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Master Plan of Post Mining Area Base on ABGC Model

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Abstract

Spatial arrangement for post mining area dealt with re-creating the functional land and utilize as new development of environment and community around the mining location. Spatial development is based on a collaboration model of ABGC (Academician, Business, Government and Community). Each component of model has its own role in terms of scope of work and responsibilities, such as innovator, incubator, facilitator and implementee, respectively.

The model was implemented in post mining area at Towi village, Kolonodale, Central Sulawesi by Betamindo (the Mining Contractor) and Department of Landscape Architecture IPB in developing Master Plan for Post Mining Area.

Based on those of ABGC's model, the Master Plan of Post Mining Area was initiated. The space arrangement, such as reforestation on reclamation area, arboretum, incubation lot, nurseries, management office, training facilities, information center, warehousing, primary processing plant, dormitory, circulation system, utilities and other infrastructure were provided in the Master Plan.

Keywords: *master plan, ABGC model, post mining, nucleus-plasm*

1. Introduction

1.1 Background

The important issue in mining industry, instead of positive impact, such as creating new job and other multiplier effect, i.e. decreasing environmental quality and surrounding area, such as changing landscape, water table, soil fertility, produce waste material, decreasing or disappearing biodiversity, environmental aesthetic and amenities as well. Since post mining area covered large area, those negative impact should be reduced by reclaiming the land. Along with re-creating the biophysical condition of land, empowering the community of after mining activities should take into consideration. Integration

between land reclamation and community development program will be conducted based on collaboration model. The collaboration model in community development program namely ABGC (A=Academician, B=Business, G=Government and C=Community).

One of the collaboration model was implemented in ex-mined area at Towi, Kolonodale, Central Sulawesi by Betamindo (the Mining Contractor) and Department of Landscape Architecture IPB in developing Master Plan for Post Mining Area. The model initiates the Nucleus – Plasma Relationship as platform for the collaboration among ABGC components. The role of business component (Betamindo), as incubator, is to arrange the post mining land as nucleus-site. On the other hand, the community in plasma-site, participate by providing their own land for production and primary agricultural processing plant. Moreover, the local government of Morowali regency and academician component (IPB) participate as facilitator and innovator both in nucleus-site and plasma-site as well.

1.2 Objective

The objective of study is to conduct spatial arrangement of post mining area by re-creating the functional land and utilize as new development of environmental biophysical aspect and social economy of community around the mining location.

2. Methodology

Spatial arrangement of post mining area was carried out at the nickel mined land located in the Towi village, Kolonodale, Central Celebes (Figure 1) for four months. The data collected are presented in Table 1. Primary data was collected directly in the field and through interviews. Secondary data obtained through the study and related reference materials that have been published. The data collected were analyzed using descriptive (quantitative and qualitative) and, in turn is the basic ingredient for planning and technical design of the nickel mined landscape for reforestation

