

4.2.4 Port Development

(1) Existing Port Development Plans

Since Tg. Perak Port, the second largest port in Indonesia, has already reached its full capacity, a 50-ha reclamation, equivalent to **1.5 million** TEU per year is planned in **Lamong Bay** to address capacity issues. As shown in Figure 4.2.17, on-pile construction of a 3.5-kilometer-long bridge connecting the land and the pier is planned to solve the sedimentation problem. The bridge is quite long to ensure the pier meets the proper depth of sea level. In this bay the sea floor sharply slopes down from 3.5 to 14 meters.

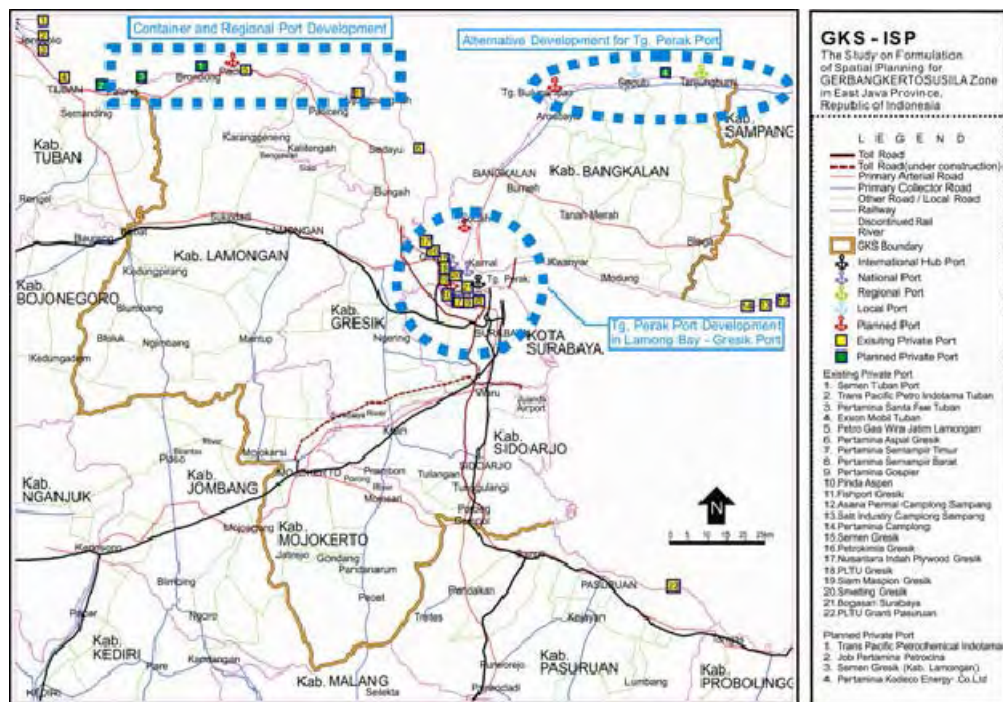


Source: Pelindo III

Figure 4.2.17 Location of Lamong Bay

A number of port development plans in the GKS are presented in Figure 4.2.18. Along the northern Java coastal line of Lamongan and Gresik up to Tuban, various types of port are to be built including the Paciran Passenger Ferry Port, Sedayu Lawas Cargo Port, Brondong Fish Port, and other industrial ports which will be developed by the private sector. In the northern coastal area of Bangkalan, several ports are also being planned, including an international container port at Tg. Bulu Pandan and other traditional ports at Sepulu and Tg. Bumi.

As an indirect result of the new seaport regulation (No. 17, 2008 and No.61, 2010), which allowed the shift of port management from public to private operators, the number of commercial port operators has increased.



Source: Tatravil Java Timur 2009-2029, Dinas Perhubungan of East Java Province

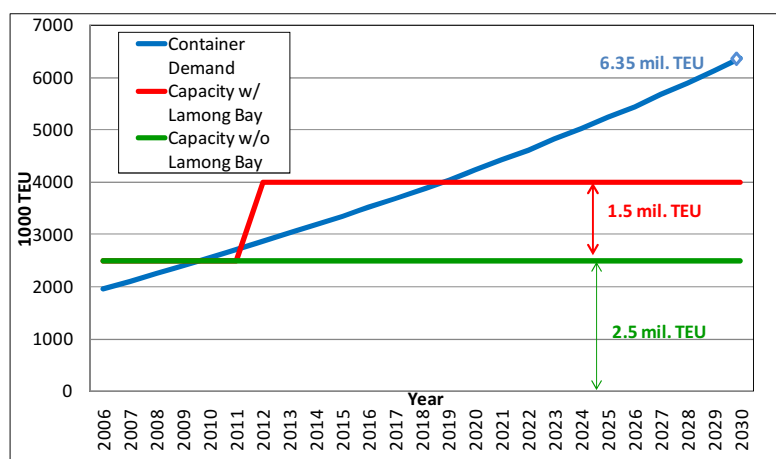
Figure 4.2.18 Existing and Planned Port Development Projects in GKS Zone

(2) Future Port Traffic

The JICA Study titled the “Study for Development of the Greater Surabaya Metropolitan Ports in the Republic of Indonesia” (November 2007) evaluated several port projects based on their long-term 2030 efficiency. The evaluation was done under the thesis that a new Surabaya metropolitan port would be needed to cover the yard constraints at Tg. Perak. According to the study, freight traffic at Tg. Perak Port will increase to 115 million tons by 2030, compared with 45 million tons in 2005, or 2.6 times its present capacity. Container traffic will sharply increase to 6.4 million TEU in 2030, compared to 1.8 million TEU in 2005, or a jump of 3.6 times, as presented in Figure 4.2.19. This result has the following implications:

- New container berths with a total length of 2,550 meters should be developed until 2030 to accommodate increasing container demand;
- The number of ships coming in/out of the port will total about 29,040 vessels by 2030. Such traffic cannot be accommodated by Lamong Bay, which constrains port expansion; and
- The existing facilities at Tg. Perak, including Lamong Bay Port, of which additional capacity is 1.5 million TEU per year, can absorb demand up to 2019. However, the remaining demand should be handled by a new container port with capacities of 1.2 million TEU by 2025 and 2.4 million TEU by 2030.

Eventually, a new metropolitan gateway port should be developed to supplement the Tg. Perak Port.



Source: JICA Study (Nov. 2007)

Figure 4.2.19 Container Traffic Demand at Tg. Perak

(3) Search for Six Candidate Port Locations

The JICA port study (November 2007) identified six candidate ports, namely (1) Lamong Bay in Surabaya City, (2) Gresik South and (3) Gresik North in Kabupaten Gresik and (4) Socah, (5) Tg. Bulu Pandan, and (6) Tg. Bumi in Kab. Bangkalan, as shown in Figure 4.2.20. After an evaluation based on several criteria, Tg. Bulu Pandan was selected for further detailed study as a gateway container port due to the following merits:

- It is a deep seaport with navigable channel and sufficient depth (more than 14–15 meters) can be developed;
- Spacious hinterland is available for the development of support facilities and industries;
- Economic benefits synchronized with benefits from the Suramadu Bridge can be expected.

- The project will trigger the economic development in Madura Island as well as Kabupaten Bangkalan.

Meanwhile, Socah was recommended as a general cargo port in the JICA port study. PT MISI with the concept of the Madura Industrial Sea Port City has proposed developing the area, which is being evaluated in the strategic environmental assessment (SEA).

It should be noted that Tg. Bulu Pandan has been added into the national spatial plan with Tg. Bumi. Thus, Tg. Bulu Pandan has been legalized through Presidential Decree (No.27, 2008) along with development of 600ha industrial area, as well as the Suramadu footage area.



Source: JICA Study (Nov. 2007)

Figure 4.2.20 Six Candidate Locations for a New Regional Gateway Port

(4) Infrastructure Requirements for New Port Development

The Study proposes the Tg. Bulu Pandan port development project with the following features:

- Container Berth: 8 berths
- Water Depth: -14m ~ -15m
- Container Yard: 203 ha
- Total Project Cost: US\$ 870 million (at 2007 prices)
- Economic Internal Rate of Return (EIRR): 17.2%
- Financial Internal Rate of Return (FIRR): 6.9%

Tg. Bulu Pandan is an expensive port due to the superstructure of its breakwater. Though it has been legalized through a presidential decree, a further study is necessary to craft new strategic solutions to the obstacles to port development. Applying the above-mentioned new seaport regulation to Tg. Bulu Pandan, another port operator may be able to develop and operate the port under a public-private partnership (PPP) scheme.

In order to support the development of Tg. Bulu Pandan port, two toll road projects and one primary arterial road project have been proposed for the medium term (2015–2020). These are the toll road connecting Perak–Suramadu (R8st), the toll road connecting the existing Suramadu Bridge to the planned Tg. Bulu Pandan port (R6at), and its frontage road (primary arterial road: R6a).

4.2.5 Airport Development

(1) Air Transportation Demand

The annual trend in air passengers at Juanda Airport is shown in Figure 4.2.21. As the graph implies, the number of passengers will significantly increase. The capacity of the passenger terminal was designed in 1994 to accommodate six million passengers per year (five million domestic passengers and one million international passengers per year). However, after the first year passenger numbers reached almost seven million, and nine million passengers in 2008. The number of passengers in mid 2010 already reached 11 million for both domestic and international flights, and a demand of 13 million passengers per year was estimated by the end of 2010.

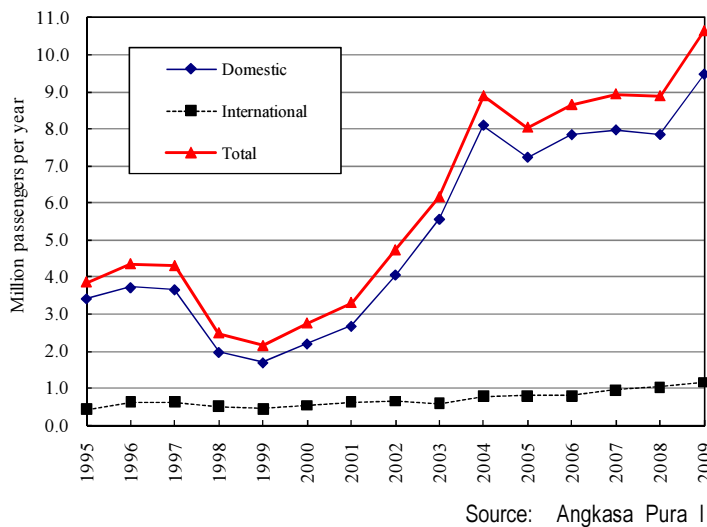


Figure 4.2.21 Trend of Annual Air Passengers at Juanda Airport

The passenger demand per year is now twice the capacity of the existing terminal due to the introduction of low-cost carriers (LCCs) which have increased air passenger numbers. In peak hours of the regular season, the frequency is 25 flights per hour, which makes it a high-risk airport due to the close time intervals which could cause accidents.

