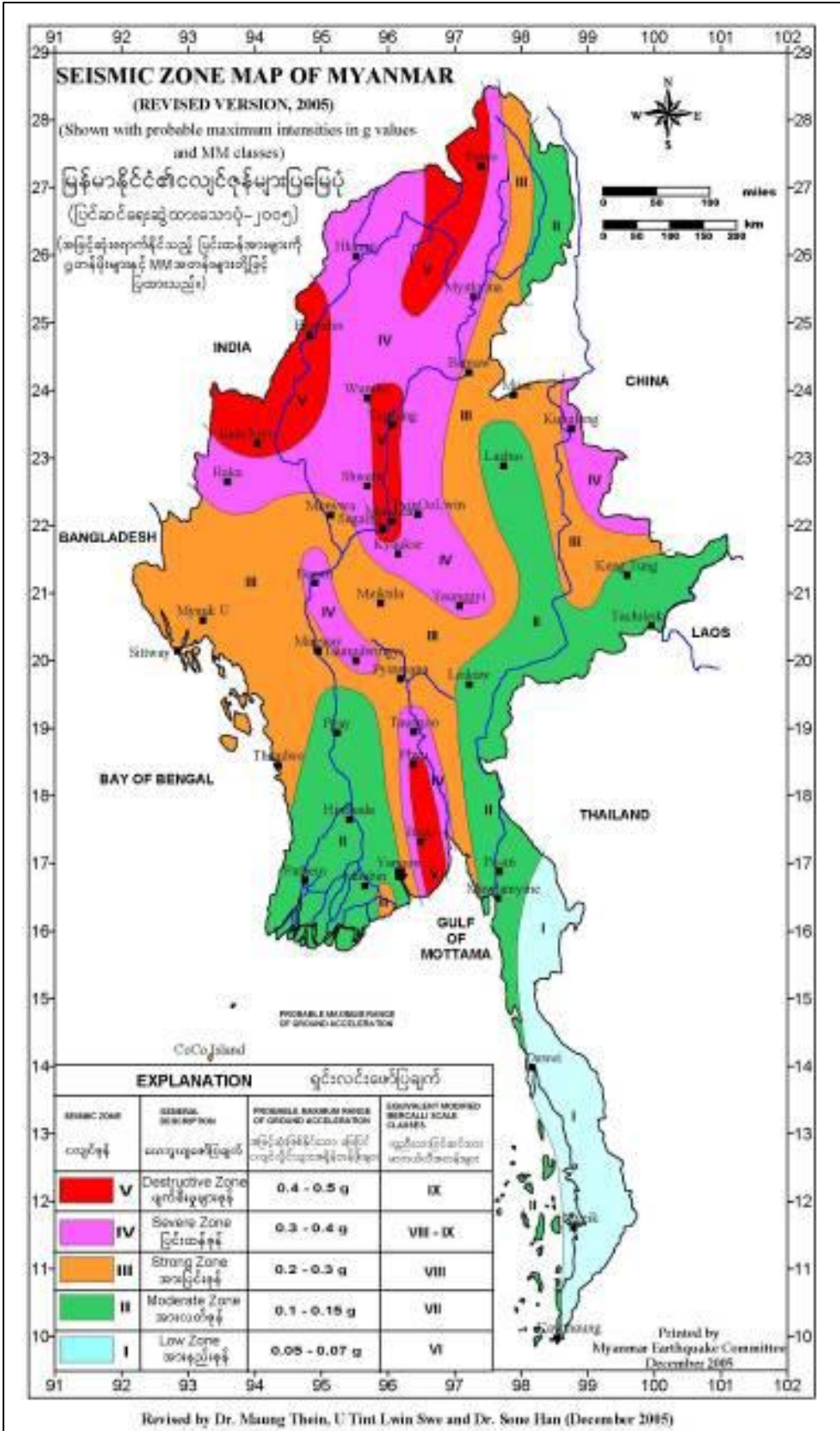
**Table 5. Environmental Measured Locations**

Environmental Quality	GPS Value	Measured Devices	Location
<b>Particulate Matters and Gases</b>	21° 08' 1.55" N 94° 52' 17.38" E	EPAS HAZ scanner ( <i>onsite</i> )	Within proposed site
<b>Noise (source)</b>	21° 08' 00.25" N 94° 52' 17.79" E	Digital Sound Level Meter ( <i>onsite</i> )	Within proposed site
<b>Noise (receptor)</b>	21° 08' 02.29" N 94° 52' 4.21" E	Digital Sound Level Meter ( <i>onsite</i> )	Outside of proposed site, near security gate
<b>Water (site)</b>	21° 07' 59.11" N 94° 52' 19.38" E	<i>Sent to laboratory</i>	Within proposed site
<b>Water (community)</b>	21° 08' 01.10" N 94° 52' 09.18" E	<i>Sent to laboratory</i>	Outside of proposed site, at Thamudarit Block

### 4.2 Physical Component

#### 4.2.1 Earthquake Intensity of Myanmar

The origin and occurrence of earthquakes occurred in Myanmar including Central Dry Zone of Myanmar and other parts of the country can be interpreted as below. Earthquake intensity in the area can be seen in Figure 15.



**Figure 14. Seismic Zone Map of Myanmar**

(source: Dr. Maung Thein,, U Thin Lwin and Dr. Sone Han\_2015)

The approach is mainly empirical and historical in the sense that it makes use of past seismic events and history to make educated guesses about region wide intensities in the future. It is hoped that a probabilistic seismic risk (or earthquake hazard map) on horizontal ground acceleration should be taken into account in the design. As shown in the map, five seismic zones are demarcated and named (from low to high) **Zone I (Low Zone)**, **Zone II (Moderate Zone)**, **Zone III (Strong Zone)**, **Zone IV (Severe Zone)**, and **Zone V (Destructive Zone)**, mainly following the nomenclature of the European Macro Seismic Scale 1992.

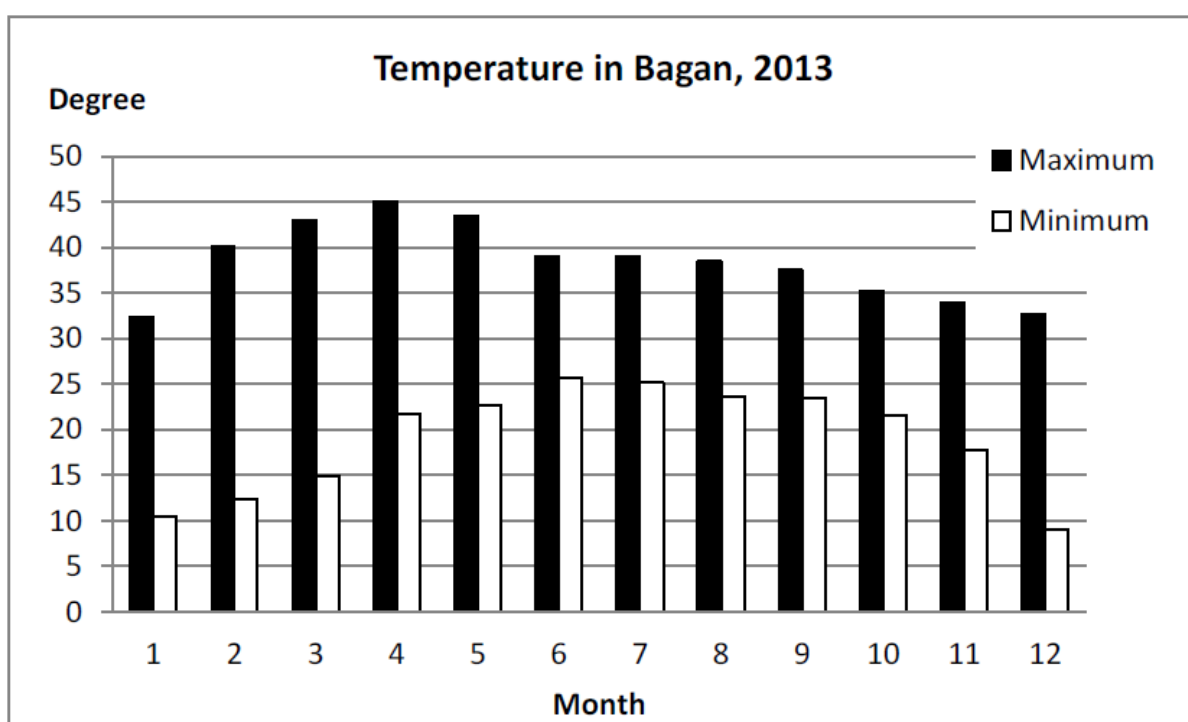
As per map the proposed project is located within the **Zone IV (Severe Zone)** and Bagan is located in an active earthquake zone, had suffered from many earthquakes over the ages, with over 400 recorded earthquakes between 1904 and 1975. Today, over 2200 temples and pagodas remain in Bagan. The last major earthquake came on 8 July 1975, reaching 8 MM in Bagan and Myinkabar, and 7 MM in Nyaung-U. Many historical structures of Bagan were destroyed. Two peoples died on collapse of rural houses and other brick masonry structures and 15 injured. This restoration was helped by many international art historians and preservationists. The restorations paid little attention to original architectural styles, and used modern materials. Government believed that the ancient capital's hundreds of unrestored temples and large corpus of stone inscriptions were more than sufficient to win the designation of UNESCO World Heritage Site, but the city has not been so designated, allegedly mainly on account of the restorations. To prevent risk of earthquake effect, structural engineers should also consider above earthquake intensity and foundation of the building should be firmly anchored so as to resist the risk for this proposed project.

#### **4.2.2 Topography**

The proposed project is located in Bagan which lies in the middle of the Dry Zone of Myanmar, the region roughly between Shwebo in the north, Pyay in the south and Rakhine Yoma mountain range in the west. Bagan lies in the vast expanse of plains in Upper Burma on the bend of the River and the topography of the proposed project site is mainly flat land. The nearest water body to the project site is Ayeyawady River and it is 5 km far west to the proposed project area. Bagan is located 290 km (180 mile) south-west of Mandalay and 700 km (430 mile) north of Yangon.

### 4.2.3 Climate

Just like other areas in Myanmar, Bagan enjoys the monsoon climate and has two seasons: rainy season from May to October and dry season from September to April. However, in terms of temperature and rainfall Bagan is substantially different from other areas in the country due to the semi-arid environment. Therefore, the average temperature is relatively high, above 30 degrees Celsius, all year round. Unlike the coastal regions of the country which receive annual monsoon rainfalls exceeding 2500 mm, the Dry Zone gets little precipitation as it is sheltered from the rain by the Rakhine Yoma mountain range in the west. In the dry season the temperature between night and day has a large difference which is conducive and attracts very many tourists hence the high season for tourists in Bagan.



**Figure 15. Average Monthly Temperature in Bagan during 2013**

(sources; Department of Meteorology and Hydrology, Nyaung-U Township, Myanmar)

With regard to the rainfall in Bagan, it is surprisingly small compared to other regions. In 2013 the number of rainy days recorded was only 42 and the precipitation was 30mm.

**Table 6. Monthly rainfall in Bagan during 2013**

Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total (mm)
0.00	0.00	0.00	0.00	2.65	3.88	0.36	3.20	12.26	9.03	0.00	0.04	31.42

(sources; Department of Meteorology and Hydrology, Nyaung-U Township, Myanmar)

## 4.3 Baseline Environmental Qualities of the Project Area

### 4.3.1 Air Quality

Ambient air quality samples were collected for Sulfur dioxide (SO<sub>2</sub>), Carbon dioxide (CO<sub>2</sub>), Carbon monoxide (CO) and Nitrogen dioxide (NO<sub>2</sub>) and Particulate Matters (PM<sub>10</sub> and PM<sub>2.5</sub>) as contents of the particulates were measured by HAZ SCANNER, Environmental Perimeter Air Monitoring System (EPAS) for 24 hours.

#### *Gas*

The concentration of gas in the ambient air was measured at the proposed project area in 13<sup>rd</sup> March 2016. The measured concentration value of NO<sub>2</sub> and SO<sub>2</sub> of the proposed project site is compared with WHO Air Quality Guidelines and CO<sub>2</sub> value compared with American Conference of Governmental Industrial Hygienists (ACGIH) Guidelines. All measured concentration values are described as follows Table 7.

**Table 7. Gas Condition of Proposed Project Area**

No.	Gas	Averaging Period	Observed Value (ppm)	Molecular Weight (kg/kmole)	Calculated Observed Value (µg/m <sup>3</sup> )	International Guidelines	Organization
1	CO	8 hr	0.000	28.011	0.000	10 mg/m <sup>3</sup>	WHO Europe
2	CO <sub>2</sub>	12 hr	350.867	44.010	-	5000 (ppm)	ACGIH
3	NO <sub>2</sub>	1 hr	0.024	46.010	43.651	200 (µg/m <sup>3</sup> )	WHO
4	SO <sub>2</sub>	10 min	0.001	64.060	2.575	500 (µg/m <sup>3</sup> )	WHO

*(source: gas level measured onsite; eguard)*

According to the measured concentration of the gases, all results indicated that they are well within the permissible limits of the international guidelines.

**Sulfur Dioxide(SO<sub>2</sub>)** is generated from combustion of fuels such as oil and coal, and a as by-product from some chemical production or wastewater treatment processes. On-road and off-road vehicles are also emission source of SO<sub>2</sub>. SO<sub>2</sub> irritates the respiratory tract, injures lung tissues and reduces visibility and level of sunlight. The emission can be controlled by implementation of manufacturer recommended engine maintenance programs, good driving practices, installing and maintaining emissions control devices, and implementing a regular vehicle maintenance and repair program.

**Nitrogen Oxides (NO<sub>x</sub>)** in the ambient air consist of nitric oxide (NO), nitrogen dioxide (NO<sub>2</sub>) and nitrous oxide (N<sub>2</sub>O). NO<sub>2</sub> is formed by chemical reaction of NO and ozone. The main sources of NO<sub>2</sub> are combustion of fuel and on-road and off-road vehicles. NO<sub>2</sub> decreases lung function and resistance to infection. The gas emission can be monitored by

combustion modification, flue gas recirculation, water/ steam injection and the same measures for SO<sub>2</sub> reduction.

Likewise, **Carbon Monoxide (CO) and Carbon dioxide (CO<sub>2</sub>)** have the same emission sources and mitigation measures for SO<sub>2</sub> and NO<sub>2</sub>. They are poisonous gas and cause damage to the respiratory organ. Guidelines 2013, adopted threshold limit values of CO<sub>2</sub> is 5,000 ppm for 8-hour, time-weighted average. Thus it can be concluded that the existing CO<sub>2</sub> level is acceptable for human health.

***Particulate Matters***

In this environmental study for the proposed project, dust emission such as PM<sub>10</sub> (particulates matter equal to or less than 10µm) which can affect human respiratory and PM<sub>2.5</sub> (particulate matters equal to or less than 2.5µm) which can affect human lungs organs as the contents of gases and particulates emission to the ambient air were measured by on 18<sup>th</sup> and 19<sup>th</sup> August 2016 are shown in following table.

**Table 8. Dust Condition Measurement Onsite of the Proposed Site**

Time	Date	PM <sub>10</sub>			PM <sub>2.5</sub>		
		Mini	Max	Avg	Mini	Max	Avg
11:00-11:59	18.9.2016	2	79.00	22.12	1.00	27.00	12.27
12:00-12:59		2	38.00	24.67	1.00	28.00	9.22
13:00-13:59		4	35.00	17.88	1.00	14.00	3.00
14:00-14:59		2	45.00	17.53	1.00	14.00	5.12
15:00-15:59		15	42.00	28.40	4.00	21.00	9.20
16:00-16:59		11	34.00	20.93	1.00	31.00	5.05
17:00-17:59		43	88.00	68.08	12.00	59.00	24.65
18:00-18:59		30	91.00	66.83	2.00	59.00	21.75
19:00-19:59		17	79.00	46.02	5.00	16.00	13.43
20:00-20:59		2	38.00	16.12	1.00	19.00	7.30
21:00-21:59		14	37.00	26.80	1.00	28.00	8.47
22:00-22:59		2	21.00	9.20	1.00	14.00	1.63
23:00-23:59		6	45.00	29.70	1.00	52.00	16.03
00:00-00:59		19.8.2016	11	30.00	21.02	1.00	15.00
01:00-01:59	14		74.00	42.18	1.00	59.00	25.70
02:00-02:59	30		88.00	67.68	21.00	38.00	25.92
03:00-03:59	32		91.00	62.13	11.00	55.00	20.42
04:00-04:59	2		79.00	28.68	1.00	25.00	11.17

Time	Date	PM <sub>10</sub>			PM <sub>2.5</sub>		
		Mini	Max	Avg	Mini	Max	Avg
05:00-05:59		2	38.00	21.73	1.00	28.00	7.63
06:00-06:59		8	37.00	20.43	1.00	22.00	4.58
07:00-07:59		2	45.00	14.87	1.00	52.00	12.39
08:00-08:59		17	42.00	30.23	1.00	52.00	37.25
09:00-09:59		11	34.00	19.13	1.00	37.00	3.75
10:00-10:59		34	87.00	62.75	20.00	59.00	37.88
11:00-11:59		30	91.00	68.38	12.00	52.00	24.30
12:00-12:59		19	79.00	51.50	17.00	53.00	40.05
13:00-13:59		2	38.00	15.52	1.00	41.00	12.02
14:00-14:59		17	37.00	27.42	1.00	28.00	9.27
15:00-15:59		2	21.00	10.30	1.00	14.00	1.63

(Source: dust conditions measured onsite; eguard)

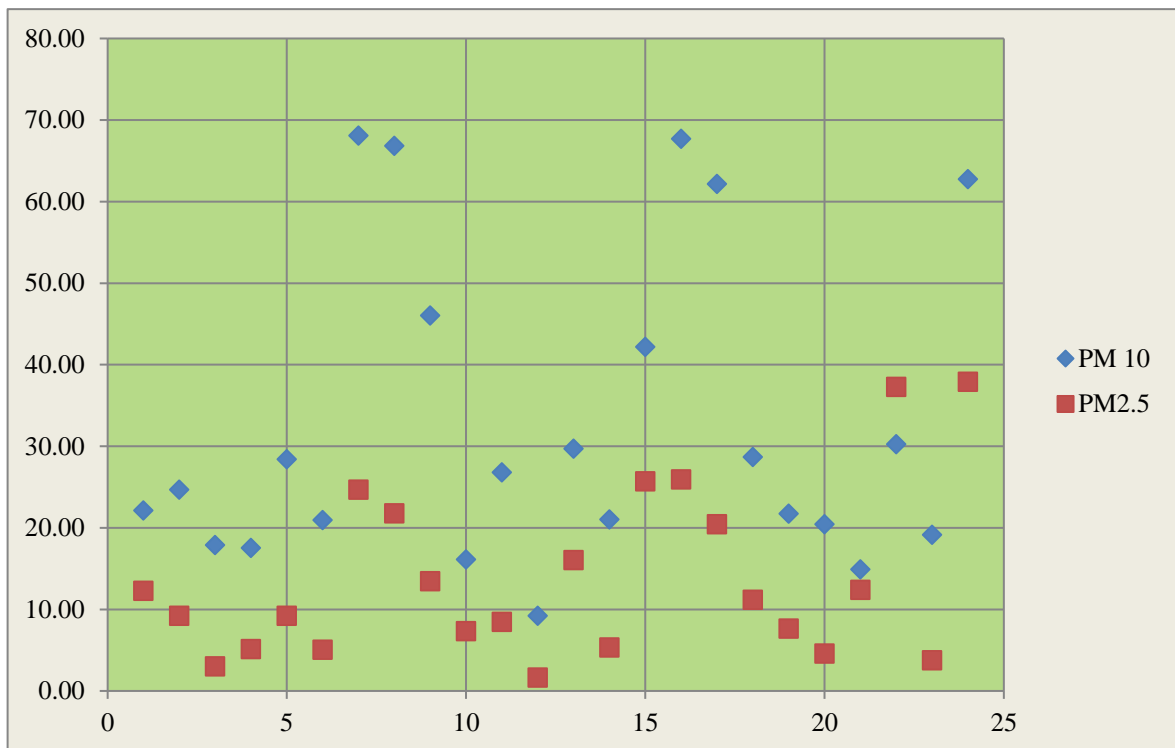


Figure 16. Ambient Dust Quality Measurement

Table 9. Result of Particulate Matter

Particle	Averaging	Result Value
PM <sub>10</sub>	24 hours	32.71 µg/m <sup>3</sup>
PM <sub>2.5</sub>	24 hours	13.17 µg/m <sup>3</sup>

**Table 10. WHO Air Quality Guidelines**

Particle	Averaging	Guideline Value
PM <sub>10</sub>	24 hours	50 µg/m <sup>3</sup>
PM <sub>2.5</sub>	24 hours	25 µg/m <sup>3</sup>

The ambient air conditions measured within the proposed project area provide some indication of the air quality within the project area. The measured values are as shown in Table 8. The mean concentrations of measured PM<sub>2.5</sub> and PM<sub>10</sub> values are within the range of WHO guideline values. Generally, the PM concentrations in the air are related to the microclimate conditions such as humidity, rainfall, temperatures of the proposed site. The temperature and humidity of the site on that day are 36°C and 62.40% respectively.