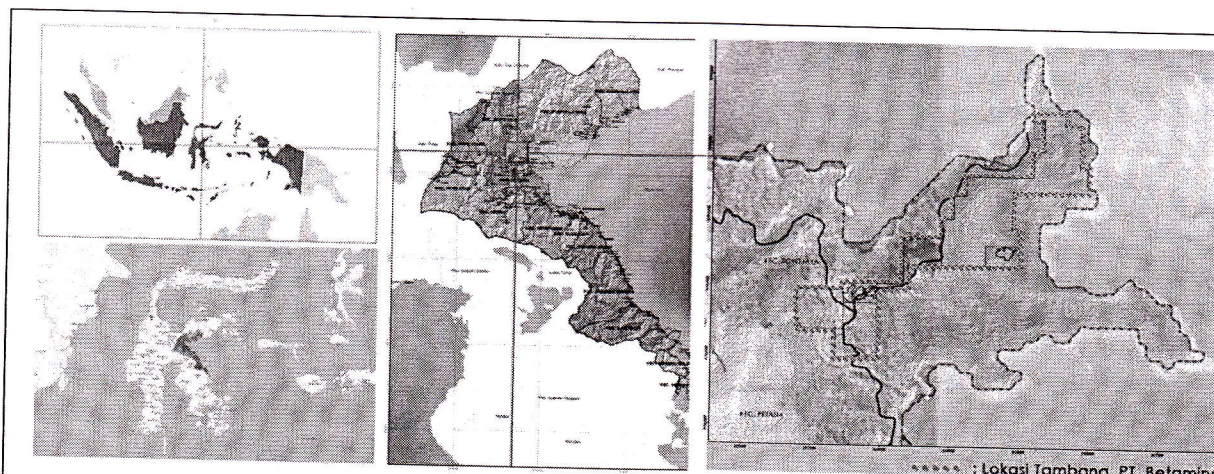


Figure 1. Site of Mine Location at Towi village, Kolonodale, Central Celebes

Table 1. Data used in the preparation of Master Plan Post-Mine Land

<i>Data</i>	<i>Interpretation</i>
1. Area/Region	<ul style="list-style-type: none"> ○ Plan for Regional Development ○ Access and transport network ○ Socioeconomic condition
2. Site	<ul style="list-style-type: none"> ○ Location, Area, and Orientation ○ Conditions around the site ○ Potential and constraints (biophysical, technical)
3. Technical	<ul style="list-style-type: none"> ○ Availability of materials and facilities development
4. Supporting data	<ul style="list-style-type: none"> ○ The desire and supports communities and

Data processing for the preparation of reports, maps, and architectural drawings and the calculation of the cost of the technical implementation of the reclamation plan performed at Studio Landscape Architecture Faculty of Agriculture, IPB Bogor. The planning process in this study using the method of Gold (1980) which consists of the following stages: (1) Inventory, (2) Analysis, (3) Synthesis, (4) The basic concept, and (5) The master plan of Post-Mine Land

3. Result

The data analyzed were: (1) physical and biophysical, (2) social and cultural rights. Physical data and the biophysical basis for the determination of land suitability for agricultural crops and land suitability for crops estate and forestry. The results of land evaluation and its recommendations are presented in Table 2, which are spatially described in Figure 2 and Figure 3. The social data analysis indicate that the social and community development plan and implementation of post-mining land reclamation should provide benefits and positive impact on communities around the mining areas.

Economic, social and cultural environment should be considered in order not to cause turmoil in society. Some of the things suggested by respondents interviewed that the handling of post-nickel mine run of success are:

- Able to provide post-employment activities of mining
- Making the most of the land reclamation, seeking a commodity that can empower communities and provide community benefits in the future as well as the reclamation will be implemented maximum;
- Reclamation is done to reduce the negative impacts of mining, was able to return the land to its original state (forest), and prioritized in a location close to the settlement.

Tabel 2. Potential Land Suitability and Improvement Recommendation

No.	Land Use	Suitability Class (Potential)	Limiting Factors	Improvement Recommendation
1.	FORESTRY: Sengon, Acacia, Eucalyptus, Gelam, Damar, Kase, Pine, Teak, Agatis	S3-S2 (less suitable – moderate suitable)	Thin or very shallow solum (spot area)	Bench terraces Alley Cropping
2.	PLANTATION: Coconut, Cocoa, Coffee (lowland)	S3-S2 (less suitable – moderate suitable)	Very steep slope Very low nutrient status	Mix Cropping Strip Cropping
3.	AGRICULTURE: Tubers (taro, sweet potato, cassava) Nuts (soybean, peanuts) Fruits (Avocado, Lychees, Durian, Longan, Mangosteen, Jackfruit, Shaman, Rambutan, Sapodilla, Sugar-apple, Cashew Nut)	N - S2 (unsuitable – moderate suitable)	Very low nutrient status: • CEC • Nitrogen • Potassium • Phosphorus Low organic matter high salinity	Balanced fertilization The use of mycorrhizal Addition of Organic Materials / Compost Improved Humidity: • Vegetation • Water Harvesting Facility
4.	GRAZING: Grass (Elephant grass, Setaria, Mexican grass, King Grass) Legume (Lamtoro, Sengon, Turi, African Timber)	S3-S2 (less suitable – moderate suitable)		The selection of commodities that are resistant to high salinity