Juanda Airport cannot accommodate additional passengers and because its apron is fully used by aircraft, aviation companies are forced to use larger aircraft (e.g., Airbus) to accommodate more passengers. And the volume of flights likewise has extended airport operations up to midnight.

Civil aviation regulations give airport operators the right to implement necessary development, if airport facility usage (i.e. apron, runway, terminal building, parking lot, etc) has reached 80% of their capacity. In Juanda's case, usage has reached 95% of capacity, but authorities have yet to act on it.

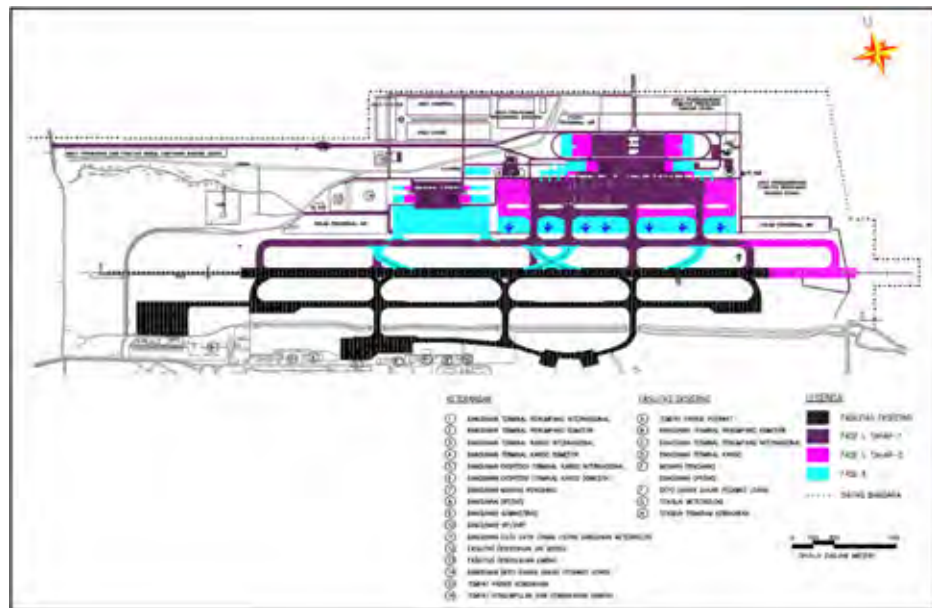
Likewise, a corresponding problem engendered by the increased number of air passengers is the growing issue on land transportation. The Waru–Juanda Railway Link (W2) or Juanda Airport–Sidotopo BRT line (B2) are designed as the solutions to this issue.

(2) Airport Development Master Plan

Transportation Ministerial Decree No.20, 2002 is the master plan for Juanda Airport (Figure 4.2.22). It consists of several phases: Stage I of Phase I (purple color) was implemented and completed with financial assistance from Japan. Stage II of Phase I (fuchsia) is under way.

The first priority in the plan was the runway extension of about 500 meters and the terminal building expansion. Due to “lesser interference” from donor countries, Angkasa Pura I, the airport operator, will take full initiative in developing the terminal while the responsibility for runway extension will be shouldered by the central government (i.e., Ministry of Transport). Starting with a detailed design of the new terminal Angkasa Pura I’s target is to realize all development plans through its own budget.

Angkasa Pura I also plans to extend the terminal building northward to accommodate 30 million passengers per year for the next 15–20 years. The plan, however, does not consider the position of the terminal station of the Waru–Juanda Railway Link (W2) , which is to be located in the same premises.



Source: Transportation Ministerial Decree number 20 year 2002

Figure 4.2.22 Master Plan for Juanda Airport

Aside from the rapidly increasing air transportation demand, in the “Master Plan Study on the Strategic Policy of the Air Transportation Sector in the Republic of Indonesia” (JICA, 2004), air passenger volume and aircraft movements were forecasted, as shown in Table 4.2.8. The study proposed that Angkasa Pura I examine the feasibility of land acquisition for a second runway which would be required after 2025, although the following forecasts by the master plan study are rather underestimated.

Table 4.2.8 Passenger and Aircraft Forecast

Year	2009	2015	2025
Passengers (million/year)			
Domestic	6.96	9.25	13.99
International	0.92	1.32	2.39
Total	7.89	10.57	16.38
Aircraft Movement (1,000/year)			
Domestic	97.6	87.6	138.9
International	9.5	13.8	18.9
Total	107.0	101.3	157.7

Source: “The Master Plan Study on the Strategic Policy of the Air Transport Sector in the Republic of Indonesia” (JICA, 2004)

(3) Second Runway Development

With its current headway of 1 minute and 20 seconds during peak hours, the airport already nears its capacity threshold. Compounding this is that there are about 20 military flights per day. Even after the terminal was separated from the navy terminal, sharing the single runway with navy aircraft seem unavoidable, even though additional flights are currently being rejected due to its full capacity.

A second runway will serve 25–26 flights per hour and its length should be 3,500m to meet safety and traffic standards. The operator also plans to use it as the main runway in the future. A rough layout of this parallel runway is shown in Figure 4.2.23. Another passenger terminal will also be constructed along with the second runway.

The two main design criteria to meet the feasibility of the second runway are as follows:

- The gradient for horizontal clearance should be at least within 3 degrees from the runway tip, and
- The slope for vertical clearance should be at least 2.5% from the runway tip.

Through rough estimates, the current planned location of the second runway meets the requirement above. However, it may involve small-scale land acquisition of the new housing complex and old residential area around the planned runway location. An environmental concern is that the second runway may affect the coastal mangrove area..

Also for passenger convenience, the extension of the Waru–Juanda Airport Rail Link (W2) to the second runway/terminal should be implemented to facilitate transfers between the two terminals.



Source: JICA Study Team

Figure 4.2.23 Rough Layout and Land for a Parallel Second Runway

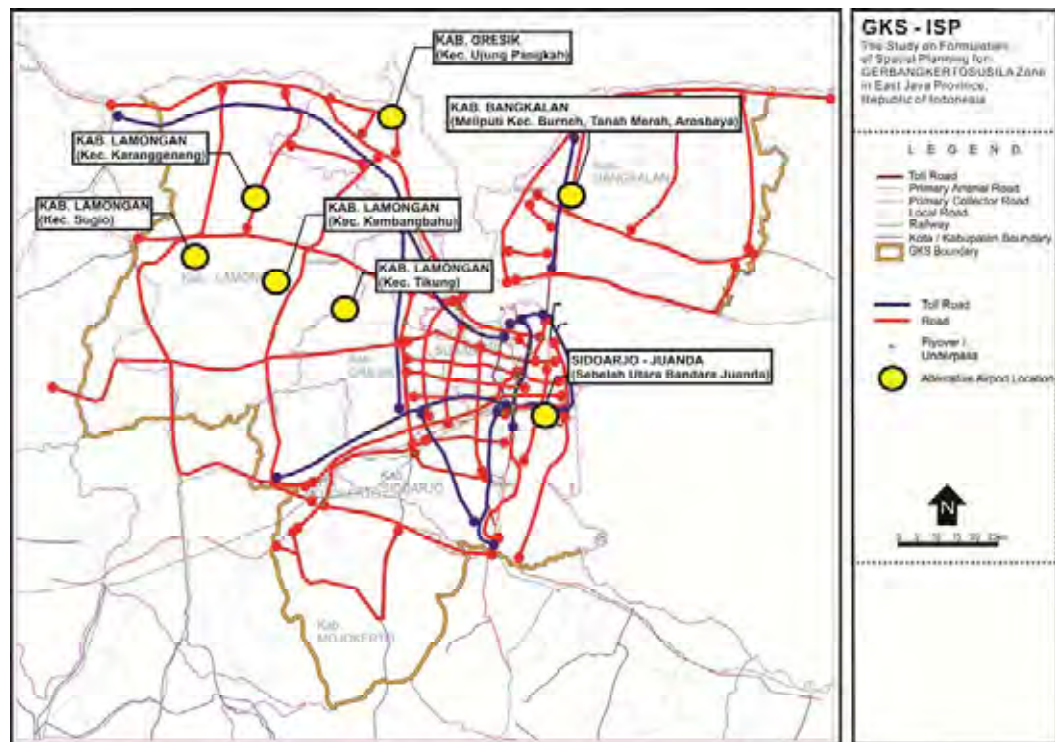
(4) Second Airport Development

Feasibility studies on an additional runway and terminal facilities have yet to be done even they are considered as partial solutions to the problem of capacity. Hence, the development of a new

airport is being considered with several alternative locations, as shown in Figure 4.2.24. However, constructing a new airport either in Kabupaten Bangkalan or Kabupaten Lamongan, will have the potential of an overlapping airspace with Juanda Airport. In terms of a plane's rotating radius Kecamatan Ujung Pangkah, Gresik may be the best alternative. Locating it in Kabupaten Lamongan, on the other hand, will allow serving not only the GKS but also the Tuban and Bojonegoro areas.

Because all candidate locations are close enough to arterial and toll roads in the road transportation plan, construction will focus on access roads and a toll road option when the location of a new airport, which will need at least 3,000 hectares, has been determined.

While the central government has been informed of both the second runway and second airport development plans for Surabaya, a feasibility study is necessary to flesh out these plans and deal with the ever-increasing air transportation demand. These several alternatives need to be evaluated not only from an economic or financial viewpoint, but also from various aspects including accessibility by land transportation and environmental evaluation. For this, it is needless to say that data collection regarding present conditions will be essential, and this includes not only field surveys but also origin-destination (OD) and opinion surveys, which should be conducted as soon as possible. The results of these surveys should be discussed among the related agencies and the central, provincial, and local governments, as well as the airport operator.