#### 4.3.2 Noise

Noise level monitoring was performed in March 15, 2016. Noise level monitoring was carried out continuously for 24 hours with 30 seconds interval. The noise levels were monitored on working days only and Sundays and Public holidays were not monitored. Monitoring was carried out at 'A' response (slow mode) and at fast mode. The observations for noise level measurement are given in Table 8.

**Table 11. Noise Level Measured**

No.	Date	Time	Observed Mean Value		Weight	Day/Night
			(Source)	(Receptor)		
1	15/3/2016	12:00:30-13:00:00	43.245	53.510	A	Day
2	15/3/2016	13:00:30-14:00:00	41.796	52.287	A	Day
3	15/3/2016	14:00:30-15:00:00	43.233	49.250	A	Day
4	15/3/2016	15:00:30-16:00:00	44.107	51.934	A	Day
5	15/3/2016	16:00:30-17:00:00	47.213	51.884	A	Day
6	15/3/2016	17:00:30-18:00:00	47.898	53.503	A	Day
7	15/3/2016	18:00:30-19:00:00	58.086	54.533	A	Day
8	15/3/2016	19:00:30-20:00:00	52.277	58.471	A	Day
9	15/3/2016	20:00:30-21:00:00	44.947	57.626	A	Day
10	15/3/2016	21:00:30-22:00:00	47.703	54.121	A	Day
11	15/3/2016	22:00:30-23:00:00	49.383	41.33	A	Night
12	16/3/2016	23:00:30-00:00:00	44.923	37.453	A	Night
13	16/3/2016	00:00:30-01:00:00	38.853	36.446	A	Night
14	16/3/2016	01:00:30-02:00:00	43.387	36.162	A	Night
15	16/3/2016	02:00:30-03:00:00	43.406	37.027	A	Night
16	16/3/2016	03:00:30-04:00:00	45.118	40.103	A	Night
17	16/3/2016	04:00:30-05:00:00	45.641	51.719	A	Night
18	16/3/2016	05:00:30-06:00:00	47.569	52.018	A	Night
19	16/3/2016	06:00:30-07:00:00	45.623	54.318	A	Night
20	16/3/2016	07:00:30-08:00:00	44.002	52.505	A	Day

No.	Date	Time	Observed Mean Value		Weight	Day/Night
			(Source)	(Receptor)		
21	16/3/2016	08:00:30-09:00:00	42.938	52.773	A	Day
22	16/3/2016	09:00:30-10:00:00	42.023	54.473	A	Day
23	16/3/2016	10:00:00-11:00:00	42.072	53.528	A	Day
24	16/3/2016	11:00:30-12:00:00	41.438	55.358	A	Day
<b>Average</b>			<b>45.286</b>	<b>49.681</b>		

(Sources: noise level measured onsite; eguard)

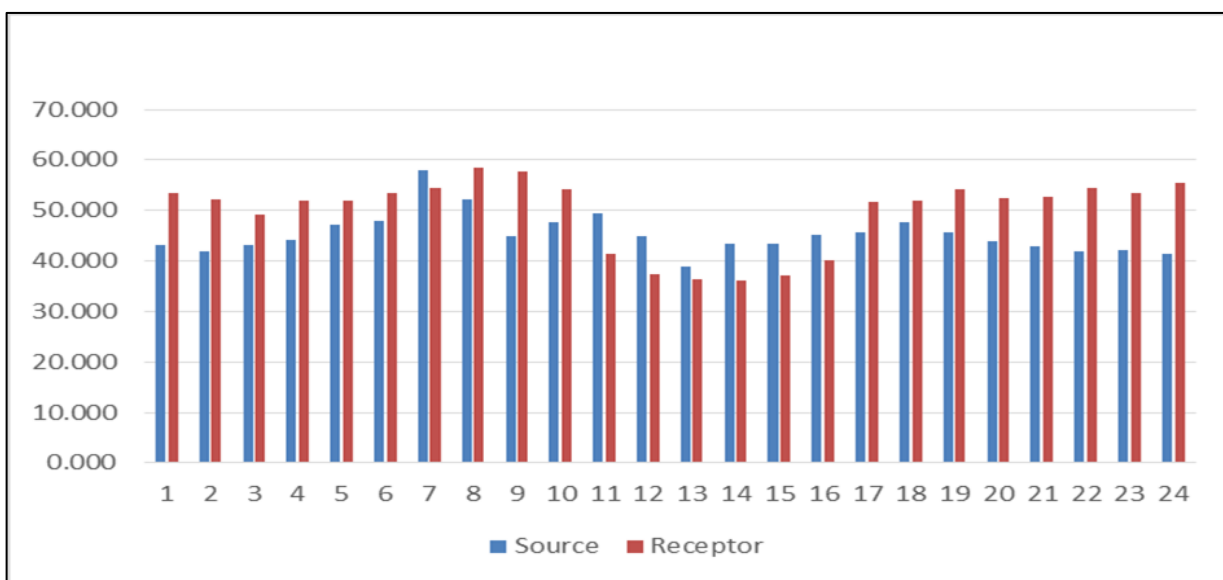


Figure 17. Noise Level Measured at Source and Receptor

Table 12. Noise Level Guidelines of International Finance Corporation for Source

Location/activity	Environmental Level LA <sub>eq</sub> , 8hr	Maximum Level LA <sub>eq</sub> , fast
Light Industry (decreasing demand for oral communication)	50-65 dB(A)	110 dB(A)

(Source: International Finance Corporation, 2007)

Table 13. Noise Level Guidelines of International Finance Corporation for Receptor

Receptor	Day Time 07:00-22:00	Night 22:00-07:00
Residential; institutional; Educational	55	45

(Source: International Finance Corporation, 2007)

Recorded noise levels are in the ranges of average 40 to 55 dB(A) at both two stations. Maximum levels of noise have recorded in day hours which is normal as our most of the activities have done in day times. Noise levels measured at two stations are normal and within limit of either noise level for Residential Area or noise level for the site area. However, it can be seen that the noise level of the receptor (residential area) is slightly higher than that of permissible of the source (site area). That is due to the fact that the

recorder for receptor was placed near the road (close to the residential area) and as a result of noise from the on-road vehicles might impose cumulative effect during the night time.

#### 4.3.3 Water Quality

The characteristics of two ground water samples are presented in Table 11. These tables have desirable as well as permissible limits of WHO Guideline for each parameter.

**Table 14. Water Quality Results compared with WHO Guidelines Value**

No.	Parameters	Unit	Observed Water Quality	WHO Guidelines value	Remarks
<b>Tube Well (Source I, construction site)</b>					
<i>Ecological Laboratories</i>					
1	pH	pH	7.9	6.5 ~ 8.5	Normal Range
2	Total Hardness	mg/l	456	500 mg/l as CaCO <sub>3</sub>	Normal Range
3	Iron	mg/l	0.25	0.3	Normal Range
4	Suspended Solids	mg/l	5	50	Maintain the Standard
5	Chlorine (Residual)	mg/l	Nil	-	Normal
6	Biochemical Oxygen Demand	mg/l	4	50	Maintain the Standard
7	Chemical Oxygen Demand	mg/l	32	250	Maintain the Standard
8	Total coliform	CFU/100 ml	0	400	Maintain the Standard
9	Total nitrogen	ppm	5.6	10	Maintain the Standard
10	Total phosphorus	ppm	0.07	2	Maintain the Standard
<b>Tube Well (Source II, residential area)</b>					
<i>Ecological Laboratories</i>					
1	pH	pH	8.0	6.5 ~ 8.5	Normal Range
2	Total Hardness	mg/l	820	500 mg/l as CaCO <sub>3</sub>	Out of Range
3	Iron	mg/l	0.33	0.3	Out of Range
4	Suspended Solids	mg/l	12	50	Maintain the Standard
5	Chlorine (Residual)	mg/l	Nil	-	Normal
6	Biochemical Oxygen Demand	mg/l	6	50	Maintain the Standard
7	Chemical Oxygen Demand	mg/l	32	250	Maintain the Standard
8	Total coliform	CFU/100 ml	0	400	Maintain the Standard
9	Total nitrogen	ppm	6.3	10	Maintain the Standard
10	Total phosphorus	ppm	0.06	2	Maintain the Standard

(Sources: Laboratory test results)

After comparing with WHO Guideline for both tube well, it can be seen that all of the water results of the tube well I, construction site is within the standards. However, one of the results (iron concentration) of the tube well II, residential area is out of standard's range while others maintain the standards.

#### 4.3.4 Water Quantity

The well's capacities of the existing tube wells within the boundary of the proposed project area are as shown in below.

- a. capacity of 6-inches pipe tube well = **2500 gl/hr (12m<sup>3</sup>/hr)**
- b. capacity of 2-inches pipe tube well = **1720 gl/hr (8m<sup>3</sup>/hr) \* 3 tube wells = 5160 gl/hr (24m<sup>3</sup>/hr)**

Thus, total water production rate from existing tube wells is **7260 gallons (36 m<sup>3</sup>)** of water per hour.

**Table 15. Water Consumption Guideline for Mid-Range Serviced Hotels**

Climate Zooning	Excellent	Satisfactory	High	Excessive
Temperate climate	<0.35	0.35–0.41	0.41–0.75	>0.75
Mediterranean climate	<0.45	0.45–0.60	0.60–0.95	>0.95
Tropical climate	<0.70	0.70–0.80	0.80–1.20	>1.20

*Unit - m<sup>3</sup>/guest per night*

*(Source; Conservation International and IBLF (2005))*

The proposed hotel is a 4-star grade and so it is mid-range serviced hotel and therefore laundry facilities are typically the highest water usage per room. As the project site is located in the tropical climate zone and the project is planned to support 70 gallons of water (approximately 0.33 m<sup>3</sup>) per guest per night and so, the resource and water consumption is within an excellent condition while compared with IFC guidelines (<0.7 m<sup>3</sup> per guest per night) as shown in Table 12.

#### 4.4 Estimated amount of Waste Generation

##### **Solid Waste**

During operation of phase I, it is estimated that average 1.2 kg/guest per night of solid wastes from guest room will be generated. So, the hotel operation with 60% occupancy rate will generate 207.4 kg of solid wastes in a single night. It is also estimated that 30 kg per day of another solid wastes including wastes from kitchen, dining rooms, staff houses, receptions and bar. Thus, total estimated amount of solid waste production during operation phase of phase I in a single day is 237.4 kg. During low season with the

occupancy rate of 15%, however, the estimated waste generation from the guest rooms will be decreased to 50 kg and 8 kg of other wastes will be occurred.

After constructed phase II, the hotel will operate with 240 rooms. The estimated waste generation with the occupancy rate of 60% will be 345.6 kg/night from the hotel rooms and 50 kg/day of other solid wastes will be occurred. During low season with 15% occupancy rate, it is also estimated to generate 86 kg/night from hotel rooms and 20 kg/day of other solid wastes will be occurred.

**Table 16. Waste Generation Standard**

<b>Waste generation</b>	<b>Excellent</b>	<b>Satisfactory</b>	<b>High</b>	<b>Very High</b>
Luxury serviced hotel	<0.6	0.60-1.2	1.20-2.00	>2.00
Mid-range serviced hotel	<0.4	0.40-1.00	1.00-1.5	>1.50
Small serviced hotel	<0.6	0.60-0.80	0.80-1.5	>1.50

*Unit: kg/guest per night*

*(Source: Conservation International and IBLF (2005))*

The hotel is estimated to generated 1.2 kg/guest of solid wastes in a single night during operation phase. As the hotel is mid-range serviced hotel, this amount is in the range of high while comparing with the waste generation standard of in conservation international and international business leaders fund (IBLF).

#### ***Liquid Waste***

It is estimated no liquid waste will discharge from the hotel as the hotel will adopt zero liquid effluents policy.

#### **4.5 Socioeconomic Information**

The socioeconomic information of the Nyaung-U Township is as shown in below table.

**Table 17. Socioeconomic Information of Nyaung-U Township**

<b>Occupations</b>	<b>Number</b>	<b>%</b>
Government	4452	2.682
Service	28745	17.318
Agriculture	44020	26.520
Livestock	20194	12.166
Trading	21372	12.876
Industrial/Handicraft	16399	9.880
Water Business	9139	5.506
Odd Job	62006	37.356
Other	15459	9.313
<b>Total</b>	<b>165986</b>	<b>100.000</b>

*(Source: Nyaung-U Township Administrative Data, 2015)*

### ***Demographic Structure of Bagan***

The population of Bagan in its heyday is estimated anywhere between 50,000 to 200,000 people. Until the advent of tourism industry in the 1990s, only a few villagers lived in Old Bagan. The rise of tourism has attracted a sizable population to reside in the area. Because Old Bagan is now off limits to permanent dwellings, much of the population reside in either New Bagan, south of Old Bagan, or Nyaung-U, north of Old Bagan. The majority of native residents are Bamar.

## **4.6 Existing Biodiversity**

### ***Vegetation***

In Bagan area, most of vegetation are semi-desert scrub types. The other vegetation such as Hta-Naung, Gannaya, Zaung-Gyan, Magyi, Htan, Thayet, Nyaung, Tama, Dahat, Pyinma, Padauk, Shar, Zee, Suyit and Zee-phyu can also be occurred. (*sources: Nyaung-U Township Administrative Data, 2015*)

### ***Wild Animal***

No wild animal is occurred in Bagan City, Nyaung Oo Township. (*sources: Nyaung-U Township Administrative Data, 2015*)

## 5. Screening of Potential Environmental Impacts and Mitigation Measures

The development of any project could necessarily bring changes in the local environment in terms of physical, biological and socio-economic aspects. The impacts generated are both beneficial as well as negative impacts.

Based on the analysis of environmental baseline information and activities that are to be performed by the project, the possible environmental impacts are identified. Most of the identified impacts have been quantified to the extent possible on the value judgment. Each of the environmental issues has been examined in terms of their current condition, likely impacts during construction and subsequent operation and decommissioning phases. The impacts have been predicted in terms of the environmental impact and business impact of the proposed project activities. The impacts on the environment from various activities of the project can be categorized as follows:

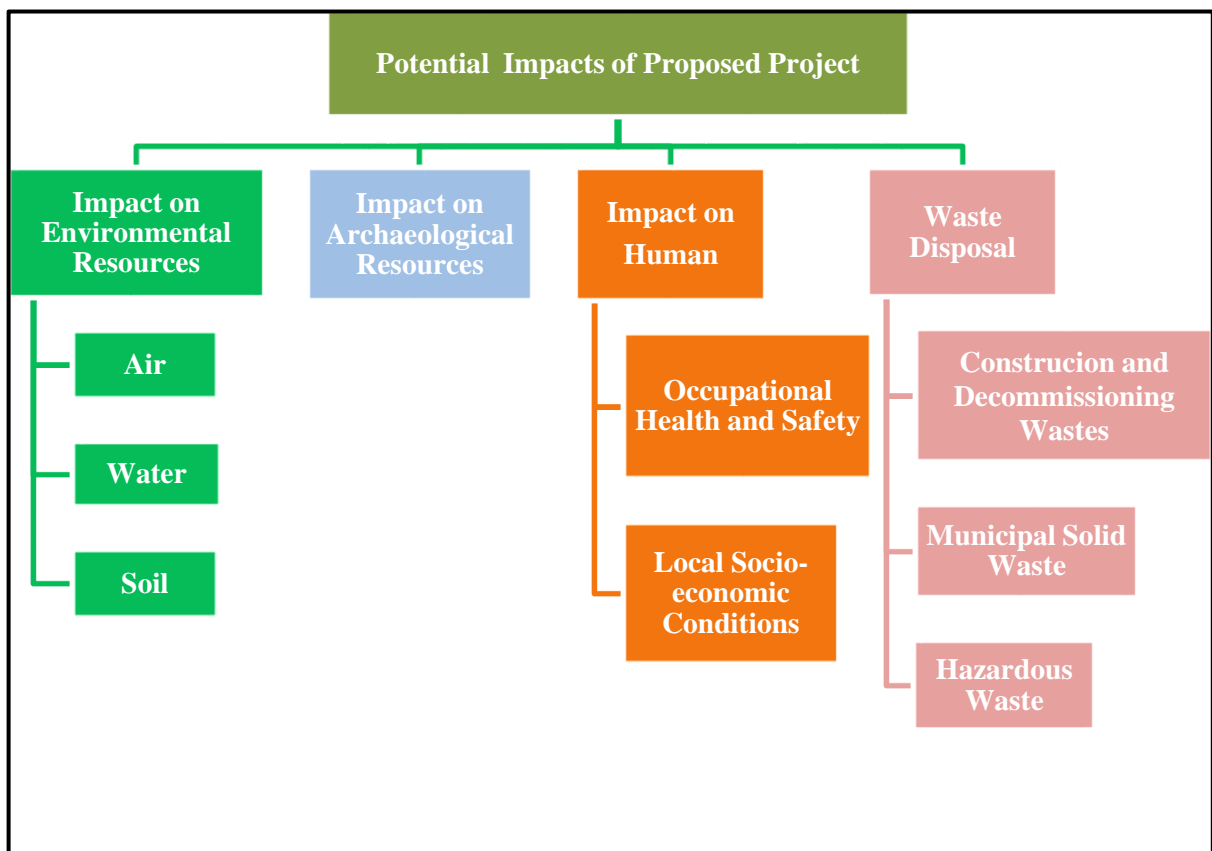


Figure 18. Screening of the Potential Environmental Impacts

## 5.1 Impact on Environmental Resource

### 5.1.1 Construction Phase

#### ***5.1.1.1. Impact on Air and Mitigation Measure***

During construction phase, it can be anticipated that a certain amount of dust particles may be generated by earth moving activities and site preparation for the construction activities. Since the project area is in the Dry Zone of Myanmar, this situation will become worse where trade winds are most prevalent. As the project is located relatively in the vicinity to residential area, airborne particulates can be a possible case. However, this case can be mitigated by spraying water to the ground to control the dust. For the operation concerning earth work (excavation work), the duration is quite short as it is limited to one and half months (short-term). Controlling speed of construction vehicles and transportation vehicles for construction materials could also reduce dust generation. Monitoring should be followed up during the construction period on site by Health, Safety and Environment (HSE) team of the proponent and sub-contractor to make sure the mitigation measures are properly implemented. Also check the vehicle maintenance records and speed checks regularly by the HSE team. Frequency for monitoring should be on quarterly basis.