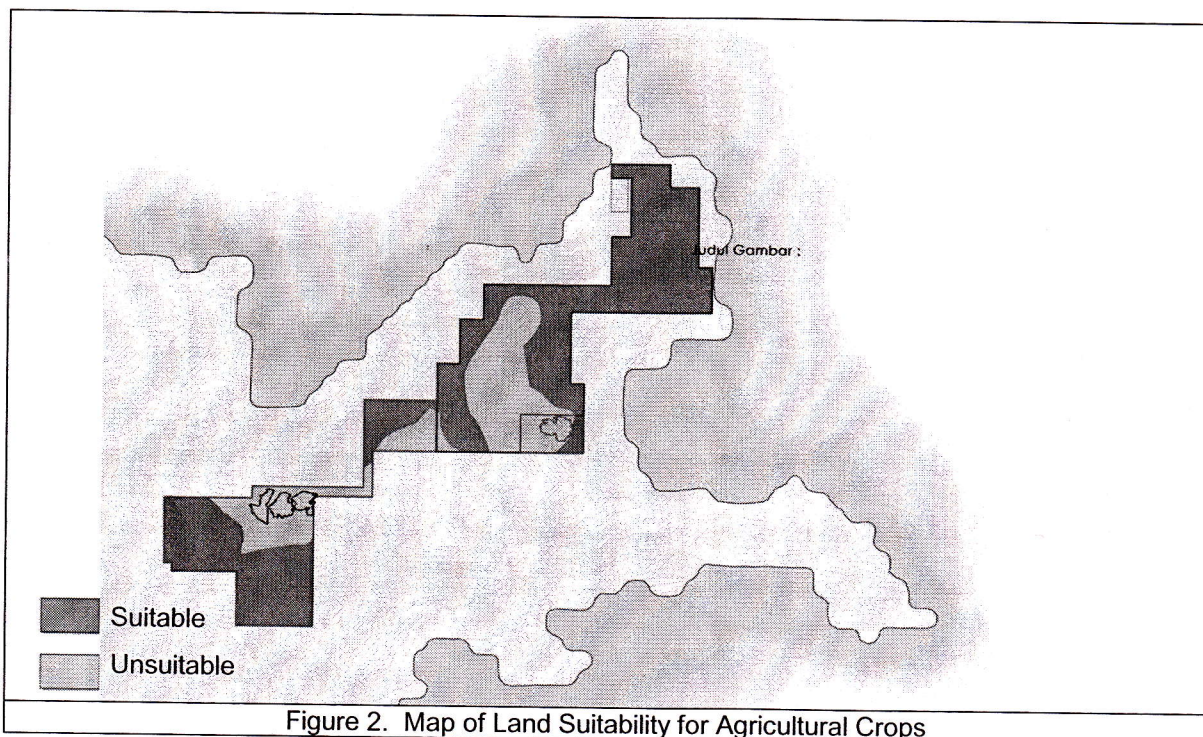


Figure 2. Map of Land Suitability for Agricultural Crops

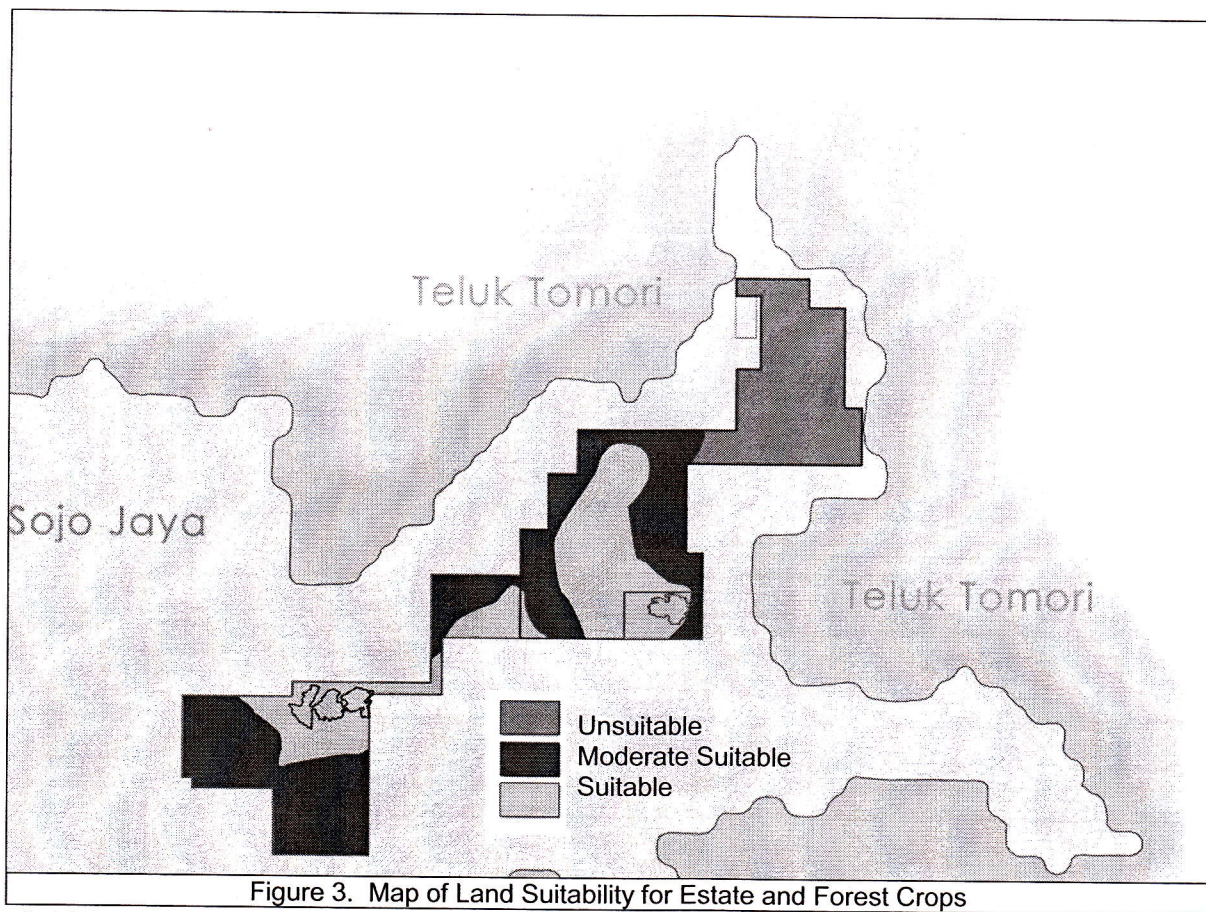


Figure 3. Map of Land Suitability for Estate and Forest Crops

3.1 Planning Concept

Planning concept of post mining reclamation area and community development based on collaboration model of ABGC. Collaboration model of ABGC dealt with integration approach to re-creating the land and community empowering. Among those component in the model has they own role in term of scope of work and responsibilities, such as innovator, incubator, implementee and facilitator, respectively (Figure 4). This model initiate the Nucleus – Plasm Relationship as platform for the collaboration among those components. The role of Bussiness component (mining corporation), as incubator, is to arrange the ex-mined land as Nucleus Site. On the other hand, the Community as Plasm, particpate by providing they own land for production and primary agricultural processing plant. Meanwhile, the Government and related institution, and Academician components (Department of Landscape Architecture

IPB) participate as innovator and facilitator both in Nucleus Site and Plasma Site as well. Those task and responsibilities will be considered in developing spatial arrangement.

The post-mine reclamation was done through reforestation based on the concept of forest succession. Succession process consists of four stages of landscape changes, namely: prior to mining (native forest) phase, mining phase, post mining reclamation phase and forest succession formation phase (Figure 5.)

The concept of community development are arranged in the form of land use post mining reclamation required by the framework program for community development. Basic facilities, infrastructure and utilities are needed to be projected to support community development programs to meet the needs of people around to changing conditions after mining activities.