Source: Dinas Perhubungan of East Java Province

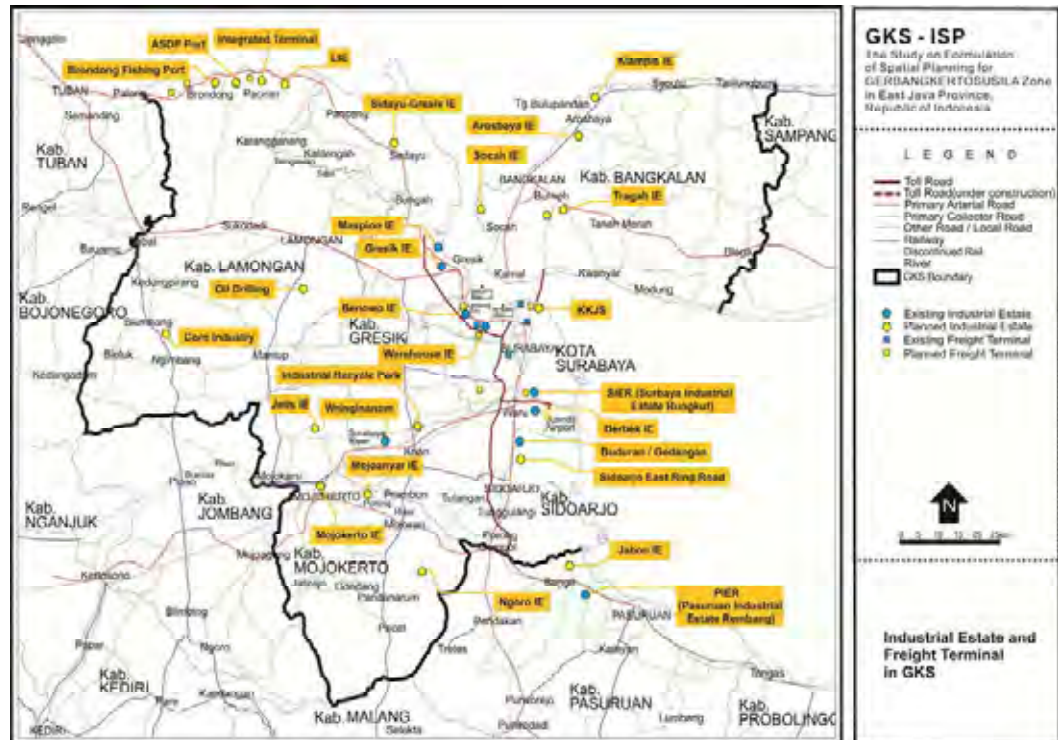
Figure 4.2.24 Alternative Second Airport Locations and Related Road Development

4.2.6 Freight Transportation System

(1) Locations of Industrial Estates

Existing and planned industrial estates in the GKS are presented in Figure 4.2.25. Three major industrial corridors will be formed: (1) along the coastal line from Surabaya to Gresik and up to northern Lamongan, (2) along the road from Rungkut/Juanda Airport to Sidoarjo and up to

Pasuruan, and (3) along the primary arterial road from Surabaya to Mojokerto. These industrial corridors will be served by trunk freight corridors consisting of toll roads and primary arterial roads.



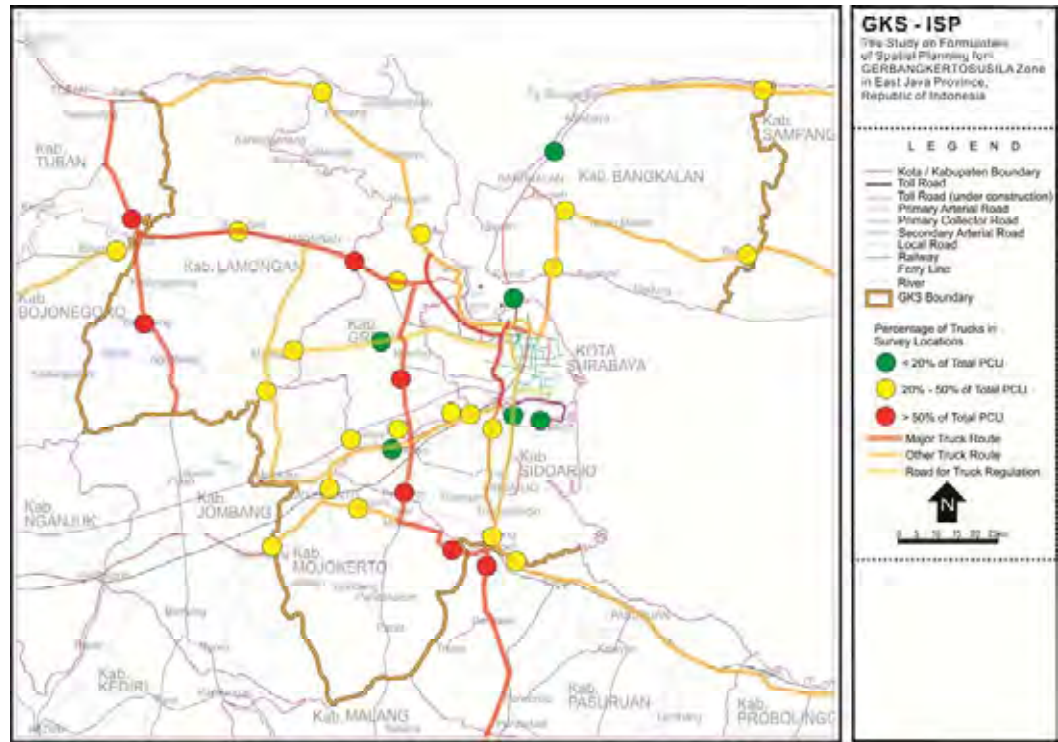
Source: JICA Study Team

Figure 4.2.25 Industrial Estates and Freight Terminal in GKS Zone

(2) Major Truck Routes

A traffic count survey conducted at over 60 locations in Surabaya and the GKS, calculated the vehicle composition at each location, and the roads loaded with trucks are shown in Figure 4.2.26. In the GKS, roads loaded with trucks partially match the road development corridors. The major truck routes were: Surabaya–Gresik (corridor no. 1), Surabaya–Lamongan–Babat (corridor no. 2), Tuban–Babat–Jombang (corridor no. 11), Gresik–Krian–Mojosari–Gempol (corridor no. 9), and Gempol–Malang (corridor no. 5). Truck shares in other routes, such as Surabaya–Sidoarjo (except for Dupak–Waru), Gresik–Paciran–Tuban, and Surabaya–Bangkalan, were still high.

In Surabaya, trucks transporting between the port and the industrial areas in south Surabaya or Sidoarjo, have no alternative routes except to go through the CBD where they are banned during peak hours. While this regulation has minimized the number of trucks from this road, it has also increased the volume on the existing toll roads and has resulted in the mixture of slow and fast traffic, as explained earlier. Such a burden on the existing toll roads (i.e. Waru–Dupak–Perak toll road, and Gresik–Dupak toll road) should be alleviated by the provision of more alternative roads for both trucks and passenger vehicles.



Source: JICA Study Team

Figure 4.2.26 Major Truck Routes in GKS Zone

(3) Truck Traffic to/from Ports

Truck-loaded roads in Surabaya can also be verified by determining their origin/destination to/from Tg. Perak Port. In the GKS, high freight trip generation was observed near industrial areas in Gresik/Manyar and Ngoro. Outside the GKS, high freight concentration was observed in external zones of Pasuruan (i.e., Pier IE) and Malang, which are located near major truck routes to/from Tg. Perak Port.

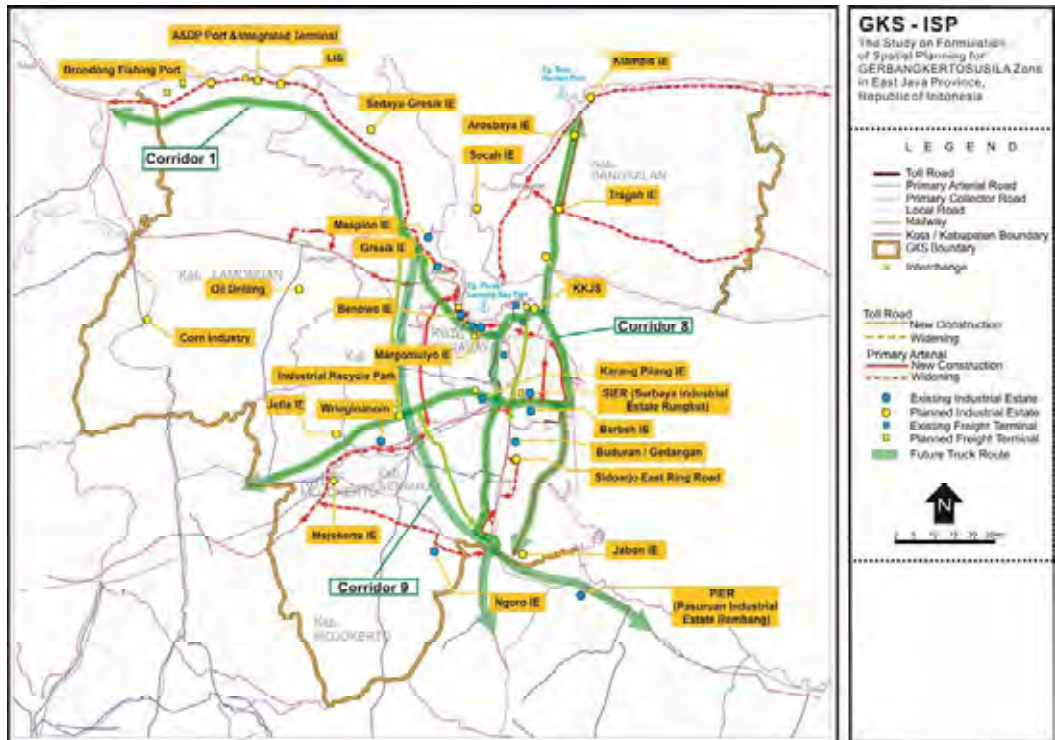
In Surabaya, large truck trips are generated in the Margomulyo and Rungkut industrial areas, which are also warehouse areas. The surrounding roads, however, didn't have a high number of trucks, which was probably due to the truck regulation. In the old Kota area, especially in Pasar Atom/Jembatan Merah, relatively large volumes of small truck trips to/from Tg. Perak Port are observed.

(4) Future Truck Routes

For better freight and traffic distribution, future truck routes in the GKS was proposed in light of the various forms of development in the GKS Zone, as shown in Figure 4.2.27. A future truck route network will mostly be based on future toll roads, which will serve nearby industrial estates and the future main ports, i.e. Tg. Perak, Lamong Bay, and Tg. Bulu Pandan. The planned network will also provide alternative truck routes that will skirt the center of Surabaya or mix with other passenger traffic on non-toll roads.