#### ***5.1.1.2. Impact on Noise Level and its Mitigation Measure***

During construction phase, the use of heavy equipment for site clearing, operation of concrete mixer and emergency generator, and use of excavator for digging up foundation and swimming pool and related building construction works will inevitably generate noise. Another source of noise generation may be from the transportation vehicles. These noises may create a nuisance for nearby residents. Although annoying, this negative impact will be short-term (limited to the duration of the construction works) and is not considered to be a significant threat to the health or wellbeing of humans. The effect of noise on the surrounding area can reduce by using modernize machines or well-maintained machines. In addition, adopting good regulation of restricting normal working time; stop working at night time can reduce the communities' nuisance due to noise generation. Employees working in the noisy areas should be equipped with noise protection gears for their health. Monitoring should be done by HSE team at two points; one at the construction site (source) and another one at the residential area (receptor) and these all should be done twice a year.

#### ***5.1.1.3. Impact on Water and its Mitigation Measure***

During construction phase, increased ground water use will occur since the water required for all construction activities will be used from the groundwater (tube wells). Anyhow, the construction time is limited and construction activities are not much extensive. Hence, the increased use of the groundwater during construction phase will be insignificant compared to the operation phase.

#### ***5.1.1.4. Impact on Soil and its Mitigation Measure***

During construction phase, contamination of soil may be occurred from spillage and leakage of engine oils and fuels while operation of the transportation vehicles and generators and load and unload of various oils. Another impact may be come out from the machineries maintenance area. This impacts can be mitigated by using modernized machineries and should be maintained regularly and isolated maintenance area should be identified with paved ground. Apart from that, construction of the hotel will involve the erection of permanent concrete structures and this will result in a loss of the top soil and representing an irreversible change of landscapes. Thus, the remaining area of the land should be replanted with some indigenous species of trees and landscaping should also be done in order not only to get esthetic view but also maintain the soil.

### **5.1.2 Operational Phase**

#### ***5.1.2.1. Impact on Air and Mitigation Measure***

During the operation phase, emission of dust particles, CO<sub>2</sub>, SO<sub>2</sub>, CO, NO and other greenhouse gases due to transportation of delivered supplies to the hotel by vehicle movements, operation of emergency generator, refrigerators and air conditioning systems should be closely monitored. The particulate emissions from the vehicles and gaseous emission from generator can be minimized by doing regular vehicles and machineries maintenance. These maintenance records should be check twice a year by the HSE team of the proponent.

#### ***5.1.2.2. Impact on Noise Level and its Mitigation Measure***

During the operation phase, noise can only generate from transportation vehicles for supporting required commodities of the hotel. The vehicles used by the pilgrims and guests can also generate some extent of noise. However, these impacts can be negligible. There may be another source of noise generation during the operation of the hotel. Sometimes parties may hold at the hotel for various reasons. Normally, most of the parties were held

at night time. As the hotel is situated at the countryside of Bagan City, noise produced at night will be louder than at other times. So party time should be made known to the public.

#### ***5.1.2.3. Impact on Water and its Mitigation Measure***

During the operation phase, groundwater explorations from the existing tube wells will be made. When the hotel runs its full strength, especially during the peak season, water consumption will be increased which is related to personal use by guests and facility requirements for housekeeping, laundry, cooking and grounds maintenance. Water-saving equipment such as ultra-low flush toilets, spray nozzles, urinals, faucet aerators and low-flow shower head, infrared and ultrasonic sensor, water spigot and pressure-control valves should be installed to reduce grey water generation. The hotel should be planned to use proper wastewater drainage systems and water efficient equipment should be used in the laundry department and kitchen. The wastewater treatment systems are planned to install for treating grey water from kitchen and black water from the toilet. After the wastewater is treated, the water released from the treated system should be reused in toilets, gardening, spraying ground. This will prevent high consumption of water.

In addition, water pollution may occur, if discharge of liquid waste and storage of fuel are not properly handled. These liquid waste and spilled fuel can percolate through the soil and contamination of ground water may occur. Contaminated water shall be reduced by using leak proof container for storage and transportation of fuels, and keeping the impervious floors of fuel handling areas. Another contamination of surface water may occur when effluent is discharged into nearby stream or river or any water body. However, there is no stream or river near the project location but special care should be done during rainy season because water can run into the water body after the rain. Monitoring should be twice a year during operation phase and the check points will be sources of water, wastewater generated areas, wastewater treatment plants and also water outlets from the treatment plant.

#### ***5.1.2.4. Impact on Soil and its Mitigation Measure***

During operation phases of the hotel, contamination of soil can occur due to the mismanagement of wastes, wastewater seepage, spillage of sludge when overloading of septic tanks and fuel spills from vehicles and machines. To mitigate this impact, the hotel should establish standard maintenance house for machines and vehicles including oil and

lubricant storage facility such as paving floor or placing secondary containments. Machines, equipment and vehicle maintenance and handling should be carried out with special care by technicians and experts. Otherwise, the maintenance of the machines and vehicles should be done elsewhere. Sludge should be pumped out at least once a year. Monitoring for this impact will need to check at the storage area of wastes, fuel storage area, maintenance area, toilet facilities and treatment plants. These areas should be checked twice a year.

## 5.2 Impact on Human

### 5.2.1 Health and Safety

As the proposed project is meant for hotel services, health, hygiene and safety of hotel employees, contractors and guests is the most priority factor for Amata Garden Resort, Bagan. The proponent, Amata International Co., Ltd. believes that commitment on health and safety of its guests and employees is the most important parameter to make its business a great success.

#### *5.2.1.1. Occupational health and safety*

**During construction phase**, accidental injuries from falling from elevation associated with ladder are among the most common cause of fatal or permanent disabling injury at construction. Staff and workers of the hotel are also susceptible to cuts and amputations, electric shock, thermal burns, crushing injury from material handling, falling objects, headache and sickness due to poor ventilation or noise and small injuries due to slips and falls, accidents and injuries could happen during the construction, operation and dismantling phases as well. In addition, vehicle traffic and use of lifting equipment in the movement of machinery and materials on a construction site may pose temporary hazard, such as physical contact, spill, dust emission and noise.

To mitigate occupational impacts on workers, the representative of project proponent should prepare health and safety management plan for the construction workers based on the EMP. Posters shown in figure 22 in Myanmar language and any other language appropriate for the contracts drawing attention to relevant health regulations should be made or obtained from the appropriate sources and will be displayed prominently at the site. Personal Protective Equipment such as safety shoes, safety gloves, helmet, goggles, earmuffs etc., will be provided during construction. For the safety of construction staff, adequate safety measures including availability of first-aid facilities are made available on

the project site.

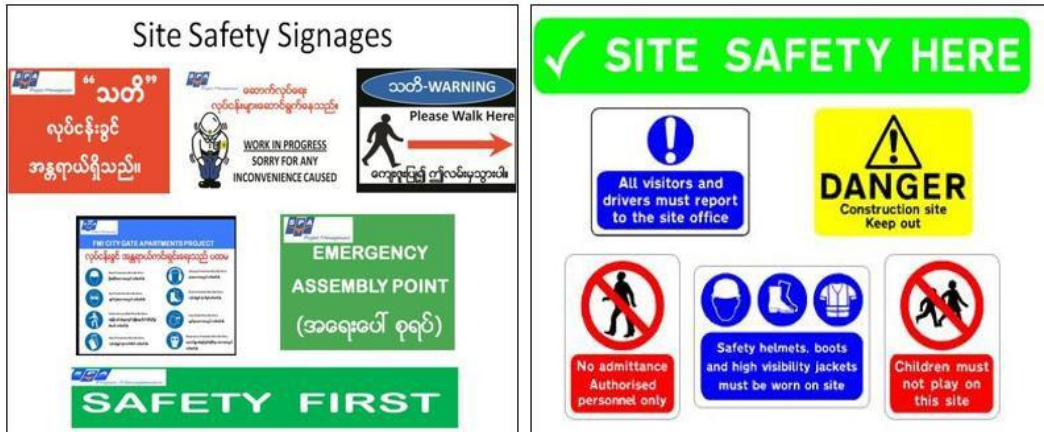










Figure 19. Safety Signage

Table 18. Personal Protective Equipment (PPE) and Their Functions

Function of PPE	Feature and Characteristics
<b>Protective Goggles (Suitable for protection from dust, particle, chips, chemical splattering)</b>	
Goggles with direct vents are not suitable for protection from chemical splattering or smoke.	
<b>Hearing Protection</b>	
Cotton earplugs: disposable earplugs for short- term use – not suitable for high noise levels	
Earmuffs: They offer a high level of sound reduction and are suitable for high noise levels. They can be used in combination with a safety helmet.	
<b>Respiratory Protection</b>	
Dust mask: lightweight mask that is fitted over the nose and mouth and secured behind the head with elastic.	
<b>Head Protection</b>	
Use head gear which conforms to recognized safety standards	
<b>Hand and Arm Protection</b>	
Gloves for common tasks (cotton/ leather)	
<b>Foot Protection</b>	
Select footwear that fits the purpose and conforms to recognized safety standards.	
<b>Body Protection</b>	
Reflective clothing: For working in busy traffic: brightly-colored reflective clothing can increase the visibility of employees and reduce their chances of being struck by vehicles or machinery	

**During operation phase**, occupational health and safety is a minor impact during the operation of hotel facilities primarily include physical hazards such as slip, trip and fall accidents in hotel rooms, lobbies and stairs or injury or illness due to repetitive exposure to work activities.

To mitigate this, hotel buildings will be designed and constructed in careful consideration of physical stability, structural load capacity, proper ventilation, lighting, fire prevention, sanitation and general safety issues, and shall comply with all relevant health and safety requirements, mainly issued by Ministry of Hotel and Tourism. To prevent and reduce of occupational health and safety, anti-slip stair tape treads should be equipped along the stair for highlighting step edge and avoid slipping. Also, qualified first-aider should be provided at all times. A good ventilation system should be arranged at labor concourse for employees. For food handling, preparation and storage areas for dry and wet food should be arranged for workers and guests' food hygiene.

#### ***5.2.1.2. Health Care for the Guest***

Health and safety of the guests may include slip, trip and fall in the hotel's shower rooms or at lobbies, restaurants and recreational area and sometimes food poison and other minor health problems can happen while staying at the hotel.

To avoid or minimize health and safety risks, daily housekeeping and cleaning services at guest rooms, toilets, cafeteria, bar, kitchen, all public places (lobby, lounge, swimming pool, spa, reception etc.) and even outdoor greening and landscaping should be carried out regularly. For the health and emergency medical care of all resort guests including employees, the first aid kits shall be kept ready at all public places of the resort and a car kept 24-hour standby to send to the nearby hospitals or clinics within the few minutes, in case of injury.

#### **5.2.2 Socio-economics**

The proposed hotel/resort project is invested by Amata International Co., Ltd. to construct and install the necessary equipment for the hotel services relevant to international standard of 4-star hotel. This investment aims to contribute development of hotel and tourism business in the area and to boost local employment opportunities and consequently the socioeconomic development of local communities.

#### **Construction Phase**

During the one and half years of construction phase (I), local technicians and general workers will be employed, with an estimated average about 150 labors per day. After completion of the construction phase (I), the hotel services operation will be started together with construction phase (II). During phase (II), it is estimated also the same number of local workers (150 labors) will be used.

## **Operation Phase**

During Operation Phase, the hotel need to employ 120 – 150 employees (technicians, experts and workers) of all Myanmar nationals, out of which more than 90% will be local inhabitants. By this way, local inhabitants will not only get opportunities but also improve their skills in hotel and tourism business by working together with and by getting trainings from experienced managers, experts and technicians of Amata Garden Resort, Bagan. Besides, electronic bike (e-bike) rental services will be developed near the hotel and using e-bike can create income for local people and environmental friendly jobs as well. Thus, the living standard, socioeconomic standard of the local inhabitants will be higher than before. Similarly, job opportunities will occur during dismantling phase.

In addition, after the tax exemption period of the first 5-year, the hotel shall pay income tax (25% of gross operating profit) and commercial tax (5% of total revenue) to the Government of the Republic of the Union of Myanmar. Therefore, the proposed investment shall bring long-term opportunities for socio-economic development of local communities and the nation as a whole.

## **5.3 Waste Disposal and Its Mitigation Measures**

### **5.3.1 Solid Waste Disposal**

**Construction and decommissioning** activities contribute to increased solid wastes including stones, wood, glasses, plastics, containers, metal rods, pieces of iron sheets, sharp objects (nails) and other wastes of constructed and demolished materials etc... These wastes shall be collected in separate bins and empty on day to day basis to avoid any undesirable working condition and environmental impacts. Based on the different waste types, these solid wastes will be collected and segregated in their dedicated rubbish bins, and regular and proper disposal will be done in accordance with Nyaung-U Township Municipal guidelines.

**In the operation phase**, major solid wastes will be generated form daily room cleaning, kitchen, bar, restaurant, cafeteria, souvenir desk, reception/office and staff quarters. Different kinds of solid wastes, such as tissue paper, food residues (organic wastes), glasses, tins, bottles, packing materials, stationeries, damaged/expired devices or appliances and other miscellaneous will be generated every day. Food wastes can be generated from the restaurants, bar and kitchen. These food wastes can generate offensive odor and make the people unpleasant and finally can affect to the health of employees and

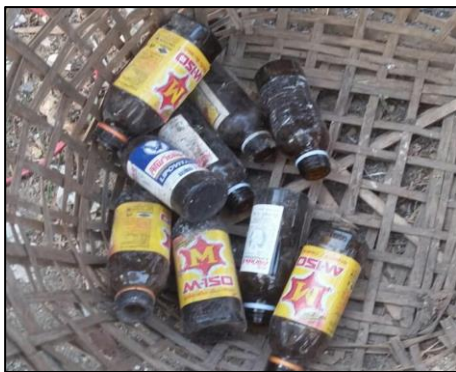
guests. Therefore, food wastes should be disposed of day by day. All these solid wastes will be collected separately in bins based on their types (reusable, recyclable or non-recyclable) and wet and dry status. The collected recyclable and reusable wastes will be sent to recycler for another uses. The final disposal of wastes will be done in accordance with guidelines of Nyaung-U Township Municipality and will be sent to New Bagan waste dumping site. When all disposal solid wastes reached the dumping site of the New Bagan, there is a scavenger and his family; who will segregate the wastes again so as to make sure if there any recyclable wastes left. The segregation categories include glass bottles, hard plastic bottles, soft plastic bottles, aluminum tins, carton boxes, irons and coppers.



Damping Site of Bagan



Glass Bottle category (1)



Bottle category (2)



Glass Bottle category (3)



Plastic Bottle category (1)



Soft Plastic Bottle



Aluminum Tin



Plastic Bag



Plastic Bottle *category (2)*

**Figure 20. Solid Waste Segregation at Damping Site**

### 5.3.2 Liquid and Sanitary Waste Disposal

The proponent shall strictly apply the policy of zero liquid waste discharge practice. The zero liquid waste discharge practice means all liquid waste will be treated in wastewater treatment plants. The water output from the treatment plant will be monitored so as to meet with environmental friendly water quality before discharge to normal drain or reapplied in other places.

**During construction and decommissioning phase**, liquid waste will produce from the maintenance and cleaning of the machineries and equipment and toilet facilities for the onsite labors. However, these impacts may not be large extent because the time is very limited.

**During the operation phase**, all resort guests and over 120-150 employees will use toilet facilities, kitchen, bar, restaurant, cafeteria, swimming pool and washing machines on daily basis. Two different types of liquid wastes are expected, used water (grey water) and sewer (black water) from toilets. The used water may include wastewater from laundry with detergents and wastewater from the kitchen with oil and grease. The proponent proposed to construct/install 3 different types (one for sewage, one for oil and grease and another one detergents) wastewater treatment plants (Kubota Johkasou (bio-tank)) System which will be attached to the hotel wastewater generation sources. All the used water (grey water) which may include cleaning agents, disinfectants, and linen washing agents will be collected through separated channels or pipe lines into different wastewater treatment plants. All treated water will be applied in gardening, washing of the machineries and toilet. Monitoring plan should be done twice a year by the HSE team of the hotel by inspection at the wastewater treatment plants and at the source of liquid waste generation.

### **5.3.3 Hazardous waste**

In construction and decommissioning phases, hazardous wastes such used oil from machines, maintenance waste oil and fast dry chemical for the building. This can be addressed by systematic disposal of used oil by collecting with leak proof drums and paving the ground not to be leaked around maintenance areas. For the fast drying chemical, it should be mixed with cement at a fixed ratio.

During the operation phase, there is potential discharge to environment such as detergent, liquid chlorine/tablets, cleaning agents due to the use of chemical products for cleaning, laundry, swimming pool and spa. This must be addressed by using secondary containment to avoid accidental leakage and spill. However, these all wastewater will be treated in wastewater treatment plants.

## **5.4 Impact on Archaeological Resources and Cultural**

Cultural heritage is in the heart of people, as a result of history of the country, and the living situation of the people of the specific area. UNESCO expresses how important it is for nationalities to protect and safeguard their culture and natural resources. Measures that will be implemented to mitigate these impacts are described. Cultural heritage site in Bagan reveals one of the most important origins of traditional culture of Myanmar. Bagan monuments are not only national symbols but also precious cultural heritage monuments.

The proposed project may bring some impacts to the archaeological resources as the project will be developed at the ancient city, New Bagan City, which is full of old archaeological resources. However, there are no ancient building and ancient pagodas near the construction site of the proposed project. The nearest pagoda is 90 meters far from the project site. Even there is no ancient buildings and ancient pagodas, vehicles for transportation, materials support, construction machineries and transport of worker to the construction machineries and workers to the construction site may create some impacts to archaeological resources by emitting smoke from vehicles which can blacken the monument and accidentally crushing to the ancient buildings. To minimize this impact, speed limit should be imposed while driving in township and instructions for all drivers should be strictly laid down.

During operation phase, no significant direct impact to the archaeological resources is anticipated from hotel services. However, there may be some indirect impacts to the archaeological resources by means of guests visiting to that ancient city. These impacts may include trading of ancient materials illegally, damaging to mural paintings of the temples by taking pictures with cameras using flashlights, graffiti on stucco wall, and sketching on them and stealing ancient materials.