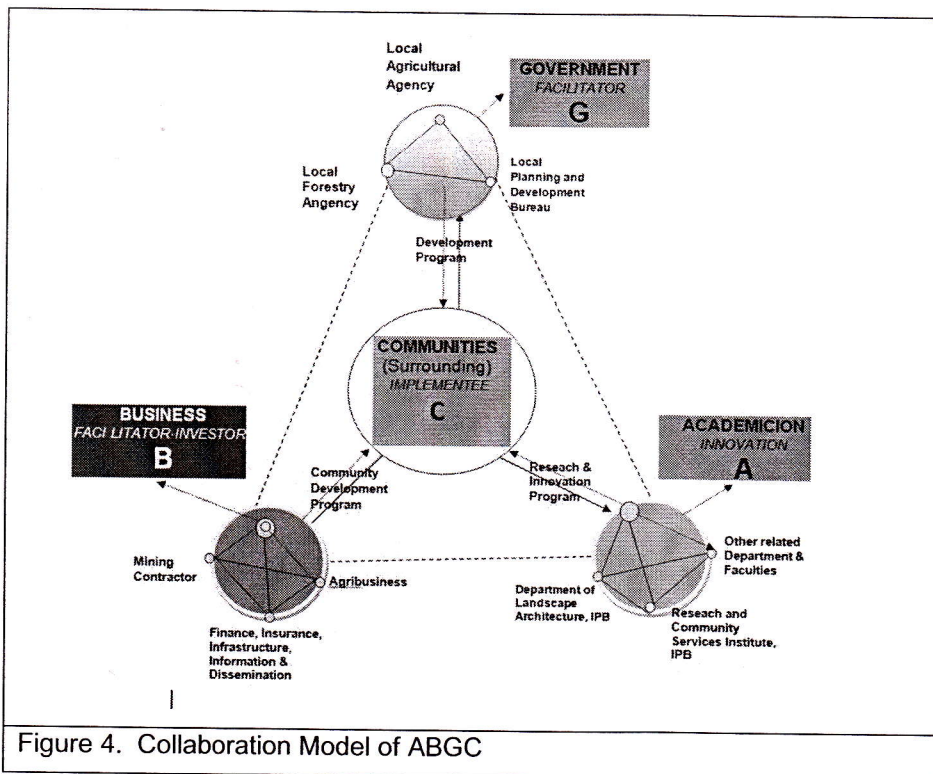


Figure 4. Collaboration Model of ABGC

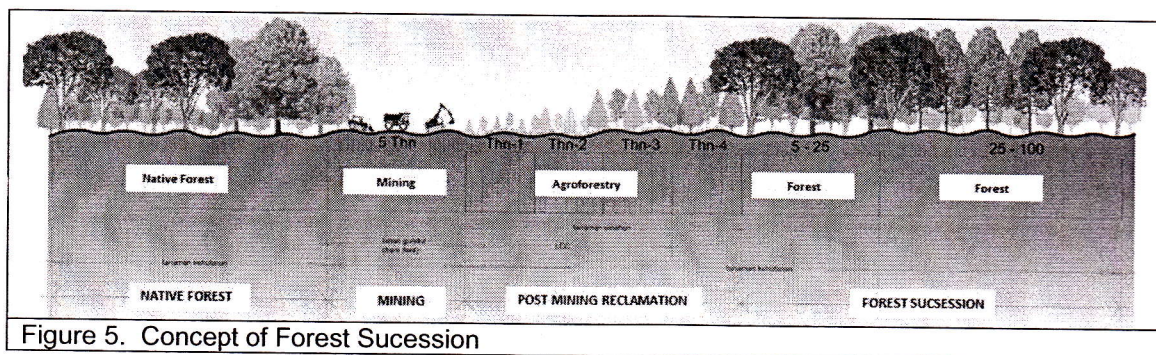


Figure 5. Concept of Forest Succession

3.2 Zonation

To minimize the impact of post mining land reclamation, required spatial planning that includes the integration of the area reclaimed, surrounding environment, and community as well. Land reclamation is an activity that should be introduced new activities for local communities and be integrated with the local government plans. Reforestation or afforestation is an activity that requires the integration between the mining companies, surrounding communities and local government.

Based on the evaluation of land and social assessment indicated that facilities and programs need to be developed in the post-mining land. Facilities and programs are formulated into the activity and functional spaces in the form of zoning (Table 3.). There are five zones are developed, i.e. the Reclamation Zone, Supporting Zone, Enrichment

(Preservation) Zone, Welcome Zone, Management Zone (Figure 6). The Enrichment (preservation) zone and the reclamation zone actually the main zone, which is a designated zone for agro-forestry and tourism. Linkage zones are reversed by a transition zone. Then the support zone is the area allocated for the management and utilities.

In the Enrichment (Preservation) Zone of existing protected forest condition is maintained, while the addition of vegetation *enrichment* conducted in the area, with due regard to existing vegetation (Endemic). This zone is located in the eastern part of the middle block and an area that is not mined. Zone is a zone designated for agroforestry is located in the center of the central block which is a mining area and also be enabled for the tourist zone. The next zone is the zone where the supporters of this zone will function as a zone of acceptance and management. Finally the transition zone is the area that became a

liaison between primary and support zones.