Corridor 1, i.e., the northern coastal toll road (Surabaya–Gresik–Paciran–Tuban) will serve freight traffic between Tuban and Surabaya/ Malang; thus, it is expected to help reduce the number of trucks on the primary arterial road (Babat–Lamongan–Gresik) and the primary collector road (Tuban–Babat–Jombang). In addition, Corridor 9, namely the SMA ring road connecting Manyar–Krian–Gempol will serve as a truck route bypassing Surabaya and connecting the industrial estates in Malang and Pasuruan with the Java northern trunk road. Similarly, Corridor

8, which is expected to divert freight traffic from the Dupak–Waru toll road, will be supported by the primary arterial road (i.e., Outer East Ring Road) in the short term and then by the toll road (i.e., Surabaya East Ring Road) in the medium term.



Source: JICA Study Team

Figure 4.2.27 Future Truck Routes in GKS Zone

(5) Integration of Railway Cargo Terminals

For efficient railway cargo transportation, the existing railway cargo terminals in Surabaya, namely Kalimas, Pasar Turi, and Waru, should be integrated into one station, that is, Kalimas, and the Kalimas Station should be reformed as a container freight train marshaling yard and station. The land area of Kalimas Station has enough space for a new freight marshaling yard. The location of Kalimas Station and its vicinity, i.e., Jl. Tanjung Perak Timur and Jl. Kalimas Baru and north of Jl. Sisingmangaraja, is shown in Figure 4.2.28.

In addition, PT. KA plans to revitalize the operation of freight trains to deal with container traffic in Tg. Perak Port, i.e., the berths of Nilam, Berlian, and TPS (Terminal Petikemas Surabaya or Surabaya Container Terminal). Hence, existing dedicated single freight track (port access) that connects Pasar Turi and Kalimas stations (and up to Tg. Perak Port) should be rehabilitated for a faster, more reliable freight service. Elevated single track could also be studied except for the marshaling yard area.

Kalimas has to be equipped with freight handling facilities. All containers to be transported by railway should be brought to this area by shanty locomotive, then arranged in long-haul trains using container handling equipment such as stackers or RTGs. The space should be enough to arrange several trains with 20–30 freight wagons designed to carry 40' containers. Likewise, the facilities of Prapat Kurung station to Port Section (From Kalimas) needs revitalization because it is old and unutilized.

Furthermore, in future, if Kalimas freight station reaches its full capacity for handling containers, Kandangan station, which is located close to the Margomulyo industrial area, will need to be

developed into another freight terminal in the long term (Figure 4.2.29).

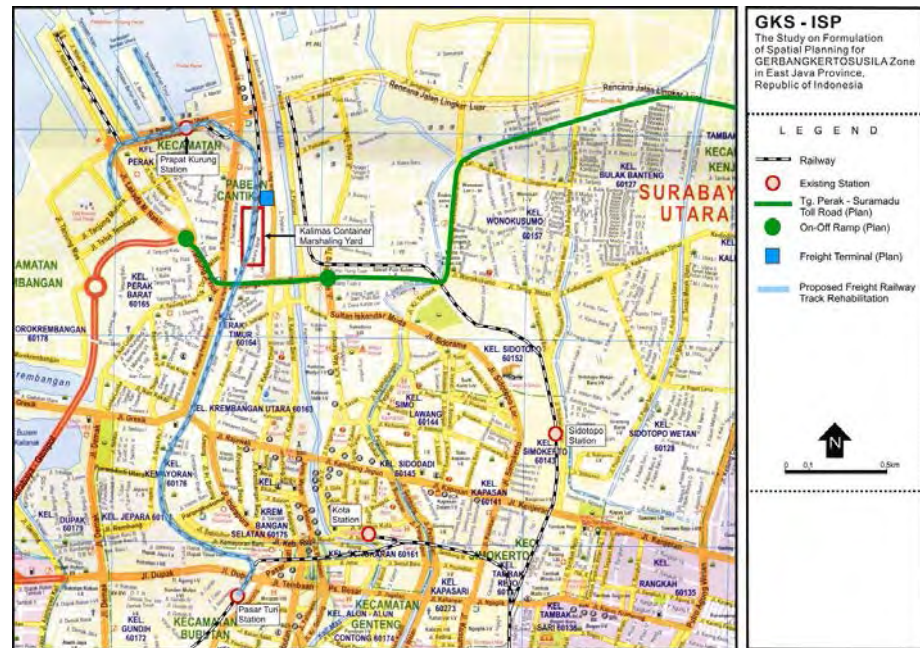


Figure 4.2.28 Kalimas Cargo Station for Integration of Cargo Terminals

(6) Relocation of Warehouse in Old Kota

The warehouses in Old Kota, namely Pasar Atom/Jembatan Merah, generate large volumes of small truck trips to/from Tg. Perak Port, causing chronic traffic congestion on arterial roads and local streets. To reduce truck traffic in this area existing warehouses should be relocated to other areas in Surabaya, as shown in Figure 4.2.29. Land is available in the industrial areas of Margomulyo and Berbek, both located close to the toll road. Such land can be reserved as relocation site of the warehouses.

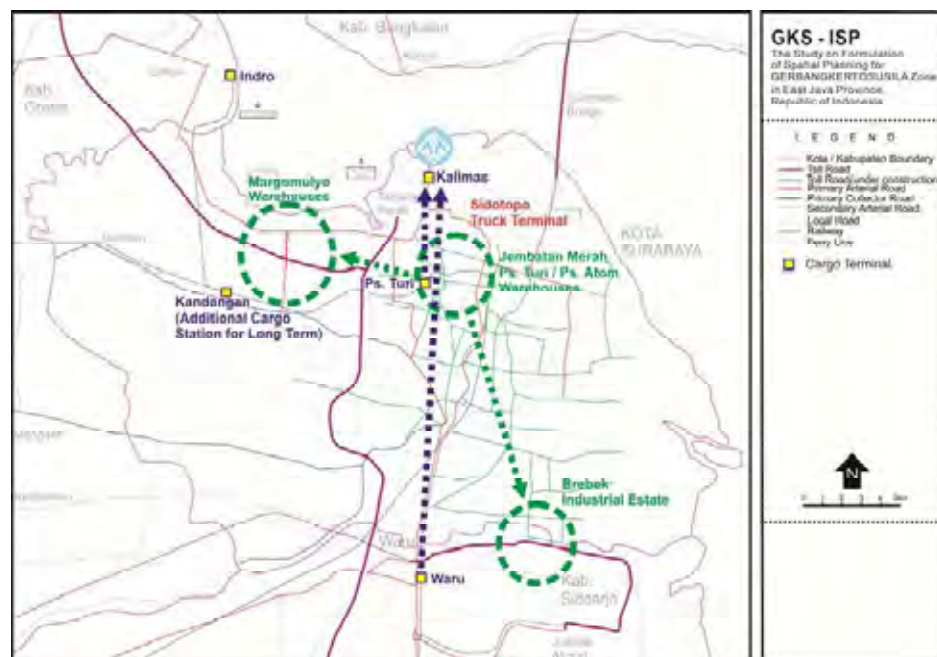


Figure 4.2.29 Relocation of Cargo Terminals/Warehouses in Surabaya

4.3 Water Resource Management and Water Supply System

4.3.1 Water Demand Scenario

(1) Current Demand

Water in the GKS Zone is consumed for household, commercial, industrial, livestock, fisheries and irrigation purposes. Irrigation demand, whose volume is legally fixed in accordance with the RTRW land-use plan, dominates other uses. This condition has affected the flexibility of allocating water for the other uses and is one of the major issues in the urban and industrial development program.

Domestic water demand

Domestic demand (household demand) is aggregated by water providers into rural and urban demands. In a population and demand correlation, the urban population of the GKS in 2007 was 6.3 million, while its rural population was 3 million.

Potable water service rates in GKS urban areas vary by regency, between 7% to 70%, or 47% on average. Rural potable water service rate is between 1 and 14%, or 4% on average. Service rate in the entire GKS is 33%, which is lower than the MDG target service rate of 60%.

Unit water consumption in rural areas is 30 lpcd, which is regulated through national design standards for rural water supply. Unit water consumptions in urban area differ per regency, from 78 lpcd in Kota Mojokerto to 245 lpcd in Kota Surabaya. The average consumption in urban areas is 199 lpcd.

Non-domestic water demand

Water consumption in the industrial sector is according to industrial growth. Growth of commercial water consumption changes in accordance with domestic water consumption. Domestic water and commercial water consumption has been 1:0.25~0.40. Fishery was the second largest water consumer after the irrigation sector. Fishery is a major industry in Sidoarjo and Gresik, and consumption is dependent on the cumulative size of fishponds, although the volume has not significantly change, its standard demand is still pegged at 7 mm/m³ water surface/day. Livestock sector is a minor water consumer, with less than 1% of the total water consumption in the GKS Zone.

(2) Future Demand

Future water demand was estimated through non-irrigation water and irrigation water categories.

Non-irrigation water demand

Non-irrigation water is forecasted to reach **81.75 m³/sec** by 2030 compared with the 57.74 m³/s in 2010 for domestic (household), commercial, industrial, livestock, and fishery uses, as summarized in Table 4.3.1 and Figure 4.3.1.

Irrigation water demand

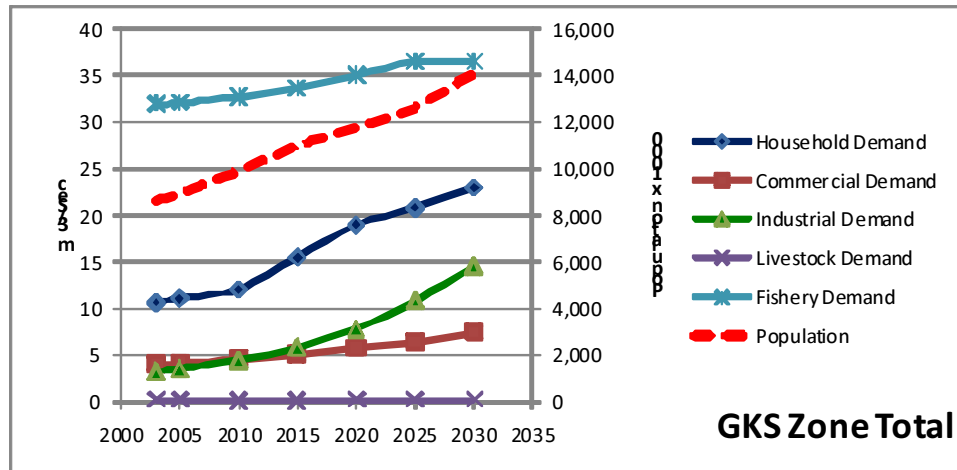
In 2003, the irrigated area in the GKS Zone was 1,263 km². This area is forecasted to slightly decrease by -3% per annum. The average irrigation rate at peak time (the month of planting) was **1.00–1.28 L/ha/sec** in 2003. The peak irrigation rates by 2025 will be **0.87–1.48 L/ha/sec**, which include the increase in Mojokerto by 112%, Gresik by 115%, and Bangkalan by 105%. Even a slight increase in the irrigation rate impacts the total water volume in a big way. Such increment can be avoided through technical improvements for efficient water use in the irrigation sector.