Most of the Myanmar's people give highly respect to things that are related to the religions. They did not wear indecent clothes while going to homage to the pagodas, they did not climb up to the top of the pagodas/temples (especially women). Myanmar people think these facts are unsuitable with religious things. Lack of respect on local customs and values by the tourist could lead to conflicts between communities and them. To avoid traditional, social and cultural impact, Amata Garden Resort, Bagan should adopt the Myanmar Hotel and Tourism Law.

To mitigate this kind of impact, provide leaflets or labels indicating do's and don'ts including penalties and fines for all guests placed in all vicinity of hotels. The tour guides should be given awareness about the vital roles of the archaeological resources of the Bagan, so that they can convey the message to the guests. Another one that is to be followed at the religious site or archaeological resources such as pagodas for the foreigners is to wear decent clothes (by not wearing spaghetti blouses and shorts). Now, entering with socks, shoes and skimpy clothes like shorts and camisole are prohibited and notified by signboards on monuments. The prohibition of socks, shoes, spaghetti blouses and shorts is

easy to understand, and arrangements are made at small shops to buy or borrow some pieces of clothes and longyis for the visitors.



Graffiti on the wall of Stucco



Litter left near the temple



Climbing to the top of the ancient Pagoda

**Figure 21. Tourism Impacts to the Archaeological Resources**



Figure 22. Dos and Don't Warning Signs at Monuments

**Table 19. Identification of Level of Significance of the Predicted Impact**

No.	Project Activities	Potential Impacts	Level of Significance				
			VL	L	M	H	VH
<b>A. Construction Phase</b>							
1.	Earth moving activities (transportation vehicles) for site preparation and operation of heavy machineries	Air pollution, noise pollution, nuisance, injury		<input checked="" type="checkbox"/>			
2.	Soil excavation	Soil quality degradation, top soil losses		<input checked="" type="checkbox"/>			
3.	Traffic conjunction	Accidents, nuisance		<input checked="" type="checkbox"/>			
4.	Storage of construction materials	Air pollution, soil contamination, fire hazard	<input checked="" type="checkbox"/>				
5.	Labor on site	Soil pollution, water pollution, injury, water consumption		<input checked="" type="checkbox"/>			
6.	Construction waste disposal	Nuisance, Accident, Resources Depletion			<input checked="" type="checkbox"/>		
7.	Temporary Employment	Positive					
<b>B. Operation Phase</b>							
1.	Vehicle movements to transport required commodities to hotel and vehicles used by guests.	Air Pollution, noise, soil pollution, accident and fatal case			<input checked="" type="checkbox"/>		
2.	Operation of emergency generator, refrigerators and air conditioning systems	Air Pollution, Soil Contamination, noise, nuisance, accident, fire hazard	<input checked="" type="checkbox"/>				
3.	Water consumption in hotel facilities such as toilet,	Water resources depletion			<input checked="" type="checkbox"/>		
4.	Electricity and fuel used in hotel services	Increased energy and fuel consumption		<input checked="" type="checkbox"/>			
5.	Storage and Handling of materials used for materials used for kitchen and operation of kitchen	Odor, nuisance, Health hazard		<input checked="" type="checkbox"/>			
6.	Solid waste from hotel rooms and general waste	Nuisance, Soil contamination, injury		<input checked="" type="checkbox"/>			
7.	Solid waste from kitchen and restaurants	Odor, nuisance, Soil pollution, health hazard		<input checked="" type="checkbox"/>			
8.	Liquid waste from hotel rooms, spa, kitchen and restaurants	Soil pollution, water pollution		<input checked="" type="checkbox"/>			
9.	Hazardous waste	Environmental quality degradation		<input checked="" type="checkbox"/>			

No.	Project Activities	Potential Impacts	Level of Significance				
			VL	L	M	H	VH
10.	Foreigners show lack of respect to cultural and local people while touring	Archaeological resources, social and cultural impact and may conflict with local people			<input checked="" type="checkbox"/>		
11.	Emergency Fire	Fire hazard, Fatal case		<input checked="" type="checkbox"/>			
12.	Employee and Staff	Occupational health and safety problem, damage mentality, air pollution, soil contamination, pollution and infectious diseases		<input checked="" type="checkbox"/>			
13.	Project Implementation and employment	Positive					

### 5.5 Cumulative Impacts

During construction phase, cumulative air emission of fugitive dust particle could occur from combination of on-site excavation and movement of earth materials if some buildings will be constructed at the same period of the project site. In addition, increase water consumption, water contamination and waste generation may cumulate from the construction of other similar projects. Furthermore, increase traffic intensity will be cumulated due to transport of required materials for construction by vehicles and consequently accident rate will be increased. The mitigation measures should focus on the control use of water, control speed, energy and waste management. Environmental awareness talks should be provided with the corporation of hotels in the vicinity of the Amata Garden Resort, Bagan.

During the operation/hotel service phase, a total of 240 guestrooms (144 rooms in phase I and 96 rooms in phase II) for 480 guests will be made available for throughout its lifespan. Moreover, there are hotel zones and small hotels existed around the Bagan City. The average monthly foreigners visited ancient Bagan City were 16429 in 2013, 19177 in 2014 and 20114 in 2015 respectively (data received from Directorate of Hotel and Tourism, Bagan). To reduce impact on cumulative rate, hotel room should be charged for foreign guest and local guests separately, especially during peak season. Moreover, promotion plan such as reserved guests can be allowed to get discount room charges rate during peak season. However, according to the Ministry of Tourism and Hotel, Bagan branch's data during 2011 to 2013, annual foreigners visiting the ancient Bagan City were almost three times more than local visitors.

Traffic may one of the cumulative impacts from the tourism industries. The increased number of traffics and conjunction may be occurred due to the development the proposed project and neighboring hotels. However, most of the visitors prefer to enjoy riding bicycles, electronic bikes (e-bike) and carts than visiting with the cars. Thus, it is not anticipated that massive traffic conjunction will occur.

Air emission, water and energy conservation, noise and waste generation from tourist facilities include products of combustion, domestic grey water and black water from bathing and toilet flushing, consuming large amounts of energy in the form of heat energy may cumulative due to the 240 guest rooms for 480 guests and those nearby. Cumulative traffic intensity will be increased due to vehicles used by guests and local pilgrims.

One suggestion is to develop Nyaung-U – Bagan Hotel Management and Development Committee (under Mandalay Region Tourism Management Organization) for a focal point of Hotels and Tourism services at the Nyaung-U – Bagan Area. This committee will take responsible for the inspection of hotels in conformity with the Myanmar Hotels and Tourisms Law, to reduce the cumulative impacts on physical resources such as water and energy consumption, air pollution, noise pollution and waste generation. Otherwise, Bagan Hotel Business Association should take care of this case. Often, public talks and meetings should be arranged in order to accrue knowledge for people regarding environmental friendly best practices.

## 6. Environmental Management Plan

### 6.1 Institutional Arrangement

The development and implementation of the proposed hotel construction for providing 4-star hotel's services at Bagan will be managed by Amata International Company Limited. A Health, Safety and Environment (HSE) Coordinator and assistants for Environmental Health and Safety (EHS) issues should be appointed throughout the lifespan of the hotel. EHS coordinator is responsible for implementation and monitoring of Mitigation Measures of the Environmental Impacts and Environmental Monitoring Plan (EMOP) as well as coordination with the construction company, local authorities, decommissioning company and also with the nearby communities.

#### 6.1.1 Responsibilities of Health and Safety Executive Team

HSE Team also makes regular review of EMP to cover all potential impacts, improvement and modification in the operation and decommissioning phase of the proposed project. The following are the Job Descriptions of the HSE team;

<b>TITLE:</b>	Manager of Health, Safety and Environmental
<b>LOCATION:</b>	Amata Garden Resort, Bagan
<b>REPORTS TO:</b>	Group General Manager/Managing Director
<b>GRADE:</b>	Executive Level
<b>WORK SCHEDULE:</b>	48 hours per weeks.
<b>SUPERVISES:</b>	Hotel security officer, engineers and other Support Staff

#### **JOB SUMMARY:**

Plan, organize, direct, evaluate, and report on all personnel and operations involved in the care of guests' safety, hygiene at the hotel, and to review environmental management plan. Inspect and evaluate the environment, equipment and processes in working areas to ensure compliance with government safety regulations and industry standards. Protect the employees, customers and the environment.

#### **RESPONSIBILITIES:**

- Conduct comprehensive assessments and evaluations of the security and/or policing services for all campuses based on both established and projected needs.
- Establish and maintain standards for security operations and performance, as well as related community programming.
- Inspect the PPEs for the staff's security.

- Develop training schedule for the hotel's employees.
- Create Health, Safety and Environmental awareness to all employees and guest and also local communities.
- Review disciplinary procedures on all Hotels to support for a safe environment.
- Implement the Corporate Social Responsibility (CSR) Plan annually.
- Must be able to interpret institutional policies, plans, objectives, rules and regulations and communicate this information to subordinates and others.
- Monitor budget allotment for health and safety for everyone in the hotel and environmental management plan and maintain records of needs and expenditures made.

## **6.2 Environmental Management Plan**

The Environmental Management Plan (EMP) prepared for the proposed project covers the anticipated impacts that may generate in the future of the proposed project, mitigation measures, management and monitoring plans during each of the phases:

- Construction,
- Operation and

The detailed EMP based on the project activities is seen in Table 20 and the monitoring plan based on the environmental concerns is in Table 21.

**Table 20. Environmental Management Plan**

<b>Item</b>	<b>Project Activities</b>	<b>Potential Environmental Impact</b>	<b>Mitigation Measures</b>	<b>Estimated Cost (USD)</b>	<b>Frequency</b>	<b>Responsible Party</b>
<b>A. Construction Phase</b>						
<b>1.</b>	Earth moving activities (transportation vehicles) for site preparation and operation of heavy machineries	Air pollution, noise pollution, nuisance, injury	<ul style="list-style-type: none"> <li>- Spraying the working ground with water</li> <li>- Control speed of vehicles and operation machineries</li> <li>- Ensure sound condition of construction machinery and equipment</li> <li>- Use of modernized equipment</li> <li>- Workers must be provided with proper PPEs such as dust masks during dry and windy conditions and ear plugs during working in noisy area.</li> <li>- Local residents should be given notice of intended noisy activities so as to calm down from getting upset</li> </ul>	1,500	Quarterly	Contractor and EHS Team
<b>2.</b>	Soil excavation	Soil quality degradation, top soil losses	<ul style="list-style-type: none"> <li>- Landscaping should be done after construction with indigenous tree species if possible</li> <li>- Soil waste should be disposed of properly or cut and fill should be adopted</li> </ul>	1000	One time after construction	Amata International Company and EHS team
<b>3.</b>	Traffic congestion	Accidents, nuisance	<ul style="list-style-type: none"> <li>- Provide adequate parking and driveways</li> <li>- Enforcement of speed limits</li> </ul>	500	Twice a year	Amata International Company and EHS team
<b>4.</b>	Storage of construction	Air pollution,	<ul style="list-style-type: none"> <li>- Fine grained materials (sand, marl,</li> </ul>	800	Twice a year	Contractor and

Item	Project Activities	Potential Environmental Impact	Mitigation Measures	Estimated Cost (USD)	Frequency	Responsible Party
	materials	soil contamination, fire hazard	<p>etc.) should be stockpiled away from surface drainage channels and features.</p> <ul style="list-style-type: none"> <li>- Flammable materials (e.g. fuels) should be properly stored in appropriate containers and kept separately. Conspicuous warning signs (e.g. 'No Smoking') should also be posted. Firefighting equipment should be placed.</li> <li>- Paved the ground of the storage area or leak proof epoxy flooring should be applied</li> </ul>			Amata International Company and also EHS Team
5.	Labor on site	Soil pollution, water pollution, injury, water consumption	<ul style="list-style-type: none"> <li>- Provide PPEs</li> <li>- Provision of temporary toilets</li> <li>- Separate septic tanks</li> <li>- Applied best construction practices such as using safety harness and life line while working at heights</li> <li>- Provide adequate first aid facilities</li> <li>- Site fencing and safety signboard</li> </ul>	900	Twice a year	Contractor and Amata International Company and also EHS Team
6.	Construction waste disposal	Nuisance, Accident,	<ul style="list-style-type: none"> <li>- Waste collection, segregation and disposal should be properly managed and contact to Nyaung-U Township Municipality for final disposal.</li> <li>- Reusable inorganic waste (e.g. excavated soil) should be stockpiled away from drainage features and used for in filling where necessary.</li> </ul>	800	Every two month	Contractor and EHS Team

Item	Project Activities	Potential Environmental Impact	Mitigation Measures	Estimated Cost (USD)	Frequency	Responsible Party
			<ul style="list-style-type: none"> <li>- Reusable or recyclable materials should be recycled and reapplied in order to reduce waste generation</li> <li>- Cleaning should be done daily</li> </ul>			
7.	Temporary Employment	Positive	Nil	Nil	Nil	Contractor
<b>B. Operation Phase</b>						
1.	Vehicle movements to transport required commodities to hotel and vehicles used by guests.	Air Pollution, noise, soil pollution, accident and fatal case	<ul style="list-style-type: none"> <li>- Regular vehicle maintenance should be done</li> <li>- Speed control should be enforced.</li> </ul>	1,000	Quarterly	Amata International Company and EHS Team
2.	Operation of emergency generator, refrigerators and air conditioning systems	Air Pollution, Soil Contamination, noise, nuisance, accident, fire hazard	<ul style="list-style-type: none"> <li>- Regular maintenance should be done</li> <li>- Silent type should be used</li> <li>- Secondary Containments should be used</li> <li>- Kept separately with fuel storage area</li> <li>- Fire extinguishers should be kept</li> </ul>	1,000	Quarterly	Amata International Company and also EHS Team
3.	Water consumption in hotel facilities such as toilet,	Water resources depletion	<ul style="list-style-type: none"> <li>- Water-saving devices should be installed including ultra-low-flush toilet, spray nozzles, urinals, and low-flow showerheads</li> <li>- Install water meter.</li> </ul>	1,000	Twice a year	Amata International Company and also EHS Team
4.	Electricity and fuel used in hotel services	Increased energy and fuel consumption	<ul style="list-style-type: none"> <li>- Energy saving devices such as energy saving bulbs, intelligent door lock and energy saving switch card will be used to reduce energy consumption.</li> <li>- Auto switching off electrical equipment will be installed to control energy conservation.</li> </ul>	600	Twice a year	Amata International Company and also EHS Team

Item	Project Activities	Potential Environmental Impact	Mitigation Measures	Estimated Cost (USD)	Frequency	Responsible Party
5.	Storage and Handling of materials used for Kitchen	Odor, Health hazard,	<ul style="list-style-type: none"> <li>- Store in separate freezer cabinets for meals, vegetable and other foods</li> <li>- Everyday check all foods for its expiry date and their validity</li> <li>- Provide adequate such as gloves, masks, hats, etc.,</li> <li>- Used qualified chefs</li> <li>- Train the followers to understand food hygiene</li> <li>- Take care the chefs and followers' personal hygiene</li> <li>- Intensive housekeeping should be done at working and storage areas</li> </ul>	1,500	Quarterly	Amata International Company and also EHS Team
6.	Solid waste from hotel rooms and general waste	Nuisance, Soil contamination, injury	<ul style="list-style-type: none"> <li>- Waste segregation system should be adopted</li> <li>- Provide a numbers of bins with labels</li> <li>- Pave the floor of temporary waste storage area in order to save leaking</li> <li>- Recyclable waste should be sent to recycler and reusable waste should be reused</li> <li>- Final disposal should be follow the guidelines of Township Municipality</li> </ul>	600	Quarterly	Amata International Company and also EHS Team
7.	Solid waste from kitchen and restaurants	Odor, nuisance, Soil pollution, health hazard	<ul style="list-style-type: none"> <li>- Food wastes should be collected in enclosed bins</li> <li>- Regular disposal on daily basis</li> <li>- Install incinerator if possible or otherwise dispose by composting</li> <li>- Record waste transfer by notes</li> </ul>	1,000	Twice a year	Amata International Company and EHS Team

Item	Project Activities	Potential Environmental Impact	Mitigation Measures	Estimated Cost (USD)	Frequency	Responsible Party
8.	Liquid waste from hotel rooms, spa, kitchen and restaurants	Soil pollution, water pollution,	<ul style="list-style-type: none"> <li>- Install oil and grease separator method should be used</li> <li>- Arrange drains to be well-drained and ensure wastewater not to go outside of the project area before treated</li> <li>- Install wastewater treatment plants</li> <li>- Frequently check the septic tank not to overload sludge and pump out</li> <li>- Record waste transfer by notes</li> </ul>	1,500	Quarterly	Amata International Company and EHS Team
9.	Hazardous waste	Environmental quality degradation	<ul style="list-style-type: none"> <li>- Use environmental friendly refrigerants for air-conditioners such as R401A, instead of R22.</li> <li>- Used bottles used in cleaning, washing and spa should be collected in separate bins and disposed properly</li> <li>- Record waste transfer by notes</li> </ul>	800	Twice a year	Amata International Company and EHS Team
10.	Foreigners show lack of respect to cultural and local people while touring	Archaeological resources, social and cultural impact and may conflict with local people	<ul style="list-style-type: none"> <li>- Hotel should provide awareness program with the assistance of Ministry of Hotels and Tourism.</li> <li>- To avoid traditional, social and cultural impacts, the proponent should adopt the Myanmar Hotel and Tourism Law</li> <li>- Do's and Don'ts labeling in the vicinity area of the hotel</li> <li>- Sharing of leaflets to foreigners for Do's and Don'ts while visiting in Myanmar</li> </ul>	800	Annually	

Item	Project Activities	Potential Environmental Impact	Mitigation Measures	Estimated Cost (USD)	Frequency	Responsible Party
11.	Emergency Fire	Fire hazard, Fatal case	<ul style="list-style-type: none"> <li>- Provide adequate fire extinguishers and firefighting equipment</li> <li>- Sprinklers should be installed especially in kitchens</li> <li>- Develop firefighting plan and evacuation plan</li> <li>- Organize firefighting, evacuation and first aid trainings. Organize a volunteer firefighting team with hotel employees</li> </ul>	800	Twice a year	Amata International Company and EHS Team
12.	Employee and Staff	Occupational health and safety problem, damage mentality, air pollution, soil contamination, pollution and infectious diseases	<ul style="list-style-type: none"> <li>- Equip anti slip stair tape treads.</li> <li>- Do not allow workers to enter kitchen without kitchen wear.</li> <li>- Provide proper PPEs and qualified first-aider at all times.</li> <li>- Arrange welfare plan and Create good working conditions</li> <li>- Food-handling, preparation and storage areas must well-managed for workers and guests, especially for food hygiene.</li> <li>- Arrange 24 hours standby car for emergency health case</li> <li>- Give knowledge and awareness training to the workers about the transmitted diseases (including sexual)</li> </ul>	2,000	Thrice a year	Amata International Company and EHS Team
13.	Project Implementation and employment	Positive				Amata International Company and EHS Team

**Table 21. Environmental Monitoring Plan**

Item	Environmental Concerns	Parameters	Frequency	Locations	Responsible Party
<b>A Construction Phase</b>					
1	Ambient air quality	PM <sub>10</sub> , PM <sub>2.5</sub> , CO, CO <sub>2</sub> , NO <sub>2</sub> , SO <sub>2</sub>	Twice a Year	One point on construction site	Amata International, EHS Team
2	Noise level and vibration	Equivalent noise and vibration level dB(A)	Twice a Year	At major construction area	Amata International, EHS Team
3	Water Quality	Colour, Turbidity, Total Hardness, Biological Oxygen Demand (BOD), Suspended Solid, Oil and Grease	Twice a year	2 points, Tube wells of the project site and residential area	Amata International, EHS Team
4	Water Quantity	Amount of water extraction, amount of water use	Annually	Tube wells, construction machineries	Amata International, EHS Team
<b>B Operation Phase</b>					
1	Ambient air quality	PM <sub>10</sub> , PM <sub>2.5</sub> , CO, CO <sub>2</sub> , NO <sub>2</sub> , SO <sub>2</sub> , O <sub>3</sub>	Once a Year	One point in project area	Amata International, EHS Team
3	Noise level and vibration	Equivalent noise level dB(A)	Once a Year	One point at the entrance of the factory (as receptor)	Amata International, EHS Team
4	Water Quality	pH, Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total Suspended Solids, Total Coliform Bacteria, and Total Nitrogen, Total phosphorus	Twice a Year	Treated water output from KUBOTA bio-tanks (waste water treatment plant)	Amata International, EHS Team
5	Water Quantity	Amount of water extraction, amount of water use	Quarterly	Tube wells, water applied devices and kitchen	Amata International, EHS Team
6	Solid Waste	Waste transfer notes	Monthly	Disposal of wastes, waste segregation area	Amata International, EHS Team

### 6.3 Corporate Social Responsibility (CSR) Plan

The proposed project of Amata International Company Limited will implement Corporate Social Responsibility (CSR) plan together with EMP during its operation period. The objective of this plan is to create social welfare of factory workers and development of the local, regional and also community. The project proponent will implement CSR plan by using 2% of net profit. CSR plan formulated for the proposed project is shown in the following table.