Tabel 3. Facilities and programs are formulated into the activity and functional spaces in the form of zoning

	ZONA	ATIVITIES/P ROCESS	SPACE/ FACILITIES	SUCCESSION PERIODE (YEARS)						FUNCTIONS							
				1	2	3	4	5	5-100	Welcoming	Model of Nature Forest Conservation	Model of Revegetasi/Reforestasi	Ecotourism	Nature Interpretation	Management	Infrastructure	Utilities
I.	WELCOME	Penyambutan via jalan darat	Gate														
		Penyambutan via air	Marina														
II.	ENRICHMENT	Formasi Hutan Campuran (Existing)	Blok Formasi Hutan Campuran (Existing)														
III.	RECLAMATION																
		Koleksi Pohon Lokal	Blok Arboretum/Kebun Raya														
		Reklamasi Vegetasi Pohon dan tumpang sari (Agroforestri)	Blok Formasi Hutan Tanaman (Agroforestri)														
		a. Penanaman Tegakan Pohon Utama	a. Tegakan Pohon Utama														
		b. Penanaman Tanaman Sela (Annual Crop)	b. Tanaman Sela (Annual Crop)														
		c. Tanaman perennial (cacao, kopi, rotan)															
		d. Pemeliharaan Ternak (Agropastura)															
		e. Pembibitan	Kebun Bibit														
IV.	MANAGEMENT																
		Site Office	Kantor Pengelola														
		Akomodasi	Asrama														
		Pengamanan	Pos Pengaman														
		Pelatihan	Ruang Pelatihan														
		Pertemuan	Bangsai/Pendopo														
		Toilet	Toilet														
V.	SUPPORTING																
		Sistem Jaringan Jalan Utama	Jaringan Jalan Utama (6 m)														
		Sistem Jaringan Jalan Kebun	Jaringan Farmroad (2 m)														
		Pagar	Hedgerows (Pagar Tanaman)														
		Sistem Sumber Energi	Sumber Energi Surya dan Angin, Biogas														
		Sistem Air Bersih	Jaringan Instalasi air bersih														
			Jaringan Irigasi														
		Sistem Sanitasi (Septic System)	Jaringan sanitasi														