Table 4.3.1 Total Non-irrigation Water Demand Forecast for GKS Zone

(Unit: m³/Sec)

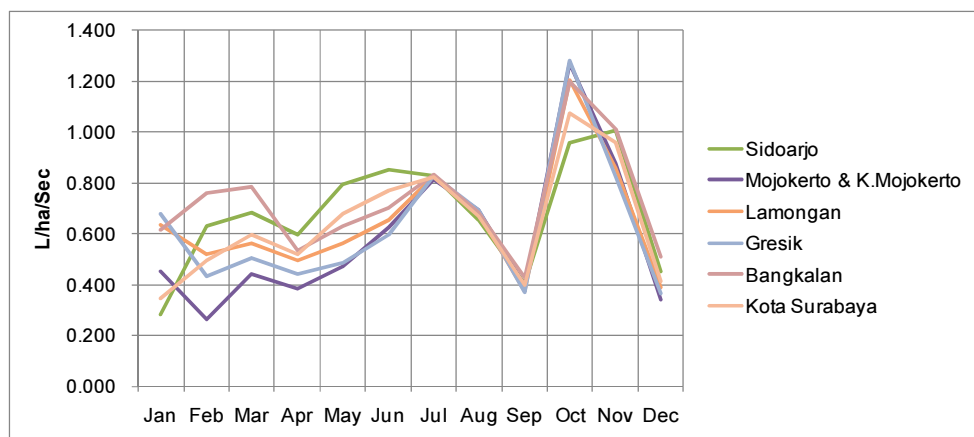
Year	2003	2005	2010	2015	2020	2025	2030
Household	13.52	14.07	15.57	17.28	19.25	21.51	22.95
Commercial	4.06	4.22	4.67	5.19	5.77	6.45	7.46
Industrial	3.24	3.54	4.49	5.87	7.89	10.89	14.58
Livestock	0.21	0.20	0.20	0.20	0.21	0.23	0.23
Fishery	31.97	32.14	32.81	33.78	35.03	36.53	36.53
Total	53.00	54.17	57.74	62.32	68.15	75.61	81.75
Population (000)	8,605	8,951	9,899	10,981	12,223	13,652	14,118

Source: JICA Study Team



Source: JICA Study team

Figure 4.3.1 Non-irrigation Demand Forecast for GKS Zone



Source: JICA team analyzed based on SDA2006 data

Figure 4.3.2 Seasonal Changes in Irrigation Water Demand, 2003

4.3.2 Capacity of Water Sources

(1) Surface Water

The GKS has several river basins: (1) the Brantas River basin in Sidoarjo, Mojokerto, and Surabaya; (2) the Solo River basin in Lamongan and Gresik; and (3) the Sampen-Madura River basin in Bangkalan. Availability of surface water is calculated based on river flow and as controlled by dams, wherein volume is programmed by the River Basin Management Agency (Balai Besar Wilayah Sungai Brantas, Balai Besar Wilayah Bengawan Solo) to manage water demand and supply which fluctuate seasonally, as shown in Table 4.3.2 and Figure 4.3.3.

Table 4.3.2 Surface Water Availability in GKS Zone

(Unit: m3/sec)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Sidoarjo	84.35	92.05	78.44	110.30	54.60	37.70	22.80	22.10	19.40	25.00	39.00	64.70
Mojokerto	136.86	178.70	171.15	165.70	94.71	101.44	59.40	47.04	52.99	62.14	52.90	79.87
Lamongan	80.03	89.78	69.40	47.51	17.91	12.88	11.01	8.55	6.75	8.11	30.10	40.92
Gresik	66.75	68.56	53.53	83.11	41.31	29.70	19.02	18.32	16.71	21.68	27.75	44.04
Bangkalan	39.75	23.93	8.56	6.56	3.83	3.01	0.54	0.33	0.33	0.28	5.74	14.79
Kota Surabaya	30.45	31.53	24.14	39.48	19.30	14.00	8.64	8.33	7.64	10.10	12.28	20.35
GKS	438.2	484.6	405.2	452.7	231.7	198.7	121.4	104.7	103.8	127.3	167.8	264.7

Source: SDA2006

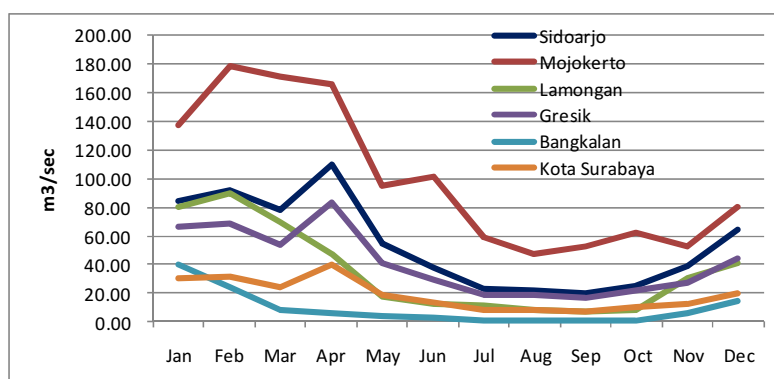


Figure 4.3.3 Surface Water Availability in GKS Zone

(2) Groundwater

Groundwater utilization should be maintained and managed well because demand is rapidly increasing. Since it is a limited resource its availability for future generations should be ensured through the proper balance of resource recharge and yield. In Pasuruan and other areas, groundwater is a commodity sold to other regencies.

Regency	Yield (m3/sec)
Sidoarjo	8.37
Mojokerto	11.65
Lamongan	10.12
Gresik	7.41
Bangkalan	6.06
Surabaya	3.63

(3) Water Balance

Balance among non-irrigation demand, irrigation demand, and surface water availability is subject to seasonal changes. During the rainy season (December to April) surface water is abundant and

fills reservoirs. However, during the dry season (May to November), availability decreases below the required amount.

When the availability of surface water becomes minimal, groundwater can be an alternative. Deficits usually occur in the irrigation sector. However, since the irrigation sector does not use groundwater, it could be used for non-irrigation demand. In the GKS, water deficit is significant in Sidoarjo, Lamongan and Bankalan, while Mojokerto has excessive water supply.

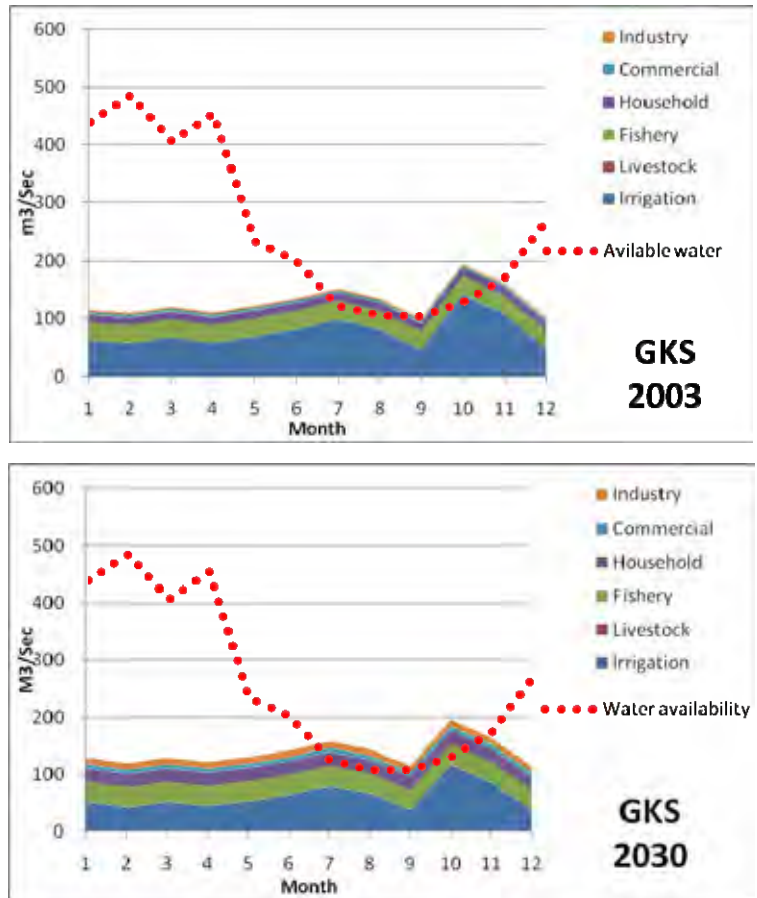


Figure 4.3.4 Projection of Water Balance 2030 in GKS Zone

4.3.3 Water Resource Management

East Java province has implemented a progressive approach to water resource management through such initiatives as the establishment of a river management public corporation, imposition of user charges for river water use, introduction of privately financed water projects, etc. Through these actions, a strategy was formulated to work at a demand-supply balance of water in the GKS, taking into account the following aspects:

(1) Water Resource Management

Water demand structures will also change along with changes in economic activities and land use demands. Land conversion can affect harvesting plans and water demand volumes. Thus, agricultural water use plans must be amended in response to the future economic structures in the GKS.

Table 4.3.3 indicates projected numbers of water deficit months under the status quo. To relieve prevailing water shortages, it is necessary to minimize water losses in all sectors, which includes: 1) watershed conservation for raw water; 2) maintenance of water storage capacity of dams; 3) irrigation water losses mitigation; 4) mitigation of water supply leakage.

Decreases in reservoir capacity causes further shortages, necessitating the removal of sediments in the reservoirs. Currently, water loss in the water supply sector is more than 30% which is beyond the reasonable range. Since future water demand will increase, the reduction of water loss is an urgent measure.