**Table 22. Corporate Social Responsibility (CSR) Budget Plan**

No.	Activity	Timing
1.	Development of Education Sector	Annually
2.	Development of Health Sector	Annually
3.	Social Welfare of Local People	Annually
4.	Natural Disaster Protection Program	Annually
5.	Community Development Program	Annually
<b>Total</b>		<b>(2 % of the Net Profit)</b>

### 6.4 Emergency Preparedness

In case of fire, all the guests and employees should be evacuated systematically as soon as possible. Voluntarily firefighting group should be developed in cooperation with Nyaung-U Township government fire stations. Fire drills should conduct regularly and firefighting group should be organized and trained. Fire alarm system, fire hoses and hydrants, fire extinguishers and emergency exits should be inspected regularly and followed by proper maintenance as necessary. The proponent has committed to abide guidelines provided by Myanmar Fire Services. Fire drills should be done monthly.

As the proposed project is located in the earthquake zone of Zone IV (Severe Zone), the emergency preparedness for earthquake should also be taken into account as one of the component of the EMP. The buildings should be built with the international standards to withstand the risk of earthquake. The employees should have the knowledge concerning with the earthquake.

For all emergency cases, emergency response plan should be developed by the proponent and train to all employees in order to evacuate systematically during emergency cases. Recovery plan must be developed because recovery plan should be follow after severe damages.

# [FIRE]

A fire is both frightening and destructive. Fires are a danger to buildings and residents in equal measure. Keep your cool in the event of a fire by following these SAFE STEPS:

## BE PREPARED...

 <b>PREPARE YOUR GO-BAGS</b>	 <b>KNOW AND PRACTICE YOUR ESCAPE ROUTE</b>	 <b>FIRE ALARM</b> GET IT INSTALL IT CHECK IT	 <b>DO NOT LEAVE BURNING CIGARETTES OR CANDLES UNATTENDED</b>
 <b>PREPARE FIRE FIGHTING EQUIPMENT...</b>	 <b>AND KNOW HOW TO EXTINGUISH A FIRE</b>	 <b>PULL</b> <b>AIM</b> <b>SQUEEZE</b> <b>SWEEP</b>	 <b>NEVER USE WATER OR FOAM EXTINGUISHER ON AN OIL OR ELECTRICAL FIRE</b>

## IN CASE OF FIRE...

 <b>IF YOUR CLOTHES CATCH FIRE... STOP</b>	 <b>DROP</b>	 <b>ROLL</b>	 <b>IF THERE IS SMOKE...</b>
<b>STOP WHERE YOU ARE</b>	<b>DROP TO THE GROUND</b>	<b>ROLL ON THE FLOOR TO PUT OUT THE FLAMES</b>	<b>GET DOWN LOW - COVER YOUR MOUTH WITH A DAMP CLOTH AND GET OUT!</b>
 <b>GET OUT THROUGH A SAFE EXIT</b>	 <b>SOUND ALARM AND CALL FOR HELP</b>	 <b>BEWARE OF GAS LEAKS AND EXPOSED WIRE</b>	 <b>DO NOT GO HOME UNLESS LOCAL AUTHORITIES DEEM IT SAFE</b>

NATIONAL GEOGRAPHIC CHANNEL

**SAFESTEPS.COM**

SAFE STEPS TIPS APPROVED BY: International Federation of Red Cross and Red Crescent Societies

PRUDENCE FOUNDATION

# [EARTHQUAKE]

The shaking during an earthquake causes buildings to collapse and can lead to other hazards, such as fires, tsunamis, flooding and landslides. For your best chance of coming out of an earthquake unshaken, follow these SAFE STEPS:

## BE PREPARED...

 <b>PREPARE YOUR GO-BAGS</b>	 <b>KNOW WHERE TO EVACUATE</b>	 <b>SECURE OBJECTS THAT COULD FALL</b>	 <b>PREPARE FIRE FIGHTING EQUIPMENT</b>
---------------------------------	-----------------------------------	---	--

## IF YOU FEEL SHAKING...

 <b>MOVE AWAY FROM WINDOWS, GLASS AND HEAVY OBJECTS</b>	 <b>EXTINGUISH ANY FIRES IMMEDIATELY</b>	 <b>ENSURE EXIT DOORS ARE OPEN SO THEY DON'T GET STUCK</b>	 <b>IF IN BED, DON'T MOVE, PUT A PILLOW OVER YOUR HEAD</b>
 <b>DROP DOWN TO YOUR KNEES AND GET SMALL</b>	 <b>TAKE COVER GET UNDER A STURDY TABLE</b>	 <b>HOLD ONE OF THE TABLE LEGS</b>	 <b>WAIT UNTIL THE SHAKING STOPS THEN GET OUT</b>

## AFTER...

 <b>STRAP GO-BAGS AND LEAVE. NEVER USE AN ELEVATOR</b>	 <b>STAY AWAY FROM DAMAGED BUILDINGS</b>	 <b>DROP</b>	 <b>COVER</b>
 <b>HOLD</b>	 <b>IN CASE OF AFTERSHOCKS, FOLLOW THE SAME SAFE STEPS</b>	 <b>DO NOT GO HOME UNLESS LOCAL AUTHORITIES DEEM IT SAFE</b>	

NATIONAL GEOGRAPHIC CHANNEL

**SAFESTEPS.COM**

SAFE STEPS TIPS APPROVED BY: International Federation of Red Cross and Red Crescent Societies

PRUDENCE FOUNDATION

Figure 23. Safety Cards for Awareness of Emergency Cases

## 6.5 Emergency Response Plan

*In case of Fire, the following emergency response plan should be done immediately.*

- ◆ Alert other people
- ◆ If small, control using an extinguisher or fire hose reel
- ◆ Contact fire brigade if not under immediate control
- ◆ Attend to human life in immediate danger
- ◆ For electrical fires turn off power before fighting
- ◆ For oil and lubricant fire DO NOT USE WATER, rather use fire extinguisher
- ◆ Once out of the building, stay out. Do not allow people to go back into the burning building to collect valuables. While existing the building, close doors (but do not lock) to slow down the spread of fire
- ◆ Obey all instructions
- ◆ Proceed to emergency evacuation area
- ◆ First aid measure should be follow to all injured persons and transfer to hospital if necessary.

## 7. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

### 7.1 Importance of Public Consultation and Information Disclosure

The opinions of the local people, social organizations and stakeholders with the development of the proposed project have been taken into account in the IEE. The public consultation indicated the transparency of IEE's proponents to the local people. Consultation meetings were held with various stakeholders including communities near project area, administrative, community based and social organizations. The results getting from the consultations meeting and negotiations with environmentally and socially of the affected people were taken into consideration in evaluation of impacts, design of mitigation measures and monitoring plans. Negotiation with related governmental organizations was also done.

All feedbacks from public consultation meetings were well addressed and considered in the formulation of EMP, environmental monitoring plan and CSR plan.

### 7.2 Objective, Invitation and Participation

Public consultation and information disclosure concerning with the Initial Environmental Examination (IEE) for proposed project was held on 19<sup>th</sup> August 2016 at the Amata Boutique House. The objective of the meeting is to disclose the findings including the baseline environmental data of project and potential impacts of project activities and mitigation measures and, to receive public's opinions and recommendations and feedbacks on the proposed project.

The proponent invited the stakeholders via invitation cards. The invitation list will be seen in appendix. The number of participants attending the meeting is briefly shown in table below.

No.	Category	Number of Participant
1	Government Officials	7
2	Local People	7
3	NGOs/INGOs	3
<b>Total</b>		17

### 7.3 Event of the Meeting

The meeting was held according to the following agenda.

1. Opening of the meeting
2. Brief explanation about project description and Introduction of the project by U Thawdar Myint (Resident Manager, Amata International Company Limited)

3. Results and outcomes of environmental studies at proposed project area by Daw Yinmar Swe Hlaing (Senior Consultant, E Guard Environmental Services Company Limited)
4. Recommendation and suggestion by Attendees
5. Closing of the meeting

According to Agenda described above, the opening of meeting was announced and then, Thawdar Myint, Residence Manager greeted all attendees and introduced the summary of the proposed project. He requested the stakeholders to give comments and suggestions on project implementation.

Then, Daw Yinn Mar Swe Hlaing, Senior Consultant, E Guard Environmental Services Co., Ltd., made a presentation to disclose the following information of the project to the public.

1. Objectives of the Public Consultation
2. Objectives of IEE
3. Current situations of the Project
4. Potential Environmental Impacts and its Significance
5. Environmental Management Plan (EMP)
6. Emergency Response Plan
7. Corporate Social Responsible (CSR)
8. Recommendation

#### Attendees' Suggestion

U Soe Soe Lin, Deputy Director of Ministry of Cultural Heritage suggested for the laws and regulations related to Historical Heritage to import to IEE report. Then, U Zin Ko Ko Oo, Associate Consultant, E Guard Environmental Services Company Limited responded that all applicable and related laws and regulations are already included in this IEE report as a chapter.

Finally, U Thawdar Myint, Residence Manager made a closing remark and thank everyone who attended that meeting for public consultation and information disclosure.

## 8. Conclusion and Recommendation

### 8.1 Conclusion

This Initial Environment Examination (IEE) study was carried out at the beginning stage of the proposed Amata Garden Resort which is established on the Ancient Site Zone of Bagan, New Bagan City, Nyuang-U Township, Nyaung-U District, Mandalay Region, Republic of the Union of Myanmar. The main aim of the study is to identify the major environmental impacts due to implementation of the project activities in all three phases (construction phase, operation phase and decommissioning phase).

The primary and secondary data were used to assess the environmental impacts. The potential environmental impacts were assessed in a comprehensive and scientific screening procedure. The report has provided a full picture of all potential environmental impacts associated with the proposed hotel, and made recommendations for suitable prevention and mitigation measures.

There will be positive impacts as the proposed project will generate local employment opportunities and also to enhance their capabilities and work skills. As a result, their socio-economic conditions will be improved. Because of the hotel business, government will also benefit a certain amount of revenue. After replanting and landscaping are carried out, soil cover of the resort will be rehabilitated and habitat will be restored.

For **the construction and decommissioning phases**, most of the impact findings are minor or no significant environmental impacts such as dust particles dispersion, noise, waste generation, water pollution and potential occupational health and safety impacts on employees such as accidents. All these impacts are minimal, short term, limited to the site and controllable.

During **the operation phase**, there may mostly minor or no significant environmental impacts and some may significant impacts. However, there is environmental impact with significant which is water resource depletion in quantity due to domestic water consumption from the tube well That must be addressed by installing water meter and water saving equipment for control of water use. Another way is to reuse water out from the wastewater treatment plants in toilets and other uses in gardening, washing of vehicles. During the operation phase, there is potential discharge to environment such as detergent, liquid chlorine/tablets, cleaning agents due to the use of chemical products for cleaning, laundry,

swimming pool and spa. This must be addressed by using secondary containment at the storage area to avoid accidental leakage and spill and wastewater treatment plants should be attached at effluent areas. In addition, there is a low significance impact which is noise and atmospheric emission due to traffic/vehicle movement during loading and unloading of supplied goods which must be taken care of by conducting regular noise and air monitoring survey, use of proper PPEs and regular vehicle maintenance. During the operation phase, there may be some impacts on archeological resources concerning with the tourism and mitigation measure for such impacts are already addressed in chapter 5.

Based on possible impacts figured out, an Environmental Management Plan (EMP) and Corporate Social Responsibility (CSR) Plan together Environmental Monitoring Plan are prepared and attached in this IEE, as a comprehensive and collective solutions for environmental management, health and safety and CSR framework for all three phases (construction, operation and decommissioning) of Amata Garden Resort, Bagan. The environmental management, management and monitoring practices, procedures and responsibilities are comprehensively expressed here to get full compliance with the existing environmental policy, laws, rules and instructions of the Republic of the Union of Myanmar.

In conclusion, it can be verified that no adverse or harmful impacts of any significance are expected by proposed Amata Garden Resort, Bagan.

## **8.2 Recommendations for Future Works**

The following recommendations have been made for efficient and effective implementation of environmental conservation, health & safety, social responsibilities measures through the lifespan of the proposed resort.

- Abide environmental policy, laws, rules and instructions of the Republic of the Union of Myanmar
- Once EMP is approved by concerned authorities, strict implementation is essential
- For full and proper implementation of EMP, well understanding and support by resort owner and its administrative authority is deem necessity
- Fully implement Corporate Social Responsibility (CSR) Plan as an ethical business obligation, so as to be regarded as good neighbor/investor in the neighborhood
- Install approved Wastewater + Sewage Treatment System recommended.
- Well experienced and knowledgeable HSE Coordinator and HSE assistants shall be selected and appointed

- Daily, monthly and annual action plan shall be formulated based on EMP and fully practiced
- Keep full records of environmental management, health & safety management and social responsibility management activities and present to annual independent third party environment audit
- Follow the annual audit report and comments
- Revise the management plan from the lessons learned

## APPENDIX

## Appendix 1: Laboratory results of Tube Well (Sites)



Laboratory Technical Consultant: U Saw Christopher Maung  
 B.Sc Engg. (Civil), Dip S.E. (DefR) Lecturer of YIT (Reld), Consultant (Y.C.D.C), LWSE 001,  
 Former Member (UNICEF, Water quality monitoring & Surveillance Myanmar)



**WTL-RE-001**  
 Issue Date - 01-12-2012  
 Effective Date - 01-12-2012  
 Issue No - 1.0/Page 2 of 2

**W0316 460**

### WATER QUALITY TEST RESULTS FORM

Client	E-guard Environmental Services Co.,Ltd
Nature of Water	Tube Well Water (Source - 1)
Location	Bagan, Nyaung Oo Township
Date and Time of collection	17.3.2016
Date and Time of arrival at Laboratory	18.3.2016
Date and Time of commencing examination	19.3.2016
Date and Time of completing	24.3.2016

#### Results of Water Analysis

#### WHO Drinking Water Guideline (Geneva - 1993)

Parameter	Value	Unit	Guideline
Temperature (°C)		°C	
Fluoride (F)		mg/l	1.5 mg/l
Lead (as Pb)		mg/l	0.01 mg/l
Arsenic (As)		mg/l	0.01 mg/l
Nitrate (N.NO <sub>3</sub> )		mg/l	50 mg/l
Chlorine (Residual)	Nil	mg/l	
Ammonia (NH <sub>3</sub> )		mg/l	
Ammonium (NH <sub>4</sub> )		mg/l	
Dissolved Oxygen (DO)		mg/l	
Chemical Oxygen Demand (COD)	32	mg/l	
Biochemical Oxygen Demand (BOD) (5 days at 20 °C)	4	mg/l	
Cyanide (CN)		mg/l	0.07 mg/l
Zinc (Zn)		mg/l	3 mg/l
Copper (Cu)		mg/l	2 mg/l
Silica (Si)		mg/l	

**Remark:** This certificate is issued only for the receipt of the test sample.

#### Tested by

Signature:   
 Name: Zaw Hein Oo  
B.Sc (Chemistry)  
Sr. Chemist  
ISO TECH Laboratory

#### Approved by

Signature:   
 Name: Win Myint  
B.E (Civil) 1980, M.MES  
Technical Officer  
ISO TECH Laboratory

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# LABORATORY

Laboratory Technical Consultant: U Saw Christopher Maung

B.Sc Engg: (Civil), Dip S.E (Delft) Lecturer of YIT (Reid), Consultant (Y.C.D.C), LWSE 001  
Former Member (UNICEF, Water quality monitoring & Surveillance Myanmar)

WTL-RE-001

Issue Date - 01-12-2012

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Issue No - 1.0/Page 1 of 2

W0316 460

## WATER QUALITY TEST RESULTS FORM

Client E-guard Environmental Services Co.,Ltd.  
 Nature of Water Tube Well Water (Source - 1)  
 Location Bagan, Nyaung Oo Township  
 Date and Time of collection 17.3.2016  
 Date and Time of arrival at Laboratory 18.3.2016  
 Date and Time of commencing examination 19.3.2016  
 Date and Time of completing 24.3.2016

### Results of Water Analysis

### WHO Drinking Water Guideline (Geneva - 1993)

pH	7.9		6.5 - 8.5
Colour (True)		TCU	15 TCU
Turbidity		NTU	5 NTU
Conductivity		micro S/cm	
Total Hardness	456	mg/l as CaCO <sub>3</sub>	500 mg/l as CaCO <sub>3</sub>
Calcium Hardness		mg/l as CaCO <sub>3</sub>	
Magnesium Hardness		mg/l as CaCO <sub>3</sub>	
Total Alkalinity		mg/l as CaCO <sub>3</sub>	
Phenolphthalein Alkalinity		mg/l as CaCO <sub>3</sub>	
Carbonate (CaCO <sub>3</sub> )		mg/l as CaCO <sub>3</sub>	
Bicarbonate (HCO <sub>3</sub> )		mg/l as CaCO <sub>3</sub>	
Iron	0.25	mg/l	0.3 mg/l
Chloride (as CL)		mg/l	250 mg/l
Sodium chloride (as NaCL)		mg/l	
Sulphate (as SO <sub>4</sub> )		mg/l	200 mg/l
Total Solids		mg/l	1500 mg/l
Suspended Solids	5	mg/l	
Dissolved Solids		mg/l	1000 mg/l
Manganese		mg/l	0.05 mg/l
Phosphate		mg/l	
Phenolphthalein Acidity		mg/l	
Methyl Orange Acidity		mg/l	
Salinity		ppt	

Remark: This certificate is issued only for the receipt of the test sample.