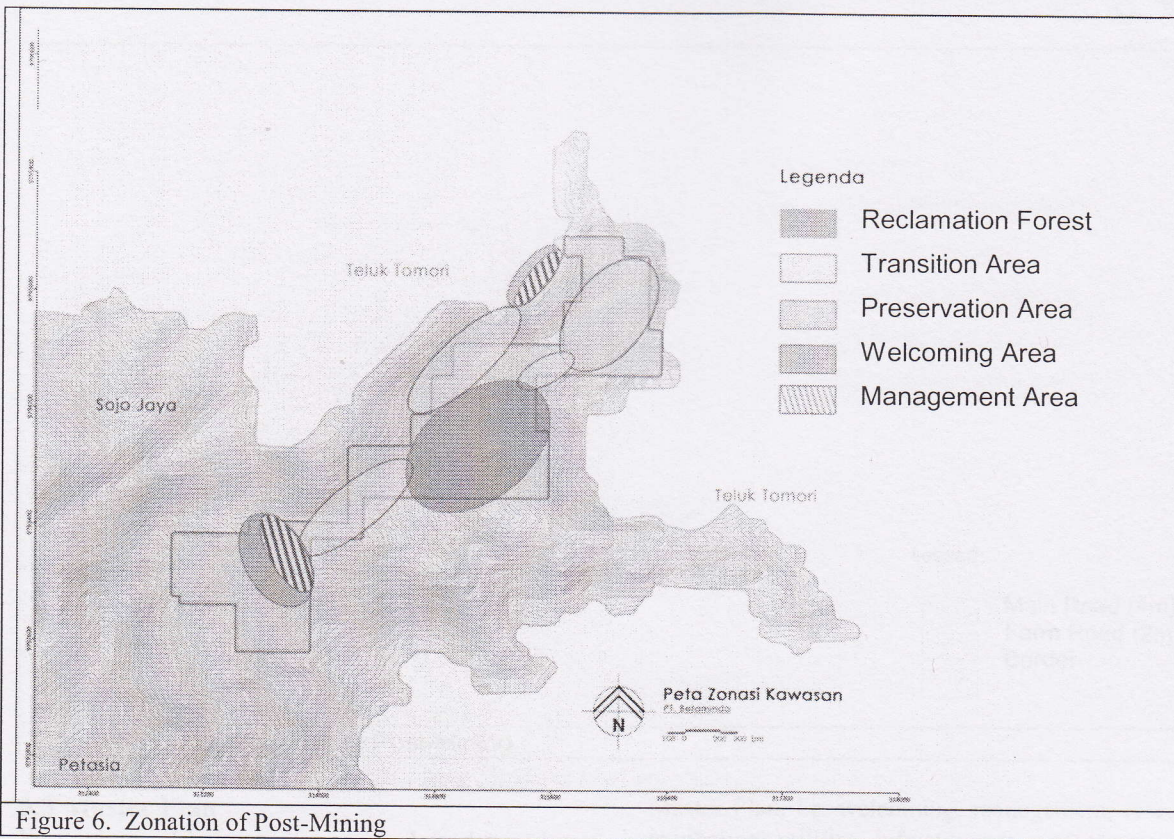


Figure 6. Zonation of Post-Mining

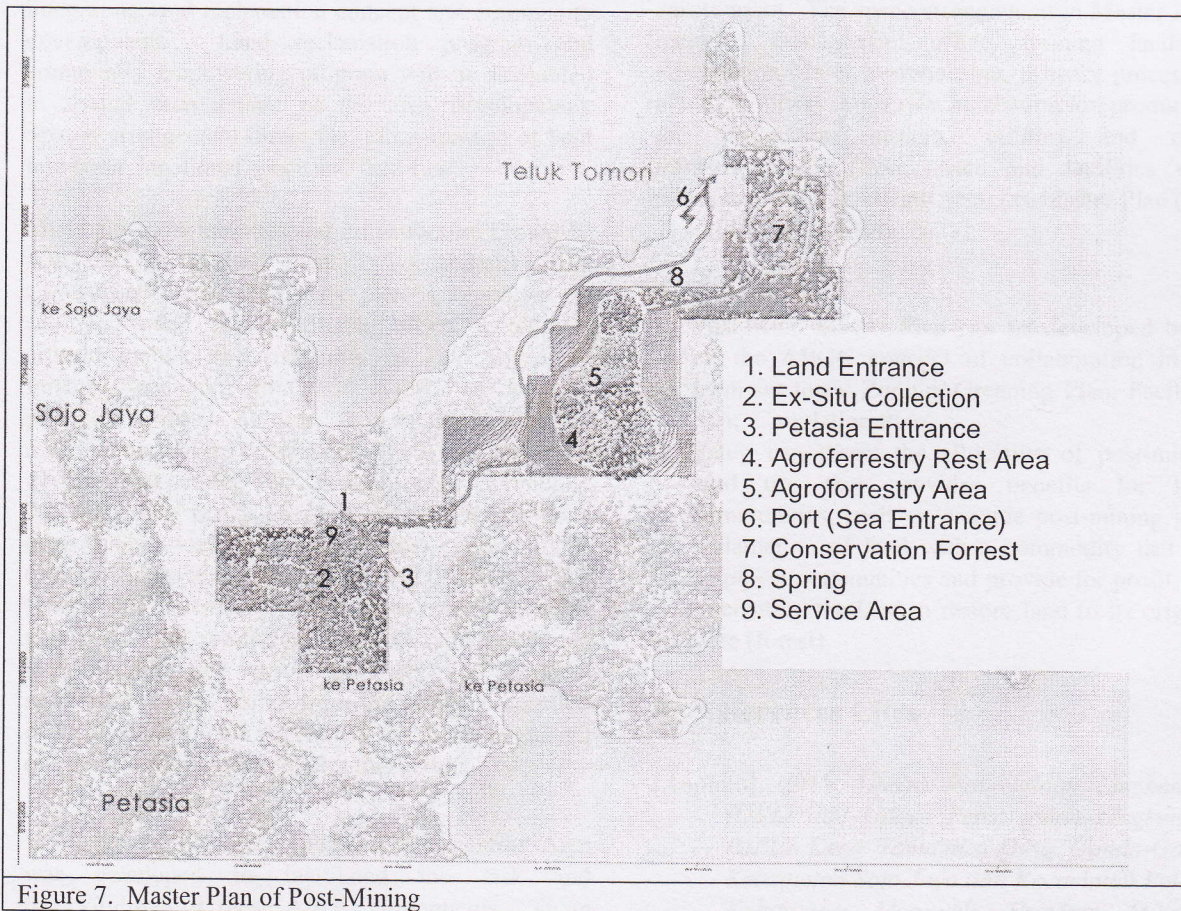


Figure 7. Master Plan of Post-Mining

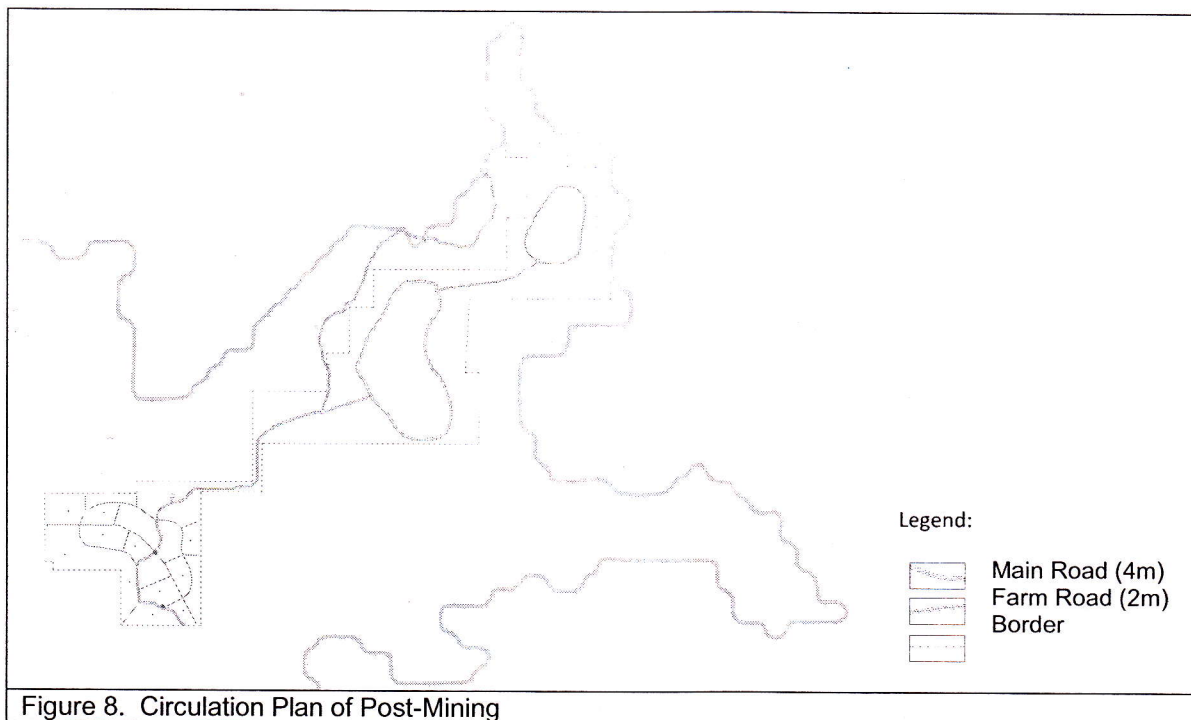


Figure 8. Circulation Plan of Post-Mining

3.3 Master Plan

Post mining development was conducted based on integrating land reclamation concept and community development. Land reclamation program and community empowering program will be facilitated in spatial arrangement of the area development. Spatial arrangement direct the utilization use of land into some functional space and facilities.

There are some facilities and infrastructure should be provided in Master Plan. To support local agroforestry concepts, master plan is supported by ecological and social criteria. Where Ecological criteria include the suitability of land for agroforestry, endemic flora and fauna, as well as protected areas. As for the social results of reclamation land developers (both private and government) need to pay attention to the community through the provision of decent employment opportunities to help the educational community in order to improve the welfare of the community. The survey and interviews found that people strongly agree with the reforestation actions and ex-mining land utilization for tourism purposes. For the local agreement that is visible from the public perception of local needs to be a benchmark for the management of greening the landscape after this action.

Moreover, the Master Plan of Post Mining Area was developed to facilitated the task and responsibilities of those ABGC components. There were 8 (eight) function were accommodated in

Master Plan, i.e. welcoming, management, research, incubation, utilities, infrastructure, conservation and agrotourism. The space arrangement in Master Plan, included management office, training facilities, information center, warehousing, primary processing plant, dormitory, nurseries, incubation lot, production lot, circulation system, utilities and other infrastructure. Those space and facilities were presented as the following map, i.e. Master Plan (Fig. 7) and Circulation (Fig. 8).

4. Conclusion

1. Post-Mine Master Plan can be developed based on the ABGC concept of collaboration in the form set forth: Zoning, Greening Plan, Facilities Plan, Circulation Plan
2. Setup can direct the allocation of post-mining land use that provides benefits for local communities, such as: provide post-mining jobs, reclamation of land with a commodity that can empower communities and provide for profit, and re-creating the land to restore land to its original state (forest)

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