(2) Groundwater Management

The utilization of groundwater, including wells and springs, is increasing as an alternative supply for the non-irrigation demand, its utilization should be maintained and managed as a limited public resource. Law No. 22, 1999, and Government Regulation No. 25, 2000, authorizes local governments with the mandate to manage their groundwater resources and ensure environmental sustainability. However, due to the serious water shortages, an inter-regency water transaction mechanism should be explored, especially in Pasuruan, taking into account the hydro-geological conditions in yielding fields

Table 4.3.3 Water Deficit in GKS Zone

Regency	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Months of deficit
Bankalan	34	18	3	2	-2	-3	-6	-5	-4	-8	-1	10	7
Gresik	39	43	27	57	15	3	-10	-10	-9	-11	-1	19	5
Surabaya	18	19	11	27	7	1	-4	-4	-5	-3	-1	8	5
Lamongan	50	64	42	23	-10	-18	-27	-23	-13	-44	-9	20	7
Mojokerto (K&K)	114	163	149	145	71	72	23	15	32	8	14	61	0
Sidoarjo	54	59	45	77	20	2	-12	-11	-12	-11	2	33	4
GKS zone	309	365	276	331	101	58	-36	-39	-11	-68	5	151	4

Source: JICA Study Team

4.3.4 Water Supply Service

(1) Current Supply Systems

Water supply is categorized into potable water and industrial water supply. Potable water for urban areas is produced and distributed by PDAM (Municipal Water Supply Company), which is owned by each regency and the private water treatment companies. Raw water is supplied by the River Management Public Corporation (Perum Jasa Tirta 1, PJT1) operated under Balai Besar Wilayah Sungai Brantas, Balai Besar Wilayah Bengawan Solo. In the rural areas, potable water for domestic use is taken from individual wells or community level water supply system (called HIPPAM or IKK system) operated by the local community. The provincial government has established the Provincial Water Supply Corporation for interregency water supply.

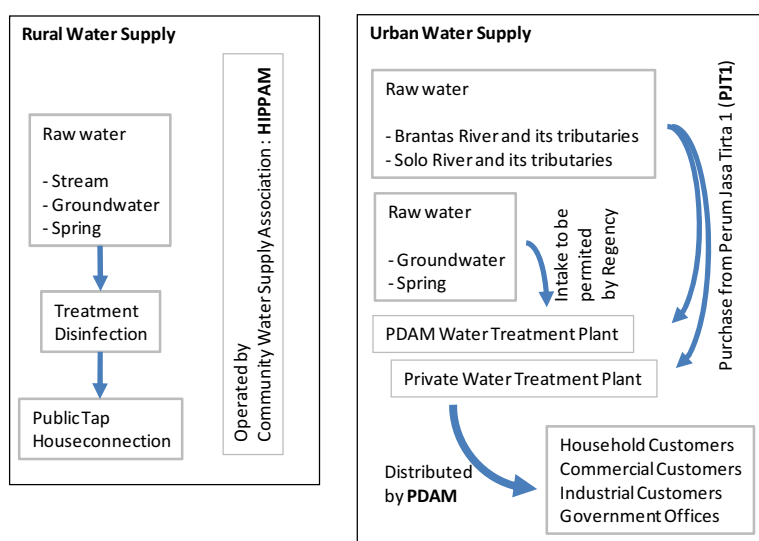


Figure 4.3.5 Current Water Supply System

(2) Service Coverage

PDAM Surabaya currently covers 68% of its urban consumers. In 2007, PDAM Sidoarjo served 29% of its coverage and it targets to raise this to 45% by 2022. Service coverage of PDAM Lamongan was 12% and it plans to increase this to 44% by 2020.

Since rural water supply is a priority government program, the Ministry of Public Works, in corporation with the USAID, has implemented a rural water supply and sanitation program. The program constructs rural water supply and sanitation systems which, when completed, will be operated and maintained by the local HIPPAM. In 2009 the program served 144,623 people in the GKZ (equivalent to 2% of population), and this percentage will be further increased.

(3) Water Shortage

Water shortage during the dry season severely manifests in the irrigation sector and then extends to the domestic and industrial sectors. The standard mitigating measures by the PDAMs is the construction of reservoirs and new water treatment facilities; however, the ratios for non-revenue water (NRW) in each PDAM are significantly high at **35–40%**, which implies ineffective water saving. Increasing production and reducing NRW are the major challenges in the future. Since the source of raw water is unlikely to increase, NRW measures should be considered as top priority.

(4) Water Accessibility Targets as Stated in the Millennium Development Goal

In its commitment to the Millennium Development Goals (MDGs) the Indonesian government stated that an estimated 78 million more people will be provided with improved water supply and 73 million more of its people will received improved sanitation services by 2015.

While the MDG target for the whole nation has been pegged at **73%**, the current PDAM water coverage in Surabaya, Sidoarjo and Lamongan are 68%, 29% and 12% respectively. And the HIPPAM program has only covered 2% of the total population in the GKS. This implies that there is still much room for improvement on water accessibility in GKS Zone.

The Water Law of 2004 stipulates the comprehensive regulation of water as a finite natural resource. Notwithstanding this decree there is no legal framework that properly defines what the "minimum standard of services" should be and in how to achieve this standard. A practical institutional system should be explored to solve the issues that continue to fester in the water sector.

(5) Administrative Enhancement of Water Management

Two administrative reforms are recommended to be pursued.

- A: Establishment of an Interregency Infrastructure Development and Maintenance Regulatory Board
- B: Introduction of a PIS (Performance Indicator System) for Private Water Works

In Proposal A, some inter-regency water import-export requirements should be facilitated to help rationalize and flex the allocation of water to demand areas. There are several proposals for intra-regency water transaction schemes, but in practice these are snagged by several barriers. One barrier is the difficulty in arriving at a consensus among stakeholders over administrative boundaries. These complications could be solve by the establishment of an inter-regency authority with a special task force that will technically and administratively coordinate inter-regency water-related infrastructure development and its maintenance.

For Proposal B, a performance indicator system (PIS) is commonly used in the business sector to

evaluate how a business is successfully being done vis-à-vis its long-term goals and customer satisfaction. The PIS is an effective tool in evaluating a provider's performance, its visions and the benefits generated by its services. This system is important to facilitate privatization, or PPP mechanisms, in public service ventures such as water-related services and solid waste management-related services.

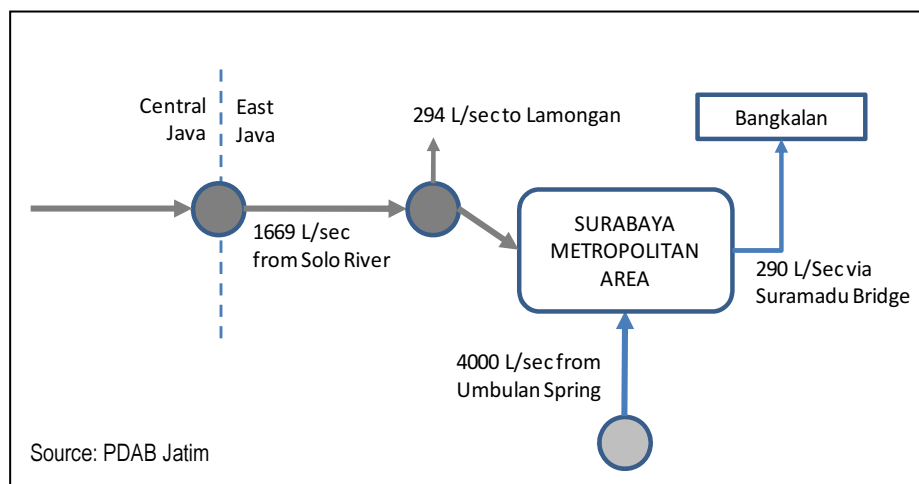


Figure 4.3.6 Water Diversion Project from Solo River and Umbulan Spring

4.3.5 Strategies and Priority Actions for the Water Supply System

The development of a stable and sustainable water supply system covering the entire GKS Zone is vital to ensure a sustainable social and economic growth in the long run. To this end, the following strategies need to be undertaken:

- 1) Water Resource Management, including:
 - Watershed conservation for raw water;
 - Maintenance and increase of water storage capacity of dams;
 - Mitigation of irrigation water losses;
 - Demand-side management (recycling, efficient water use);
 - Mitigation of water supply leakage (34% at present)
 - Interregency utilization of groundwater and surface water
- 2) Groundwater Management
 - An interregency water transaction mechanism for Pasuruan
- 3) Administrative Enhancement
 - Establishment of an Inter-regency Infrastructure Development and Maintenance Regulatory Board
 - Introduction of a PIS (Performance Indicator System) for private water works

In order to comply with the strategies above, priority actions and responsible agencies were identified, as shown in Table 4.3.4.

Table 4.3.4 Priority Actions in the Water Supply System

Priority Action		Implementing Agency
1	Consistency plan in GKS Pluszone between future land-use plan and raw water allocation plan.	Province, Kota, Kab., PJT1, PDAB & PDAM
2	Interregency water export-import project in East Java province, groundwater and spring water included.	Province, Kota, Kab., PDAB & PDAM
3	Water supply facility expansion project in each PDAM – including groundwater and spring water, inter-regency water export-import in East Java province.	Province, Kota, Kab. & PDAM
4	Non-revenue water (NRW) reduction project for each PDAM.	Kota, Kab. & PDAM
5	Groundwater management plan - groundwater use and conservation plan in Jatim.	Province, Kota, Kab., PDAB & PDAM
6	Introduction of PIS (performance indicator system) implementation program for water industries.	Province, Kota, Kab.,
7	Water saving program in each regency.	Kab., Kota, PJT1 & PDAM

Source: JICA Study Team

4.4 Wastewater Treatment and Urban Drainage

4.4.1 Current Conditions

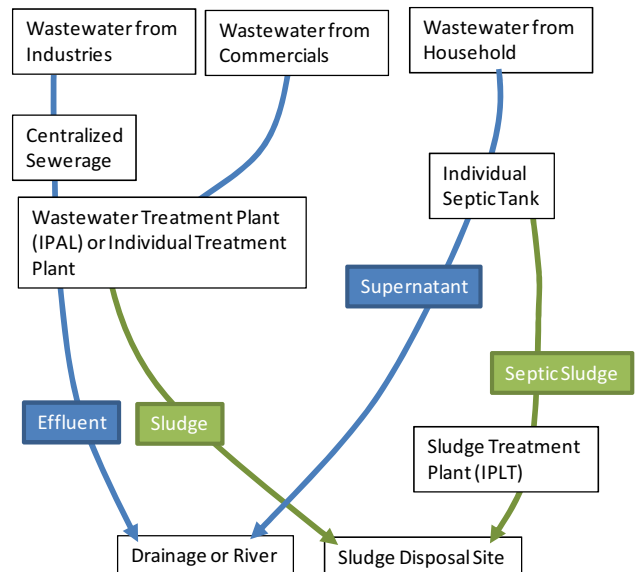
(1) Wastewater Treatment

Wastewater in the GKS Zone is not adequately managed and is mostly done through the traditional way. Households are the major wastewater generators and its wastewater is treated mostly through simple individual septic tanks, which separate wastewater into supernatant and septic sludge. Supernatant is discharged either into the drainage or into the ground, while septic sludge is collected and disposed in sludge disposal sites by contractors.