Tested by

Signature: Zaw Hein Oo

Name:

Zaw Hein Oo  
B.Sc (Chemistry)  
Sr. Chemist

Approved by

Signature: Win Myint

Name:

Win Myint  
B.E (Civil) 1980, M.MES  
Technical Officer  
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## Appendix 2: Laboratory Results of Tube Well (Residential Areas)



Laboratory Technical Consultant: U Saw Christopher Maung  
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**WTL-RE-001**  
 Issue Date - 01-12-2012  
 Effective Date - 01-12-2012  
 Issue No - 1 0/Page 2 of 2

**W0316 461**

### WATER QUALITY TEST RESULTS FORM

Client	E-guard Environmental Services Co.,Ltd.
Nature of Water	Tube Well Water (Source - 2)
Location	Bagan, Nyaung Oo Township.
Date and Time of collection	17.3.2016
Date and Time of arrival at Laboratory	18.3.2016
Date and Time of commencing examination	19.3.2016
Date and Time of completing	24.3.2016

#### Results of Water Analysis

#### WHO Drinking Water Guideline (Geneva - 1993)

Parameter	Unit	Value	Guideline
Temperature (°C)	°C		
Fluoride (F)	mg/l		1.5 mg/l
Lead (as Pb)	mg/l		0.01 mg/l
Arsenic (As)	mg/l		0.01 mg/l
Nitrate (N NO <sub>3</sub> )	mg/l		50 mg/l
Chlorine (Residual)	mg/l	Nil	
Ammonia (NH <sub>3</sub> )	mg/l		
Ammonium (NH <sub>4</sub> )	mg/l		
Dissolved Oxygen (DO)	mg/l		
Chemical Oxygen Demand (COD)	mg/l	32	
Biochemical Oxygen Demand (BOD) (5 days at 20 °C)	mg/l	6	
Cyanide (CN)	mg/l		0.07 mg/l
Zinc (Zn)	mg/l		3 mg/l
Copper (Cu)	mg/l		2 mg/l
Silica (Si)	mg/l		

**Remark:** This certificate is issued only for the receipt of the test sample.

**Tested by**

Signature: \_\_\_\_\_

Name: Zaw Hein Oo  
B.Sc (Chemistry)  
Sr. Chemist  
ISO TECH Laboratory

(a division of WEG Co.,Ltd.)

**Approved by**

Signature: \_\_\_\_\_

Name: Win Myint  
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**W0316 461**

**WATER QUALITY TEST RESULTS FORM**

Client E-guard Environmental Services Co.,Ltd  
 Nature of Water Tube Well Water (Source - 2)  
 Location Bagan, Nyaung Oo Township  
 Date and Time of collection 17.3.2016  
 Date and Time of arrival at Laboratory 18.3.2016  
 Date and Time of commencing examination 19.3.2016  
 Date and Time of completing 24.3.2016

**Results of Water Analysis**

**WHO Drinking Water Guideline  
 (Geneva - 1993)**

pH	8.0		6.5 - 8.5
Colour (True)		TCU	15 TCU
Turbidity		NTU	5 NTU
Conductivity		micro S/cm	
Total Hardness	820	mg/l as CaCO <sub>3</sub>	500 mg/l as CaCO <sub>3</sub>
Calcium Hardness		mg/l as CaCO <sub>3</sub>	
Magnesium Hardness		mg/l as CaCO <sub>3</sub>	
Total Alkalinity		mg/l as CaCO <sub>3</sub>	
Phenolphthalein Alkalinity		mg/l as CaCO <sub>3</sub>	
Carbonate (CaCO <sub>3</sub> )		mg/l as CaCO <sub>3</sub>	
Bicarbonate (HCO <sub>3</sub> )		mg/l as CaCO <sub>3</sub>	
Iron	0.33	mg/l	0.3 mg/l
Chloride (as CL)		mg/l	250 mg/l
Sodium chloride (as NaCL)		mg/l	
Sulphate (as SO <sub>4</sub> )		mg/l	200 mg/l
Total Solids		mg/l	1500 mg/l
Suspended Solids	12	mg/l	
Dissolved Solids		mg/l	1000 mg/l
Manganese		mg/l	0.05 mg/l
Phosphate		mg/l	
Phenolphthalein Acidity		mg/l	
Methyl Orange Acidity		mg/l	
Salinity		ppt	

Remark: This certificate is issued only for the receipt of the test sample.

**Tested by**

Signature: Zaw Hein Oo

Name: Zaw Hein Oo  
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Sr. Chemist

**Approved by**

Signature: Wis Myint

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Appendix 3: Laboratory Results of Tube Wells

**DEPARTMENT OF AGRICULTURE (LAND USE)  
WATER ANALYTICAL DATA SHEET**

Division - E-Guard (18.3.2016) Sheet No. 1  
Township - လှိုင်ဦး Sr No. W 1-2/15-16

Sr No.	Sample	NH <sub>4</sub> -N + NO <sub>3</sub> -N ppm	P ppm
1	Source 1 Tube Well	5.6	0.07
2	Source 2 Tube Well	6.3	0.06

  
 မဝင်းမာ  
 လက်ထောက်ဥက္ကဋ္ဌ၊ အခြေခံအုတ်မြစ်  
 ဝန်ကြီးဌာန၊ ဝန်ကြီးရုံး၊ ဝန်ကြီးရုံး  
 မြေအသုံးချရေးဌာနခွဲ



## Occupational And Environmental Health Laboratory

No. (250/A), Lower Kyeemyindine Road, Ahlone Township, Yangon, Myanmar.  
Tel: +9567-431139, 431138, +951-221387, 210844  
Fax: +9567-431139, +951-223824

<b>Sample Name:</b> Water	<b>Received Date:</b> 18-3-2016
	<b>Reported Date:</b> 25-3-2016
	<b>Reg no:</b> 053-054/2016
<b>Address:</b> E.Guard, Environmental Services Co.,Ltd.	

No.	Site Name	Reference Value	Unit	Total Coliform Count	Remark
1.	Project Name: Amata Hotel Project Source: (1) Tube Well	0	CFU/100ml	0	
2.	Project Name: Amata Hotel Project Source: (2) Tube Well	0	CFU/100ml	0	

Method: Membrane Filtration Method by Potatest Incubation Kit

**Tested by**

OH (Lab)  
Saw Thaint Sandy Thu  
Med-Tech.

**Checked by**

Laboratory Officer

**Signed by**

Dr. Kyi Lwin Oo  
Director

Occupational and Environmental Health Division



ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်  
REPUBLIC OF THE UNION OF MYANMAR

အခွန်တံဆိပ်ခေါင်း  
REVENUE STAMP

၁၅၀၀ ကျပ်  
K 200

**ကျမ်းကျိန်လွှာ**

ရန်ကင်းတိုင်းဒေသကြီး၊ မရမ်းကုန်းမြို့နယ်၊ အင်းလျားရိပ်သာလမ်း၊ အမှတ် (၁၀)နေ အဘ-ဦးလှဝင်း၏  
သားဖြစ်သူ ဦးဝင်းအောင် ၊ နိုင်ငံသားစိစစ်ရေးကတ်ပြားအမှတ် - ၁၂/ပစတ (နိုင်) ၀၂၈၇၃၂ ကိုင်ဆောင်သူ  
တရတ်-ဗဟာလူပျို၊ ဗုဒ္ဓဘာသာကိုးကွယ်သူ၊ အသက် ( ၅၀ ) နှစ်ရှိ အလုပ်အကိုင်-မန်နေဂျင်းအဖွဲ့ဝင်တာ  
(အမတအပြည်ပြည်ဆိုင်ရာကုမ္ပဏီလီမိတက်) ဖြစ်သူက အမတအပြည်ပြည်ဆိုင်ရာကုမ္ပဏီလီမိတက်၊ ကုမ္ပဏီ  
မှတ်ပုံတင်အမှတ် (၃၇၉၇/၂၀၁၂-၂၀၁၃) အား ကိုယ်စားပြု၍ အောက်ပါအတိုင်း ကျမ်းကျိန်ဆိုအပ်ပါသည်။

၁။ မန္တလေးတိုင်းဒေသကြီး၊ ညောင်ဦးခရိုင်၊ ညောင်ဦးမြို့နယ်၊ ကေးရွာအုပ်စု-ဖွားစော၊ ကွင်းအမှတ်-၁၅၄၄၊  
ကွင်းအမည် - သူဌေးကန်၊ ဦးပိုင်အမှတ် - ၇/၆၊ ပုဂံမြို့နယ်၊ မြေအမျိုးအစား (လ/န-၃၉) ကျပြီး ၊ ဧရိယာ  
(၅ ဒဿ ၀၀) ဧကရှိ မြေကွက်အား မူလအမည်ပေါက်ပိုင်ဆိုင်သူ ဦးဆင်မောင်မောင်မှ မှတ်ပုံတင်အရောင်းအဝယ်  
စာချုပ်အမှတ် - ၆၃ / ၂၀၁၁ အားချုပ်ဆို၍ ကျွန်တော် ဦးဝင်းအောင်မှ အမတအပြည်ပြည်ဆိုင်ရာကုမ္ပဏီလီမိ  
တက်ကိုယ်စား ဝယ်ယူ၍ လက်ခံအပ်သည်မှာ မှန်ကန်ကြောင်းကျမ်းကျိန်ဆိုအပ်ပါသည်။

၂။ အမတအပြည်ပြည်ဆိုင်ရာကုမ္ပဏီလီမိတက်မှ အဆိုပါမြေကွက်အား ဝယ်ယူသည်မှာ မှန်ကန်ကြောင်းနှင့်  
လက်ရှိအသုံးပြုလျက်ရှိပါကြောင်းကို အမတအပြည်ပြည်ဆိုင်ရာကုမ္ပဏီလီမိတက်၏ကိုယ်စား သဘောခိုးဖြင့်  
ဤကျမ်းကျိန်လွှာကို ပြုလုပ်မြှောက်ဆိုခြင်းဖြစ်ပါသည်။

<p><b>ကျမ်းကျိန်ဆိုသူအားကိုယ်တိုင်ဆိုသူများ</b></p> <p>၁။ _____ ဦးမြအောင် (ဘ) ဦးစိုးမြင့် ၉/ညညန (နိုင်) ၀၀၉၆၄၀ ထိရိပစ္စယာလေး၊ အမှတ် (၄) ရပ်ကွက်၊ ညောင်ဦးမြို့၊ မန္တလေးတိုင်းဒေသကြီး။</p> <p>၂။ _____ ဒေါ်ထူးထူးလွင် (ဘ) ဦးကျော်စိုးလွင် ၁၂/၈၁န (နိုင်) ၀၀၄၉၀၆</p>	<p><b>ကျမ်းကျိန်ဆိုသူ</b></p> <p>ဦးဝင်းအောင် မန်နေဂျင်းအဖွဲ့ဝင်တာ အမတအပြည်ပြည်ဆိုင်ရာကုမ္ပဏီလီမိတက်</p> <p>ကျွန်ုပ်၏ငွေပျောက်တွင် ညောင်ဦးမြို့၌ ၂၀၀၆ ခုနှစ်၊ ဖေဖော်ဝါရီလ (၂၃ ) ရက်နေ့၌ ကျမ်းကျိန်ဆိုခြင်း မှန်ကန်ပါသည်။ ဖုတ်ပုံစံ (၂/၂၀၁၄) ၁၇ ၈၇၃၂၅၆၊ ၆</p>
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၂၀၁၆ ခုနှစ် ဇူလိုင်လ ၁၃ ရက်နေ့ ရန်ကင်းတိုင်း

၂၀၁၆ ခုနှစ် ဇူလိုင်လ ၁၃ ရက်နေ့

(အင်းလျားရိပ်သာ)

ခရိုင်တရားရုံးကြီး



ပြေစာရင်းပုံ - ၁၀၅

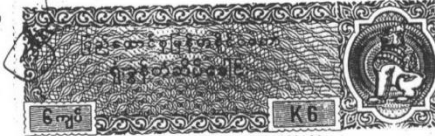
2012 - 0127764

မှန်ကန်ကြောင်း သက်သေခံ  
သက်သေမခံ

သော လက်ရှိမြေပုံတွင် ယခုနှစ်အသုံးပြုသော ဦးပိုင်မြေပုံ  
လက်ခံရေးကူးရန်ပုံစံ



ရုံးခွန်တံဆိပ်ခေါင်းကပ်ရန်



တိုင်းဒေသကြီး/ မြို့နယ် မန္တလေး	
ခရိုင် ညောင်ဦး	
မြို့နယ်/ မြို့နယ်ခွဲ ညောင်ဦး	
ရပ်ကွက်/ ကျေးရွာအုပ်စု ဖွားအော	
ကွင်း/ အကွက်အမှတ်နှင့်အမည် ၁၁၄၄ - ချော့မြေကန်	
ဦးပိုင်အမှတ်/ မြေကွက်အမှတ် ၇၂၆	

ဦးပိုင်အမှတ်	အခွန်စည်းကြပ်ခံရသူ/ ပိုင်ရှင်/ ရန်ရှင်/ အငှားဂရန်ရှင် အမည်	ပိုင်ဆိုင်ခွင့်	မြေမျိုးနှင့်အတန်း	ဝန်ယာ (ဧက)	မှတ်ချက်
၇၂၆	ဦးဝင်းစောင့်	—	လှေ (ပျော့မြေ)	၁.၀၀	မြို့နယ်စာချုပ်စာတမ်း မှတ်ပုံတင်စာရင်းအရ ၄.၁၀၄၀၁၁၄၄ ဧက စာချုပ် ၄၀၂၀၁၁ ၈၇

ရေးကူးပေးသည့်အကြောင်းအရာ **စာအောက်အစဉ်: စောက်ဂျပပ် ခွင့်ပြု ပေးပေးခြင်း ကာဗွန်**  
(အထက်ဖော်ပြပါအကြောင်းအရာအတွက်သာ အသုံးပြုခွင့်ရှိသည်။)

လျှောက်ထားသူအမည် - **ဦးဝင်းစောင့်**  
 လျှောက်လွှာတင်သည့်နေ့စွဲ - **၁၀.၈.၂၀၁၂**  
 လျှောက်ထားသူသို့ ထုတ်ပေးသည့်နေ့စွဲ - **၁၀.၈.၂၀၁၂**  
 ယခုအထက်တွင် ပြဆိုသောမြေပုံမှာ မှန်ကန်သောချာစွာ ရေးကူးထားသော ( ၂၀၁၂ ) ခုနှစ် အတွက် နောက်ဆက်တွဲတိုင်းတာခြင်း  
 မြေပုံပြန်ကြောင်း သက်သေခံလက်မှတ် ရေးထိုးပါသည်။

ရုံးတံဆိပ်

အမှုတွဲထိန်း/မြေတိုင်းစာရေးလက်မှတ် - **နေ့စွဲ - ၁၀.၈.၂၀၁၂**

တိုက်ဆိုင်စစ်ဆေးပြီး မှန်ကန်ပါသည်။  
 လက်ထောက်ဦးစီးမှူး/လက်မှတ် - **နေ့စွဲ - ၁၀.၈.၂၀၁၂**

စိစစ်အတည်ပြုပါသည်။  
 မြို့နယ်မြေစာရင်းဦးစီးဌာနမှူး/လက်မှတ် **နေ့စွဲ**



ကျမ်းကျိန်လွှာ

ရန်ကင်းတိုင်းဒေသကြီး၊ မရမ်းကုန်းမြို့နယ်၊ အင်းလျားရိပ်သာလမ်း၊ အမှတ် (၁၀)နေ အဘ-ဦးလှဝင်း၏ သားဖြစ်သူ ဦးဝင်းအောင် ၊ နိုင်ငံသားစိစစ်ရေးကတ်ပြားအမှတ် - ၁၂/ပဇတ (နိုင်) ၀၂၈၇၃၂ ကိုင်ဆောင်သူ တရုတ်-ဗမာလူမျိုး၊ ဗုဒ္ဓဘာသာကိုးကွယ်သူ၊ အသက် ( ၅၀ ) နှစ်ရှိ အလုပ်အကိုင်-မန်နေဂျင်းဒါရိုက်တာ (အမတ်အပြည်ပြည်ဆိုင်ရာကုမ္ပဏီလီမိတက်) ဖြစ်သူက အမတ်အပြည်ပြည်ဆိုင်ရာကုမ္ပဏီလီမိတက်၊ ကုမ္ပဏီမှတ်ပုံတင်အမှတ် (၃၇၉၇/၂၀၁၂-၂၀၁၃) အား ကိုယ်စားပြု၍ အောက်ပါအတိုင်း ကျမ်းကျိန်ဆိုအပ်ပါသည်။


၁။ မန္တလေးတိုင်းဒေသကြီး၊ ညောင်ဦးခရိုင်၊ ညောင်ဦးမြို့နယ်၊ ကျေးရွာအုပ်စု-ဖွားစော၊ ကွင်းအမှတ်-၁၅၄၄၊ ကွင်းအမည် - သူဌေးကန်၊ ဦးပိုင်အမှတ် - ၇/၇၊ ပုဂံမြို့နယ်၊ မြေအမျိုးအစား (လ/န-၃၉) ကျပြီး ၊ ဧရိယာ (၁ ဒဿ ၈ ၅၅) ဧကရှိ မြေကွက်အား မူလအမည်ပေါက်ပိုင်ဆိုင်သူ ဦးဆင်မောင်မောင်ထံမှ မှတ်ပုံတင်အရောင်းအဝယ် စာချုပ်အမှတ် - ၁၄/၂၀၁၂ အားချုပ်ဆို၍ ကျွန်တော် ဦးဝင်းအောင်မှ အမတ်အပြည်ပြည်ဆိုင်ရာကုမ္ပဏီလီမိတက်ကိုယ်စား ဝယ်ယူ၍ ဇူလိုင်လ ၂၀၁၃ ခုနှစ်တွင် မှန်ကန်ကြောင်းကျမ်းကျိန်ဆိုအပ်ပါသည်။

၂။ အမတ်အပြည်ပြည်ဆိုင်ရာကုမ္ပဏီလီမိတက်မှ အဆိုပါမြေကွက်အား ဝယ်ယူသည်မှာ မှန်ကန်ကြောင်းနှင့် လက်ရှိအသုံးပြုလျက်ရှိပါကြောင်းကို အမတ်အပြည်ပြည်ဆိုင်ရာကုမ္ပဏီလီမိတက်၏ကိုယ်စား သဘောချိုးဖြင့် ဤကျမ်းကျိန်လွှာကို ပြုလုပ်ခြင်းဖြစ်ပါသည်။

ပြည်ထောင်စုအစိုးရအဖွဲ့  
ပြည်ထောင်စုအစိုးရအဖွဲ့  
ပြည်ထောင်စုအစိုးရအဖွဲ့


ကျမ်းကျိန်ဆိုသူအားကိုယ်တိုင်ဆိုသူများ

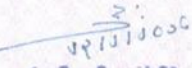
ကျမ်းကျိန်ဆိုသူ

၁။   
ဦးဝင်းအောင် (ဘ) ဦးစိုးမြင့်  
၉/၂၃၃န (နိုင်) ၀၀၉၆၄၀  
သီရိပစ္စယာလေး၊ အမှတ် (၄) ရပ်ကွက်၊  
ညောင်ဦးမြို့၊ မန္တလေးတိုင်းဒေသကြီး။