Septic sludge from a simple septic tank amounts to about 0.0005 m³/capita/day or 0.5 L/capita/day. Surabaya has a septic sludge treatment plant (IPLT) with a 300m³/day capacity, which means that the plant can cover only 300,000 persons (=300m³/0.001m³/capita/day). With Surabaya's three million people that capacity is a glaring shortfall.

In the Environment State Minister's Decree the treatment levels for commercial and industrial wastewater is specified by business type. Commercial and industrial wastewater is mostly treated individually except in industrial estates.

Another crucial issue that should be addressed is the continued deterioration of the quality of river water even with the existence of several effluent standards and

**Figure 4.4.1 Current Wastewater System in GKS Zone**

administrative rules. Based on the above decree, water quality monitoring is carried out by PJT1 every month at 60 locations in the Brantas River and Solo River. However, perpetrators have yet to be penalized by the decree.

(2) Urban Drainage

Although flooding caused by rivers have been alleviated, inundations due to drainage system overflow are a recurring problem. Design concepts of the drainage system vary by the city and the local topography. The following are the common causes of overflows:

- Lack of drain channel capacity;
- Lack of management to maintain drain capacity; and
- Lack of emergency response capacity.

As the GKZ Zone is mostly low-lying, it faces the constant threat of inundations. As a consequent of urbanization, damages from inundation could potentially increase without collective effective action from all stakeholders, as shown in Table 4.4.1.

Table 4.4.1 Responsibility Sharing for Flood Prevention

Flood	Institution	Basis of Management
Flooding of River Water	River Management Public Company (PJT1)	Brantas River Master Plan; and Solo River Master Plan
Overflows of Urban Drainage	Dinas PU Kabupaten & Kota	Long-term Regional Land-Use Plan, and Short-term Action Plan

4.4.2 Management of Wastewater and Drainage

(1) Sanitation–Wastewater Management

Wastewater management is a key element in promoting community health and sanitation. Even though domestic wastewater disposal is legally mandated there is still no public wastewater disposal services in the GKS,, except for septic sludge. A strict wastewater management system is definitely needed in the future, including a surveillance system for industrial wastewater. Thus, a Wastewater Management Master Plan, covering the GKS, is urgently required, in line with its spatial plan.

(2) Monitoring Capacity for Pollution Control

Wastewater discharge quality for domestic and industrial (effluent standards) are defined by ministerial decrees and supplemented by the Governor's decision. Qualities of specified wastewater, particularly industrial wastewater sources, and river water quality have been monitored by PJT1 for raw water quality conservation.

On the other hand, there has been an obvious deterioration of the river water quality because of pollution even with the establishment of a wastewater quality monitoring system. One reason for this could be the supervision system for wastewater discharge quality which has no punitive system for violators. The monitoring capacity to control pollution needs to be further strengthened and should be supported by legal actions and enforcement.

(3) Urban Drainage System Improvement

Efforts to improve urban drainage systems should be continuously made by the respective regencies. For this purpose, a long-term drainage development plan should be established,

employing more detailed engineering studies, and based on the macro-framework to be delineated by the GKS Spatial Plan 2030.

4.4.3 Strategies and Priority Actions for Wastewater and Urban Drainage

An overall clean and hygienic environment should be realized in the long-term through the enhancement of proper management capacities and the development of engineering facilities. For this purpose, the following are the vital strategies, as summarized in Table 4.4.2.

- 1) Sanitation –Wastewater Management
 - Facilitation of proper management of sanitation and wastewater discharge.
- 2) Monitoring Capacity for Pollution Control
 - Taking note of the quality of industrial wastewater and river water in particular.
- 3) Urban Drainage System Improvement
 - Enhancement of capacity of drain channels.
 - Proper maintenance of channels.
 - Improvement of emergency responsive capacity to promote disaster preparedness.

Table 4.4.2 Priority Actions in Wastewater Treatment and Urban Drainage

	Priority Actions	Implementing Agency
1	River Water Conservation Program for monitoring, regulatory and punitive provision for the Brantas River and Solo River Basins.	Province, Kota, Kabupaten & PJT1
2	Wastewater Disposal Master Plan in designated urban area in the GKS Zone.	Kota & Kabupaten
3	Urban Drainage Master Plan in designated urban area in the GKS Zone.	Province, Kota, Kabupaten & PJT1
4	Drainage Administration System Development including information system, operational system, PR, and human resource development.	Kota & Kabupaten

4.5 Electric Power Supply System

4.5.1 Current Demand

In Indonesia, the government manages power supply through the state-owned energy corporation Perusahaan Umum Listrik Negara Persero (PLN). Small IPPs (Independent Power Producers) provide supplemental power supply from their own power plants. The Electricity Law of 1985 mandated PLN with the responsibility for electricity generation, power transmission and distribution. PLN East Java covers East Java and the GKS Zone.

East Java's power network is part of the Java-Bali interconnection system which have large power plants that generate and transmit 500 kV (to Paiton, Gresik and Grati), 150 kV and 70 kV. The GKS Zone receives electric power from the grid provided by this system. Consumers are supplied with electric power through the 20 kV/380-220 V distribution transformers along low voltage distribution lines, except for large industrial customers who are provided with power through large capacity of high/medium voltage lines. The current power situation in East Java is as follows:

- Electricity **consumption of GKS** is 11,197GWh, accounting for 55% of consumption of East Java;
- Current electric power sources in PLN East Java are 6,456 MW with 55 power generating units (35 thermal and 20 hydro);
- **Peak electric load** is 3,461 MW, or 76.8% of load factor, including approximately 1,400 MW in the GKS Zone, and has been increasing every year;
- Total number of customers is 6,890,251 with majority of 92.50% composed of households, and total connected power to all the customers in East Java is approximately 9,619 MVA with composition dominated by the household sector of 49%; and
- The **electrification ratio** in East Java is 65.9%, while the national electrification ratio is approximately 57%. Especially for rural areas, 99.3% of villages in East Java can access to electricity supplied by PLN.

The PLN East Java's Decade Power Development Plan 2010–2019 states that electricity requirement for East Java until 2008 was mostly fulfilled. Notwithstanding this statement, the following issues still prevail in East Java:

- In some areas voltage condition is 10% below the nominal voltage, resulting to consumer complaints especially from industrial subscribers.
- Of the total 94 units of power transformers, 34 substation units are overloaded with more than the permissible 80% allowable load.
- To help solve the above problems the reinforcement of medium and low voltage distribution network facilities have been initiated, but the improvements could not be met due to limited investment funds of the PLN.

As part of East Java, the GKS Zone experiences the same power problems. In particular, the current power condition in Surabaya City is critical since it is supplied radially from the Waru substation, as shown in the figure below. If a power interruption occurs along the 150 kV transmission line between Waru and Rungkut, Surabaya will be paralyzed because power won't be able to reach the substations. To make this current network in Surabaya more reliable the expansion of the network should form a loop system.

Likewise, the load on the existing 500/150 kV transformers in the Krian substation, which is

located on the upper side of Waru Substation, has reached 93%, requiring additional transformers to keep the nominal load less than 80%.

Table 4.5.1 Existing Power Plants in East Java

Power Plant	Type	Installed MV	Available MV	Power Plant	type	Installed MV	available MV
Gresik	Steam	600	562	PLTA Wlingi	Hydropower	54	54
Gresik Block 1	Combined cycle	526	450	PLTA Ldoyo	Hydropower	5	5
Gresik Block 2	Combined cycle	526	450	PLTA Slrjo	Hydropower	5	5
Gresik Block 3	Combined cycle	526	450	PLTA Sqruih	Hydropower	29	29
Granti Block 1	Combined cycle	462	447	PLTA Tlgng	Hydropower	36	36
Granti Block 2	Combined cycle	302	297	PLTA Wnrjo	Hydropower	6	6
PLTU Perak	Steam	100	82	PLTA Mdlan	Hydropower	23	22
PLTU Paiton	Steam	3,330	2,910	PLTA Siman	Hydropower	11	0
PLTG Gresik	Gas turbine	40	32	PLTA Glang	Hydropower	3	3
PLTG GImur	Gas turbine	43	32	PLTA Gmgn	Hydropower	3	3
PLTA Stami	Hydro power	105	105	PLTA Ngbel	Hydropower	2	2
				Total		6,456	5,712

Source: PLN East Java

4.5.2 Future Demand

Peak power load in 2030 is forecast to reach 5,228 MW in the GKS and 11,644 MW for the whole East Java, which are demands far beyond the installed and available capacities of 6,737MW and 5,982MW in 2010. A 5,662 MW capacity is needed to augmented the 2030 demand. Thus, the installed and available capacities should be augmented by 13,087 MW and 11,696MW respectively. In the application of energy saving measures such as the wide-scale LED lamps, minimizing air-conditioning, and utilizing renewable energy, the peak load is expected to be lowered to 9,408MW by 2030, or 80%, compared with case without energy saving measures.

4.5.3 Existing Plans on Capacity Enhancement

The electric power sector will be developed to meet future demands. The power supply system for GKS Zone is incorporated into the East Java Grid System, which will be developed through priority actions from 2010– 2030, as shown the requirements below:

- 1) Energy sales growth with an average of 8.8%, or 52,806.2 GWh, by 2019;
- 2) Peak load growth with an average of 8.7 %, or 8,581 MW, by 2019;
- 3) Electrification ratio of 95.7% by 2019;
- 4) Additional distribution transformers with 8,490 MVA total capacity by 2019;
- 5) Additional power generators with 2,750 MW (1890 MW by PLN and 860 MW by IPPs) under a 10,000 MW power project;
- 6) Extension of medium voltage distribution network with 20,3745 km or an average of 2,038 km per year by 2019;
- 7) Additional distribution transformers of 18,492 units, or 2,145,072 kVA, by 2019;
- 8) Extension of low voltage distribution network with 24,965 km, or an average of 2,496 km/yr;
- 9) Additional 4,509,888 subscribers and electrification ratio of 95.7% in 2019; and
- 10) Additional 12 units of 60-MVA substations and 21 units of 120-MVA substations with capacity of 3,240 MVA, by 2022.