ဦးဝင်းအောင်  
မန်နေဂျင်းဒါရိုက်တာ  
အမတ်အပြည်ပြည်ဆိုင်ရာကုမ္ပဏီလီမိတက်

ကျွန်ုပ်၏ရှေ့မှောက်တွင် ညောင်ဦးမြို့၌ ၂၀၁၆ ခုနှစ်၊ ဇူလိုင်လ ( ၂၃ ) ရက်နေ့၌ ကျမ်းကျိန်ဆိုခြင်း မှန်ကန်ပါသည်။ ပုဂံ၊ မုံရွာ (၈/၈၁၆ ) မရအရင်း နှစ် ၆

၂။   
အေးထူးထူးလွင် (ဘ) ဦးကျော်စိုးလွင်  
၁၂/၈၁၆ (နိုင်) ၀၀၄၉၀၆  
အမှတ်-၄၆၊ မဟာဓမ္မလပန်းခြံလမ်း။

  
(အင်းဆင်းစစ်စိန်)  
\*ရိုင်တမ်းသူကြီး  
\*ညောင်ဦးခရိုင်တရားရုံး





**ကျမ်းကျိန်လွှာ**

ရန်ကင်းတိုင်းဒေသကြီး၊ မရမ်းကုန်းမြို့နယ်၊ အင်းလျားရိပ်သာလမ်း၊ အမှတ် (၁၀)နေ အဘ-ဦးလှဝင်း၏ အားဖြစ်သူ ဦးဝင်းအောင် ၊ နိုင်ငံသားစိစစ်ရေးကတ်ပြားအမှတ် - ၁၂/၀၆၀ (နိုင်) ၀၂၈၇၃၂ ကိုင်ဆောင်သူ တရုတ်-ဗမာလူမျိုး၊ ဗုဒ္ဓဘာသာကိုးကွယ်သူ၊ အသက် ( ၅၀ ) နှစ်ရှိ အလုပ်အကိုင်-မန်နေဂျင်းဒါရိုက်တာ (အမတ်အပြည်ပြည်ဆိုင်ရာကုမ္ပဏီလီမိတက်) ဖြစ်သူက အမတ်အပြည်ပြည်ဆိုင်ရာကုမ္ပဏီလီမိတက်၊ ကုမ္ပဏီမှတ်ပုံတင်အမှတ် (၃၇၇/၂၀၁၂-၂၀၁၃) အား ကိုယ်စားပြု၍ အောက်ပါအတိုင်း ကျမ်းကျိန်ဆိုအပ်ပါသည်။

၁။ မန္တလေးတိုင်းဒေသကြီး၊ ညောင်ဦးခရိုင်၊ ညောင်ဦးမြို့နယ်၊ ရပ်ကွက်ကျေးရွာအုပ်စုအမှတ်-ကျွန်းစစ်ထားရပ်ကွက်၊ ကွင်း/အကွက်အမှတ် - သမုဒ္ဒရာဇ်ရပ်၊ ပုဂံမြို့၊ ဦးပိုင်အမှတ် - ၉၇၊ အကွက်အမှတ် - ၉၊ ဧရိယာ (၀ ဒသမ ၁၆၁)ဧကရှိ ခြေအမျိုးအစား - (၂၆-၇-၂၀၀၂) ရက်နေ့မှ (၂၅-၇-၂၀၁၂)ရက်နေ့အထိ နှစ်ရှည် နှစ်(၃၀) ပြေငှားဂရန်မြေကွက်အား ကျွန်တော် ဦးဝင်းအောင်မှ အမတ်အပြည်ပြည်ဆိုင်ရာကုမ္ပဏီ လီမိတက်ကိုယ်စား ဝယ်ယူ၍ ဂရန်အမည်ပေါက်မြေကိုလဲ၍ မှန်ကန်ကြောင်းကျမ်းကျိန်ဆိုအပ်ပါသည်။

၂။ အမတ်အပြည်ပြည်ဆိုင်ရာကုမ္ပဏီလီမိတက်မှ အဆိုပါမြေကွက်အား မယ်မူသည်မှာ မှန်ကန်ကြောင်းနှင့် လက်ရှိအသုံးပြုလျက်ရှိပါကြောင်းကို အမတ်အပြည်ပြည်ဆိုင်ရာကုမ္ပဏီလီမိတက်၏ကိုယ်စား သဘောရိုးဖြင့် ကျွန်ကျမ်းကျိန်လွှာကို ပြုလုပ်ခြင်းဖြစ်ပါသည်။

ကျမ်းကျိန်ဆိုသူအားကိုယ်တိုင်ဆိုသူများ

ကျမ်းကျိန်ဆိုသူ

ဦးဝင်းအောင် (ဘ) ဦးစိုးမြင့်  
 ၉/ဇူလိုင် (နိုင်) ၀၀၉၆၄၀  
 သီရိဝေဇယာလေး၊ အမှတ် (၄) ရပ်ကွက်၊  
 ညောင်ဦးမြို့၊ မန္တလေးတိုင်းဒေသကြီး။

ဦးဝင်းအောင်  
 မန်နေဂျင်းဒါရိုက်တာ  
 အမတ်အပြည်ပြည်ဆိုင်ရာကုမ္ပဏီလီမိတက်  
 ကျွန်ုပ်၏ဧည့်သည်အဖြစ် ညောင်ဦးမြို့၌ ၂၀၁၆ ခုနှစ်၊  
 ဇူလိုင် ၁၆ရက် (၂၃ ) ရက်နေ့၌ ကျမ်းကျိန်ဆိုခြင်း  
 မှန်ကန်ပါသည်။ ဖက် ပုံတင် (၃၂/၂၀၁၆) မှ ၃၈ ရက် ဖြစ်ပါသည်။

ဒေါ်ထူးထူးလွင် (ဘ) ဦးကျော်စိုးလွင်  
 ၁၂/ဇူလိုင် (နိုင်) ၀၀၄၉၀၆  
 အမှတ်-၄၆၊ မဟာဗန္ဓုလပန်းခြံလမ်း။

၂၀၂၂/၀၇/၂၀၁၆  
 (အင်းသင်းအောင်)  
 ဝန်ကြီးဌာန၊  
 စာရင်းကိုင်ဌာန

၂၀၁၆ခုနှစ် ဇူလိုင် ၁၆ ရက်နေ့ မှ ၂၀၁၆ ခုနှစ် ဇူလိုင် ၂၀ ရက်နေ့



မှတ်တမ်းပုံစံ - ၁၀၅

2011 - 0096864

မှန်ကန်ကြောင်း သက်သေခံ သော လက်ရှိမြေပုံတွင် ယခုနှစ်အသုံးပြုသော ဦးပိုင်မြေပုံ  
သက်သေခံ လက်ခံရေးကူးရန်ပုံစံ



တိုင်းဒေသကြီး/ ပြည်နယ် မန္တလေး	၆	၆
ခရိုင် ဧရာဝတီ	၁	၆
မြို့နယ်/ မြို့နယ်ခွဲ ဧရာဝတီ	၁	၆
ရပ်ကွက်/ ကျေးရွာအုပ်စု ကျွန်းစစ်သာ	၁	၆
တွင်း/ အကွက်အမှတ်နှင့်အမည် (င.) သိမ့်ဒွာဂါ	၁	၆
ဦးပိုင်အမှတ်/ မြေကွက်အမှတ် ၉၇ / ၉၇	၁	၆

ကျေးလက်ထားစာပိုင်ဖြေ -

ဦးပိုင်အမှတ်	အစွန့်ပေးကြမ်းရေ/ ပိုင်ရှင်/ ဝန်ထုပ်/ အမှတ်ရရှိရှင် အမည်	ပိုင်ဆိုင်ခွင့်	မြေမျိုးအမျိုးအစား	ဧရိယာ (ဧက)	မှတ်ချက်
၉၇	ဦးအောင်စိန်	L	မြေဖြေ	၀.၁၆၁	မြေပုံအမှတ် ၉၇/၁၆၁ မြေပုံအမှတ် ၉၇/၁၆၁ မြေပုံအမှတ် ၉၇/၁၆၁ မြေပုံအမှတ် ၉၇/၁၆၁

ရေးကူးပေးသည့်အကြောင်းအရာ - ၁၆၅၅/၁၆၁ ခွင်မြေဖြေမြေပုံအမှတ် ၉၇/၁၆၁  
(အထက်ဖော်ပြပါအကြောင်းအရာအတွက်သာ အသုံးပြုခွင့်ရှိသည်။)

ချွတ်ထားသူအမည် - ဦးအောင်စိန်  
ချွတ်လွှာထင်သည့်နေ့စွဲ - ၁၀.၅.၂၀၁၂  
ချွတ်ထားသူသို့ ထုတ်ပေးသည့်နေ့စွဲ - ၁၀.၅.၂၀၁၂

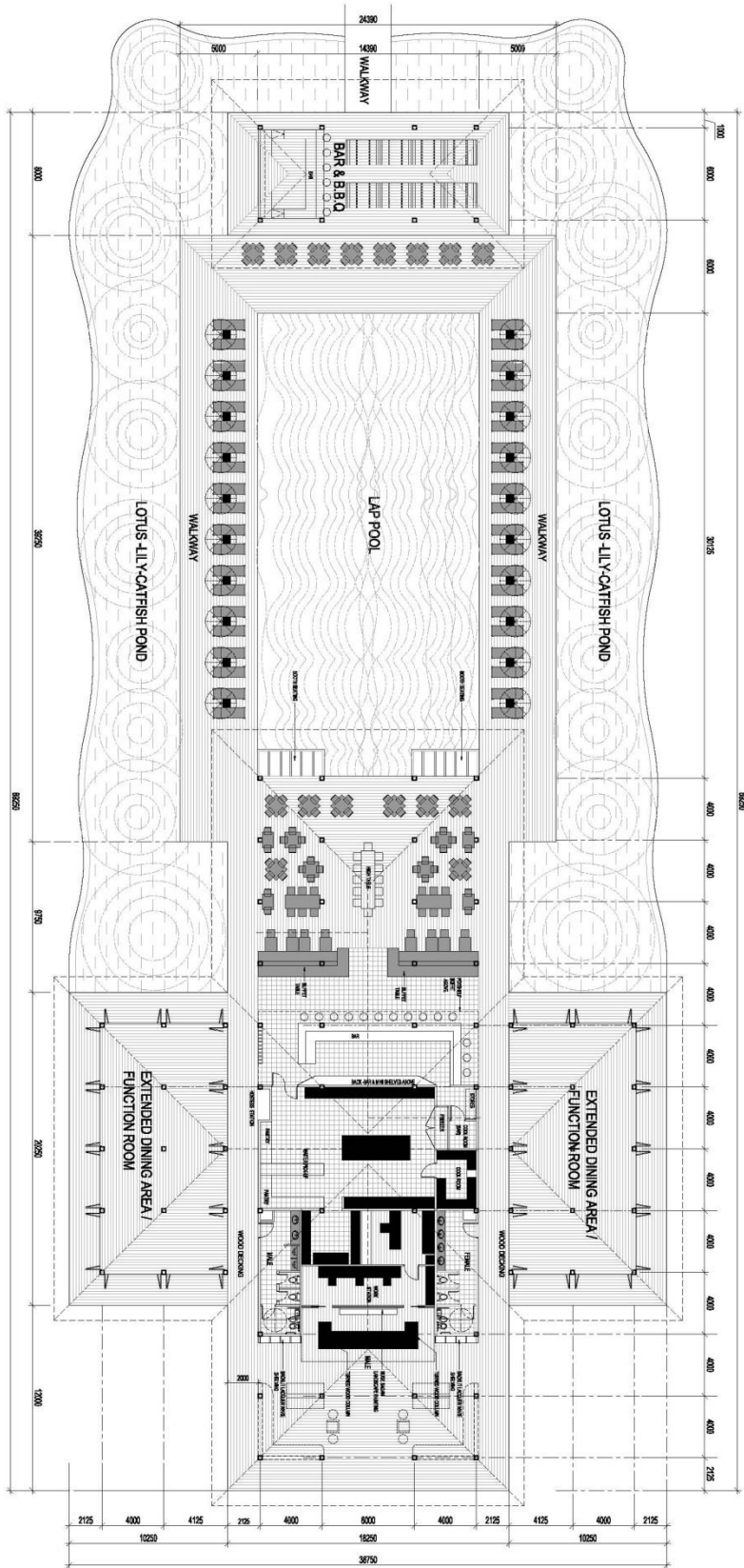
အထက်တွင် ဖော်ပြသောမြေပုံမှာ မှန်ကန်သော ရေးကူးထားသော (၂၀၁၂) ခုနှစ် အတွက် နောက်ဆုံးတိုင်းတာခြင်း ပြုခဲ့ကြောင်း သက်သေခံလက်မှတ် ရေးထိုးပါသည်။



အမှတ်ထိန်း/မြေတိုင်းတာရေးလက်မှတ် - မြေတိုင်းတာရေး (မြေစာရင်း) ဦးစီးဌာန  
နေ့စွဲ - ၁၀.၅.၂၀၁၂

တိုက်ဆိုင်ခပ်ဆေးပြီး မှန်ကန်ပါသည်။  
လက်ထောက်ဦးစီးမှူး/လက်မှတ် - လက်ထောက်ဦးစီးမှူး (စာရေးရေး) ဦးစီးဌာန  
နေ့စွဲ - ၁၀.၅.၂၀၁၂

အတည်ပြုပါသည်။  
မြေစာရင်းဦးစီးဌာနမှူး/လက်မှတ် - မြေစာရင်းဦးစီးဌာန  
နေ့စွဲ ၁၀.၅.၂၀၁၂

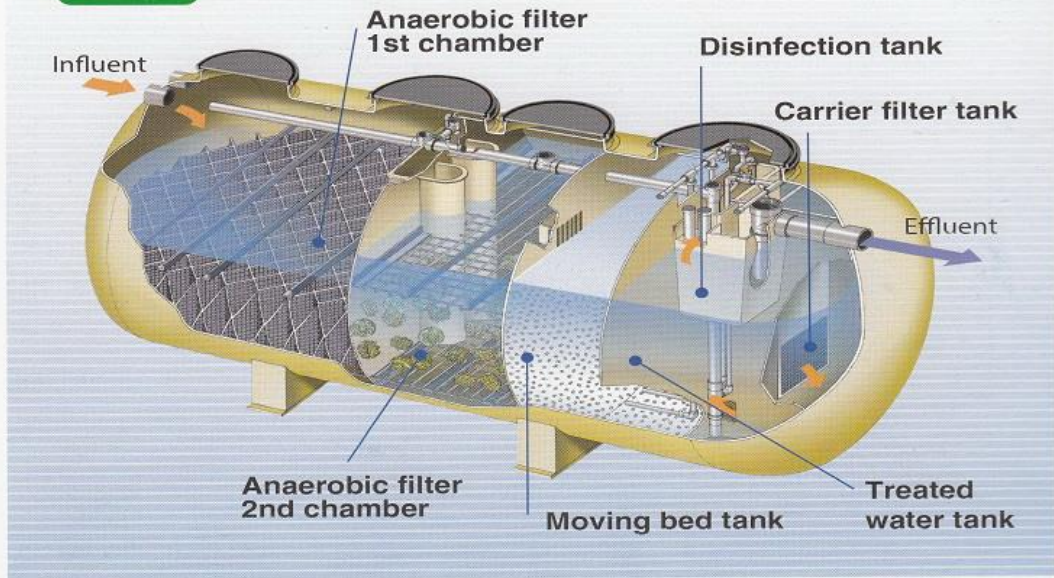


AMATA BAGAN RESORT  
**LOBBY-RESTAURANT-POOL LAYOUT PLAN**  
 SCALE 1:250

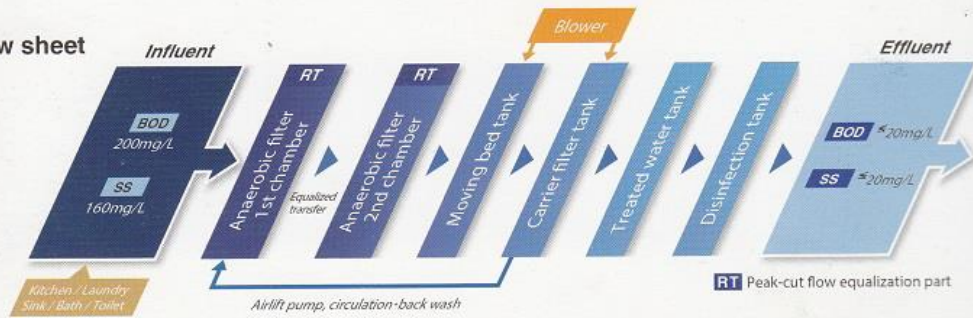
PROJECT	CLIENT	BUILDING NAME	SCALE	GENERAL NOTE:	REVISION	DATE	AMENDMENT
<b>AMATA BAGAN RESORT</b> BAGAN, MYANMAR		<b>MAIN LOBBY-RESTAURANT-POOL &amp; BBQ</b>	1:250	CONTINGENCY AT 5% AND VERIFY ALL DIMENSIONS BEFORE WORK COMMENCES			
	DRAWING TITLE	DATE	DATE	CONTRACTORS SHALL VERIFY FROM THE DRAWING ALL DIMENSIONS AND PREPARATIONS MUST BE REPORTED IMMEDIATELY TO THE ARCHITECT			
	<b>LAYOUT PLAN</b>	4 MAR 2016	4 MAR 2016				
COPYRIGHT: THE CONCEPT AND DESIGN IN THIS DRAWING ARE THE PROPRIETIES OF DESIGNER. UNAUTHORIZED USE OF ANY PART OR PORT OF THE DRAWING OR CONCEPT OR DESIGN OR USE ON PROJECTS OR SITES OTHER THAN SPECIFIED ON THIS DRAWING IS PROHIBITED.							

# Johkasou system

**HC-A**



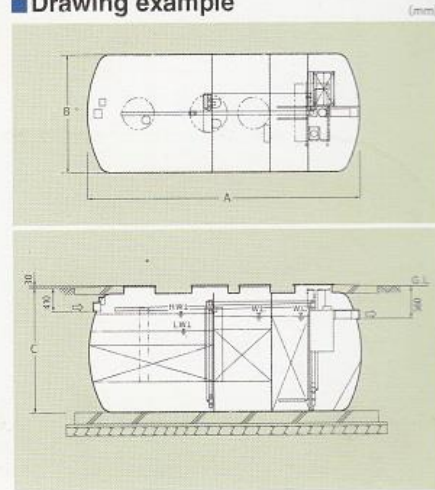
**Flow sheet**



**Specifications** (200 L/person day, inf. BOD 200 mg/L, influent 12 hrs/day)  
The data shown as 200L / person day is calculated for the japan standard.

Population for the treatment unit		14 persons	30 persons	40 persons	50 persons
Model		HC-14B	HC-30B	HC-40A	HC-50A
Flow rate (m <sup>3</sup> /day)		2.8	6.0	8.0	10.0
Dimensions (mm)	Length A	3,100	4,300	5,160	6,060
	Width B	1,660	2,000	Φ2,050	Φ2,050
	Height C	1,990	2,180	2,180	2,180
Manhole number	Φ500 / Φ600	2/1	2/2	2/1	-/3
Charcoal plate number	600 × 1,000	-	-	1	1
Inf. eff. pipe dia. (mm)		Φ125			
Air pipe dia. (mm)		Φ13	Φ20		
Capacity (m <sup>3</sup> )	Peak-cut flow equalization part	0.298	0.939	1.192	1.440
	Anaerobic filter 1st chamber	2.542	4.746	6.346	7.677
	Anaerobic filter 2nd chamber	1.771	2.754	3.170	3.849
	Moving bed tank	0.489	1.593	2.123	2.660
	Media filter tank	0.112	0.150	0.253	0.253
	Treated water tank	0.860	1.292	1.371	1.371
	Disinfection tank	0.030	0.063	0.105	0.105
Total capacity		5.804	10.598	13.368	15.915
Blower air flow rate (L/min)		80	200	250	300

**Drawing example**



# What is Johkasou . . . ?

For Earth, For Life  
Kubota

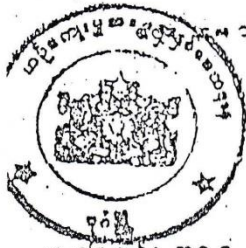
Johkasou ဆိုတာဘာလဲ... ?

- Not just a septic tank. It is the wastewater treatment system.  
ရေဆိုးများကို သိုလှောင်ရုံသာမက သန့်စင်အောင်ပြုလုပ်သည့် စနစ်ပါဝင်သော ကန်ဖြစ်ပါသည်။
- Includes various functions in one tank called anaerobic, aerobic, sedimentation and disinfection.  
ကန်တစ်ကန်ထဲမှာပင် လုပ်ဆောင်ချက်များစွာပါဝင်သည်။ ဘတ်တီးရီးယားကို “လေမဲ့” မျိုးပွား၍ သန့်စင်သည့် စနစ်၊ ဘတ်တီးရီးယားကို “လေဖြင့်” မျိုးပွား၍ သန့်စင်သည့်စနစ်၊ အနယ်ချခြင်း၊ ပိုးသတ်ခြင်း စသည့် လုပ်ဆောင် များပါဝင်သည်။
- Treat wastewater as same quality as centralized sewage system.(BOD) removal rate  $\geq 90\%$ , effluent BOD  $\leq 20\text{mg/l}$   
“Johkasou” သည် ပြုန့်စီမံ “ရေဆိုး” ပိုက်လိုင်း စနစ်များကဲ့သို့ ရေဆိုးစွန့်ပစ်ရုံသက်သက်မဟုတ်ဘဲ ရေဆိုးများ ကို ၉၀% နှင့် အထက် သန့်စင်အောင် ထုတ်ပေးနိုင်သည်။ တစ်လီတာလျှင် ၂၀ မီလီဂရမ်အောက်သာ အညစ်အကြေး ပါဝင်သော ရေကို ပြန်ထုတ်ပေးသည်။
- Treat any type of wastewater; kitchen, toilet, laundry or shower.  
မီးဖိုချောင်၊ အိမ်သာ၊ ရေချိုးခန်းနှင့် အဝတ်လျှော်ရာမှ ထွက်လာသည့် ရေဆိုး အမျိုးမျိုးကိုလည်း သန့်စင်ပေးနိုင်သည်။
- Wa Minn Company Ltd, as a sole distributor in Myanmar, is providing all services including import, installation and maintenance with skilled technicians.  
ဝမ်း ကုမ္ပဏီလီမိတက်မှ Johkasou စက်များအား တစ်ဦးတည်းကိုယ်စားလှယ်ဖြင့် မှာယူတင်သွင်းပေးခြင်း၊ တပ်ဆင်ပေးခြင်း၊ Maintenance ပြုလုပ်ပေးခြင်း တို့အား ကျွမ်းကျင်ပညာရှင်များဖြင့် ဆောင်ရွက်ပေးလျက်ရှိပါသည်။
- Kubota Johkasou sewage treatment plant is accepted and recommended by international environment conservation organization.  
နိုင်ငံတကာရှိ သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဆိုင်ရာ အဖွဲ့အစည်းများ၏ ထောက်ခံမှု အပြည့်အဝရရှိထားသော Kubota Johkasou ရေဆိုးသန့်စင်စက် ဖြစ်ပါသည်။



Kubota FRP Johkasou, Sewage Treatment Equipment [ Suitable for 5 - 5,000 persons ]

Appendix 8: Sample permit from Archaeological Department for Construction of Hotel



ယဉ်ကျေးမှုနှင့် အမွေအနှစ် ဝန်ကြီးဌာန  
 ဝန်ကြီးရုံး၊ ဝန်ကြီးဌာန၊ ဝန်ကြီးရုံး၊ ဝန်ကြီးရုံး၊ ဝန်ကြီးရုံး

တိကျမှန် ဖြစ် ပူးတွဲ ၅

ယဉ်ကျေးမှုနှင့် အမွေအနှစ် ဝန်ကြီးဌာန၊ ဝန်ကြီးရုံး၊ ဝန်ကြီးဌာန၊ ဝန်ကြီးရုံး၊ ဝန်ကြီးရုံး

ပူးတွဲ ဖြစ်။ ဝန်ကြီးရုံး၊ ဝန်ကြီးဌာန၊ ဝန်ကြီးရုံး၊ ဝန်ကြီးရုံး

ဝန်ကြီးရုံး၊ ဝန်ကြီးဌာန / ပ-ဝန်/၅-ဝ

အကြောင်းအရာ။ မြန်မာ့အနုပညာလက်ဆောင် ပစ္စည်း ထုတ်လုပ်ရောင်းဝယ်  
 ရောင်းဝယ်ဖွယ်ရာပစ္စည်း လီစင်စက်၊ နိုင်ငံတော်ကုမ္ပဏီ၊  
 ဝန်ကြီးရုံး၊ မြောက်ပိုင်း၊ ဝန်ကြီးရုံး၊ ဝန်ကြီးရုံး၊ ဝန်ကြီးရုံး၊ ဝန်ကြီးရုံး  
 တစ်ဖက်၊ အဆောက်အအုံ၊ အားဆောင်လုပ်ငန်းစဉ်ပြု -  
 ခြင်း စီစဉ်။

၁။ အထက်အကြောင်းအရာပါကိစ္စနှင့်ပတ်သက်၍ မြန်မာ့အနုပညာလက်ဆောင်  
 ပစ္စည်း ထုတ်လုပ်ရောင်းဝယ်ရေး၊ ဝန်ကြီးရုံး၊ ဝန်ကြီးဌာန၊ ဝန်ကြီးရုံး၊ ဝန်ကြီးရုံး၊ ဝန်ကြီးရုံး  
 ပူးတွဲ၊ ဝန်ကြီးရုံး၊ ဝန်ကြီးဌာန၊ ဝန်ကြီးရုံး၊ ဝန်ကြီးရုံး၊ ဝန်ကြီးရုံး၊ ဝန်ကြီးရုံး  
 တစ်ဖက်၊ အဆောက်အအုံ၊ ဝန်ကြီးရုံး၊ ဝန်ကြီးဌာန၊ ဝန်ကြီးရုံး၊ ဝန်ကြီးရုံး၊ ဝန်ကြီးရုံး၊ ဝန်ကြီးရုံး

၂။ (က) အဆိုပါဝန်ကြီးရုံး၊ ဝန်ကြီးဌာန၊ ဝန်ကြီးရုံး၊ ဝန်ကြီးရုံး၊ ဝန်ကြီးရုံး၊ ဝန်ကြီးရုံး  
 ဝန်ကြီးရုံး၊ ဝန်ကြီးဌာန၊ ဝန်ကြီးရုံး၊ ဝန်ကြီးရုံး၊ ဝန်ကြီးရုံး၊ ဝန်ကြီးရုံး  
 (ခ) အဖြင့် (ပ) ပေးပေးရန် ဝန်ကြီးရုံး၊ ဝန်ကြီးဌာန၊ ဝန်ကြီးရုံး၊ ဝန်ကြီးရုံး  
 (ဂ) ရှေးအောင်း၊ အဆောက်အအုံ၊ မြန်မာ့အနုပညာလက်ဆောင် ဝန်ကြီးရုံး၊ ဝန်ကြီးဌာန၊ ဝန်ကြီးရုံး၊ ဝန်ကြီးရုံး  
 ဝန်ကြီးရုံး၊ ဝန်ကြီးဌာန၊ ဝန်ကြီးရုံး၊ ဝန်ကြီးရုံး၊ ဝန်ကြီးရုံး၊ ဝန်ကြီးရုံး  
 မရှိကြောင်း ပြန်ကြား ထပ်မံမည်။

ဝန်ကြီးရုံး၊ ဝန်ကြီးဌာန ( )  
 ဝန်ကြီးရုံး၊ ဝန်ကြီးဌာန

ယဉ်ကျေးမှုနှင့် အမွေအနှစ် ဝန်ကြီးဌာန  
 ပူးတွဲ ဖြစ်။

ဦးမြင့်စောလွင်  
 အုပ်ချုပ်မှုဒါရိုက်တာ  
 မြန်မာ့အနုပညာလက်ဆောင် ပစ္စည်း ထုတ်လုပ်ရောင်းဝယ်ရေး ဝန်ကြီးရုံး၊  
 ဝန်ကြီးဌာန၊ ဝန်ကြီးရုံး၊ ဝန်ကြီးရုံး၊ ဝန်ကြီးရုံး၊ ဝန်ကြီးရုံး  
 မိမိ၏ လို -  
 ၁။ ရုံးလက်ခံ  
 ၂။ မြေ

### Appendix 9. Attendant List of Public Consultation Meeting

Amata International ကုမ္ပဏီလီမိတက်မှ အကောင်အထည်ဖော် ဆောင်ရွက်မည့် Amata Resort, Bagan စီမံကိန်းအတွက် ပတ်ဝန်းကျင်ထိခိုက်မှုဆိုင်ရာ ဆန်းစစ်ခြင်းနှင့် ပတ်သက်၍ ရှင်းလင်းတင်ပြခြင်းအစည်းအဝေး အခမ်းအနား သို့ တက်ရောက်လာသူများစာရင်း

အစိုးရဌာနဆိုင်ရာအဖွဲ့အစည်းများ

ရက်စွဲ - ၂၀၁၆ ခုနှစ်၊ ဩဂုတ်လ (၂) ရက်။

စဉ်	အမည်	ရာထူး	ဌာန/အဖွဲ့အစည်း	ဆက်သွယ်ရန်နံပါတ်	လက်မှတ်
၁။	၂။	၃။	၄။	၅။	၆။
၁။	ဦး ဦး	၈၂၀၀ နှိုင်း ခြီး ၅၂၂	မိုးသင်းဌာန	၀၉၇၇၇၂၇၅၅၅၃၀	
၂။	ဦး ရွှေ၊ ရီ၊ လင်း	၉-၃၃၆ ၅၂၂	၁၀ A	၀၉-၂၀၄၂၅၂၇	
၃။	ဦး သန်းဝင်း၊ ဝေဝေ	မြို့နယ်ချုပ်ရေးဌာန	မြို့နယ်ချုပ်ရေးဌာန	၀၉-၂၅၆၅၆၇၅၆၇	
၄။	ဦး သိန်းစိန်	ကျေးရွာအုပ်စုချုပ်ရေးဌာန	ကျေးရွာအုပ်စုချုပ်ရေးဌာန	၀၉-၂၅၇၀၂၀၆၆၇	
၅။	ဦး စန်ဝင်း	ရုံးအဖွဲ့	မြို့နယ်ချုပ်ရေးဌာန	၀၉-၃၇၇၆၀၂၇၇	
၆။	ဦး ခင်ဝင်း၊ ဝေဝေ	၈၂၀၀ နှိုင်း ခြီး ၅၂၂	၂၇၀၈/၁၃၅	-၃၀၂၇၃၅၂	
၇။	ဦး သန်းဝင်း၊ ဝေဝေ	၈၂/၀၀ နှိုင်း ခြီး ၅၂၂	၂၇၀၈/၁၃၅	၀၉-၄၀၇၆၆၆၇၇	
၈။					
၉။					
၁၀။					

Amata International ကုမ္ပဏီလီမိတက်မှ အကောင်အထည်ဖော် ဆောင်ရွက်မည့် Amata Resort, Bagan စီမံကိန်းအတွက် ပတ်ဝန်းကျင်ထိခိုက်မှုဆိုင်ရာ ဆန်းစစ်ခြင်းနှင့် ပတ်သက်၍ ရှင်းလင်းတင်ပြခြင်းအစည်းအဝေး အခမ်းအနား သို့ တက်ရောက်လာသူများစာရင်း

NGO, INGO, CS အဖွဲ့အစည်းများ

ရက်စွဲ - ၂၀၁၆ ခုနှစ်၊ ဩဂုတ်လ (၂) ရက်။

စဉ်	အမည်	အဖွဲ့အစည်း/ရာထူး	အီးမေးလ်လိပ်စာ	လက်မှတ်
၁။	၂။	၃။	၄။	၅။
၁။	ဦး သန်းဝင်း၊ ဝေဝေ	မိုးသင်းဌာန ခြီး ၅၂၂ နှိုင်း ၅၂၂		
၂။	ဦး သန်းဝင်း၊ ဝေဝေ	မိုးသင်းဌာန ခြီး ၅၂၂		
၃။	ဦး သန်းဝင်း၊ ဝေဝေ	မိုးသင်းဌာန ခြီး ၅၂၂		
၄။				
၅။				
၆။				
၇။				
၈။				
၉။				
၁၀။				

Amata International ကုမ္ပဏီလီမိတက်မှ အကောင်အထည်ဖော် ဆောင်ရွက်မည့် Amata Resort, Bagan စီမံကိန်းအတွက် ပတ်ဝန်းကျင်ထိခိုက်မှုဆိုင်ရာ ဆန်းစစ်ခြင်းနှင့် ပတ်သက်၍ ရှင်းလင်းတင်ပြခြင်းအစည်းအဝေး အခမ်းအနား သို့ တက်ရောက်လာသူများစာရင်း

NGO, INGO, CS အဖွဲ့အစည်းများ

ရက်စွဲ - ၂၀၁၆ ခုနှစ်၊ ဩဂုတ်လ (၂) ရက်။

စဉ်	အမည်	အဖွဲ့အစည်း/ရာထူး	အီးမေးလ်လိပ်စာ	လက်မှတ်
၁။	၂။	၃။	၄။	၅။
၁။	ဦး သန်းဝင်း၊ ဝေဝေ	မိုးသင်းဌာန ခြီး ၅၂၂ နှိုင်း ၅၂၂		
၂။	ဦး သန်းဝင်း၊ ဝေဝေ	မိုးသင်းဌာန ခြီး ၅၂၂		
၃။	ဦး သန်းဝင်း၊ ဝေဝေ	မိုးသင်းဌာန ခြီး ၅၂၂		
၄။				
၅။				
၆။				
၇။				
၈။				
၉။				
၁၀။				

## Appendix 10. List of Invitation

စဉ်	စိတ်ကြားမည့်ပုဂ္ဂိုလ်	မှတ်ချက်
၁။	ဥက္ကဋ္ဌ မြန်မာရင်းနှီးမြှုပ်နှံမှုကော်မရှင် ရန်ကုန်မြို့။	ကုမ္ပဏီ Letter Head ဖြင့် ပေးပို့ရန် Fax no.- 657889 Office – 01-658121
၂။	ညွှန်ကြားရေးမှူးချုပ် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန နေပြည်တော်။	ကုမ္ပဏီ Letter Head ဖြင့် ပေးပို့ရန် Office - 067- 431321 Fax - 067-431342
၃။	ညွှန်ကြားရေးမှူး ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန မွန္တလေးတိုင်းဒေသကြီး	ကုမ္ပဏီ Letter Head ဖြင့် ပေးပို့ရန် Office - 02- 56020 Fax – 02 56019
၄။	ညွှန်ကြားရေးမှူး ယဉ်ကျေးမှုအမွေအနှစ်ဒေသဌာနခွဲ ပုဂံမြို့၊ ညောင်ဦးမြို့နယ်။	
၅။	ဦးစီးအရာရှိ၊ ဟိုတယ်နှင့်ခရီးသွားလုပ်ငန်း ပုဂံမြို့၊ သစ်မြို့၊ ညောင်ဦးမြို့နယ်၊ မွန္တလေးတိုင်းဒေသကြီး။	
၆။	အုပ်ချုပ်ရေးမှူး အထွေထွေအုပ်ချုပ်ရေးဦးစီးဌာန ပုဂံမြို့၊ သစ်မြို့၊ ညောင်ဦးမြို့နယ်။	
၇။	ဦးစီးမှူး၊ မြို့နယ်မြေစာရင်းဦးစီးဌာန ညောင်ဦးမြို့။	
၈။	ဦးစီးအရာရှိ၊ ဟိုတယ်နှင့်ခရီးသွားလုပ်ငန်း ပုဂံမြို့၊ သစ်မြို့၊ ညောင်ဦးမြို့နယ်။	
၉။	တပ်ဖွဲ့မှူး၊ မြန်မာနိုင်ငံစီးသတ်တပ်ဖွဲ့ ပုဂံမြို့၊ သစ်မြို့၊ ညောင်ဦးမြို့နယ်။	
၁၀။	ကျေးရွာအုပ်ချုပ်ရေးမှူး ဖွားစောကျေးရွာအုပ်စု၊ ပုဂံမြို့၊ သစ်မြို့။	
၁၁။	ကျေးရွာအုပ်ချုပ်ရေးမှူး သူဌေးကန်ကျေးရွာ၊ ဖွားစောကျေးရွာအုပ်စု၊ ပုဂံမြို့၊ သစ်မြို့။	
၁၂။	ဦးစီးအရာရှိ၊ မြို့နယ်စည်ပင် ညောင်ဦးမြို့နယ်၊ မွန္တလေးတိုင်းဒေသကြီး။	
၁၃။	ဦးစီးအရာရှိ၊ သာသနာရေးနှင့်ယဉ်ကျေးမှုဦးစီးဌာန ပုဂံညောင်ဦးမြို့နယ်၊ မွန္တလေးတိုင်းဒေသကြီး။	
၁၄။	ဥက္ကဋ္ဌ၊ ဟိုတယ်လုပ်ငန်းရှင်များအသင်း၊ ပုဂံမြို့၊ သစ်မြို့။	
၁၅။	ရှေးဟောင်းဘုရားများထိန်းသိမ်းရေးကော်မတီ ပုဂံညောင်ဦးမြို့နယ်၊ မွန္တလေးတိုင်းဒေသကြီး။	
၁၆။	လူမှုရေးလုပ်ဆောင်နေသော အသင်းအဖွဲ့အစည်းများ	
၁၇။	ဥက္ကဋ္ဌ၊ ပုဂံဒေသဖွံ့ဖြိုးတိုးတက်ရေးအသင်း။	
၁၉။	NGOs များ	
၂၀။	သမုဒ္ဒရာရိပ်၊ ပုဂံမြို့၊ သစ်မြို့နှင့် သူဌေးကန်ကျေးရွာ၊ ဖွားစောကျေးရွာအုပ်စုမှ ဒေသခံပြည်သူများ။	