Table 4.5.2 Capacity Enhancement Plan for Power Generation

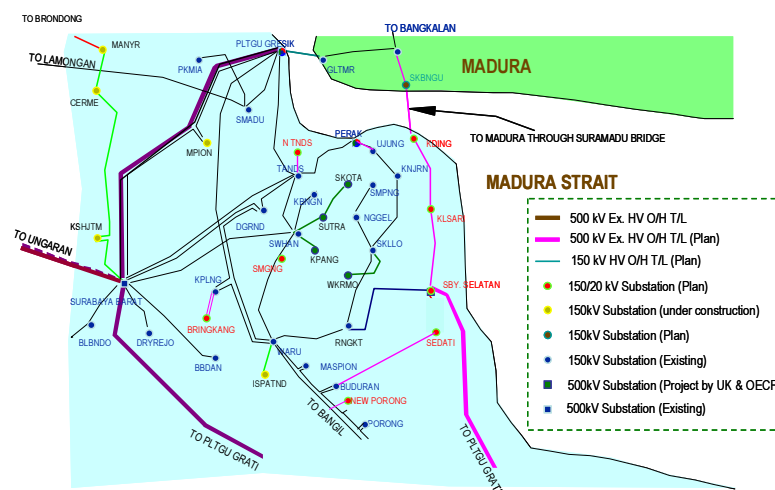
Item	Year	2011	2012	2013	2014	2021	2026	Total
	Additional Capacity (MW)		1,305.0	45.0	800.0	600.0	1,8,00	1,800
Pacitan (PLN)		630.0						
New Paiton (PLN)		660.0						
Gresik Power Indonesia (IPP)		15.0						
Petrokimia Gresik Steam (IPP)			15.0					
PLTU Gasuma Tuban (IPP)			30.0					
PLTGU Paiton III-IV (IPP)				800.0				
Tanjung Awar-Awar (PLN)					600.0			
(Target by 2020)						1,800		
(Target by 2025)							1,800	

Source: PLN East Java

Table 4.5.3 Distribution Network Enhancement by 2019

Year	MV Distribution (km)	LV Distribution (km)	District Transformer (no.)	Cubicle 20kV (no.)	Additional Customer (connection)
2010	1,769	2,167	1,605	52	346,874
2011	1,624	1,990	1,474	64	383,977
2012	1,732	2,133	1,572	78	403,918
2013	1,847	2,263	1,677	86	424,906
2014	1,968	2,412	1,787	95	446,99
2015	2,097	2,569	1,903	104	470,255
2016	2,130	2,609	1,933	116	471,871
2017	2,261	2,770	2,052	126	495,319
2018	2,400	2,940	2,178	136	519,949
2019	2,547	3,121	2,312	143	545,819
Total	20,375	24,974	18,493	1,000	4,062,888
Average p.a.	2,038	2,497	1,849	100	

Source: PLN East Java

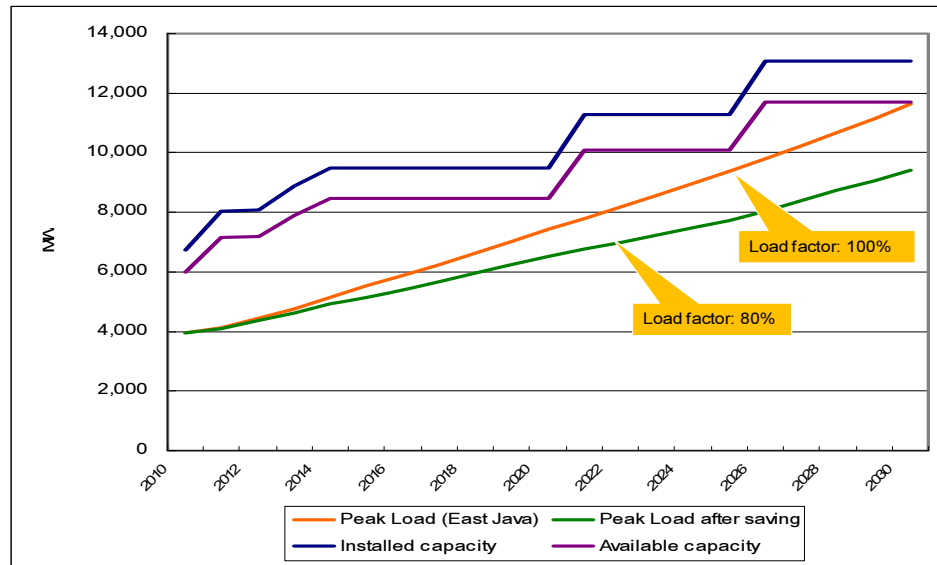


Source: PLN East Java

Figure 4.5.1 Transmission Network in Surabaya City

4.5.4 Balance between Supply and Demand

In addition to enhancing power generation capacity, transmission and distribution networks will be developed to meet future demand. Figure 4.5.2 indicates the balance between future supply and demand in East Java. In this figure, the step-wise supply curves of both installed and available capacity are depicted up to 2030, and the two alternative demand curves for a normal case and a 20% saving case are also indicated on the same coordinate. It is obvious that given the 20% saving, the available supply will meet demand by 2030. Hence, electric power supply will not hinder economic growth, provided the capacity enhancement plan is implemented as planned.



Source: JICA Study Team

Figure 4.5.2 Supply–Demand Balance of Electric Power in East Java Province

4.5.5 Strategies and Priority Actions

Key strategies for the power sector are as follows:

- 1) Promotion of energy conservation and saving;
- 2) Improvement and reinforcement of network for stable power supply with enhancement of transmission and distribution network;
- 3) Demand-side Management; and
- 4) Control of non-technical loss such as irregular/illegal connections, revamping kWh meters, etc.

Based on these strategies, important priority actions should focus on the expansion of the supply over the provincial grid, as shown in Table 4.5.4.

Table 4.5.4 Priority Actions for the Electric Power Sector in East Java (GKS)

Facility		Capacity
1	Additional power generators	(1) 2,750 MW (1890 MW by PLN and 860 MW by IPPs) under 10,000 MW Power Project by 2014; and (2) 3,600 MW by 2026 (1,800 MW by 2021 and 1,800 MW by 2026)
2	Extension of medium voltage distribution network	20,3745 km or an average of 2,038 km per year by 2019, and low voltage distribution network with 24,965 km, or an average of 2,496 km per year.
3	Additional District transformers	18,492 units, or 2,145,072 kVA by 2019.
4	Substations	Additional 12 units of 60-MVA substation and 21 units of 120-MVA substation with capacity of 3,240 MVA by 2022

4.6 Telecommunications

4.6.1 Current Situation

Telecommunications development in Indonesia has entered into a new phase to keep up with the rapidly developing information technology. Mobile phone coverage reaches all provinces and most districts/cities. Subscribers of mobile phone services are increasing exponentially, although a fluctuating trend has been seen in the fixed wired telephone service in the last five years (it increased a little in 2006, then decreased again since 2007), while the fixed wireless phone service has been on an upward trend. The number of fixed wireless phone consumers in 2009 increased approximately five times as high as those in 2004, increasing to a robust 97% p.a. average.

This significant improvement is due to the two main operators, Telkom Flexi and Bakrie Telecom, which saw an increase of 87.1% and 160.5% per year respectively in their customer base in the last five years. The rapid increase in the number of fixed wireless phone customers can be attributable to the intense competition among the operators, each trying to attract consumers into buying their products and services.

The total number of mobile phone customers reached more than 140 million in March 2009, and the number of operators grew from four in 2004 to eight as of 2009. Most mobile phone customers are prepaid users, with a 97.5% share of the total market. The mobile phone market grew by 204.4% from 2005 to 2009, or an average of 33.6% per year. However,, the trend could be nearing saturation due to the tight competition among operators and the end of the first wave of the popularization process.

Although telephone services are prevalent in urban areas, some rural villages have yet to enjoy the same. Accordingly, in order to meet the telecommunications needs of such villages, the Department of Communication and Information has an affordability telecommunications program for the rural areas, which is an implementation of the Telecommunications Universal Service (Universal Service Obligation/USO) policy which is embodied in the Indonesian ITU Information Society Declaration. The program is implemented in the rural areas through the telecommunications universal service area (WPUT). East Java is part of WPUT XI and 2,303 villages, or 28.7% of the total number of villages in East Java has been designated as target areas for WPUT XI.

4.6.2 Development Strategies

Telecommunications services in Indonesia have already been privatized. Each plans to increase

its customers, expand its service coverage, and control a large segment of the market, taking into account the existing urban and regional development plans. Indonesia's telecoms sector has been very competitive and each operator has kept its plans and strategies confidential. The government should keep watching the market to ensure fair competition and provide interventions, if necessary.

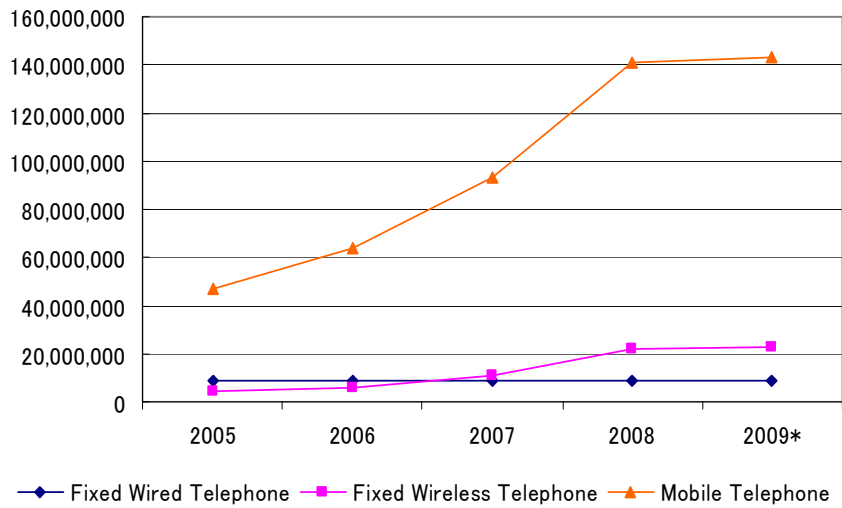


Figure 4.6.1 Number of Telephone Customers

4.7 Solid Waste Management

4.7.1 Current Situation

(1) Waste Generation and Collection

About 3.5 million tons of waste was generated in the GKS in 2007, of which 63% was generated in urban areas and the balance in the rural areas. Solid waste is serviced only in urban areas, and in 2008 the average rate was 52.7%, which varied among regencies with the lowest at 13.4% for Sidoarjo and highest at 83.4 for Surabaya, as shown in Table 4.7.1.

(2) Landfill and Composting for Served Waste

Solid waste serviced or collected in urban areas are dumped in landfills or are composted. In 2007, almost all the collected waste, 99%, were dumped in landfills.

(3) Existing Landfill Capacity

Landfills are limited in capacity, and local governments are finding ways to secure and develop new landfill sites. The existing and planned landfill provisions per regency are shown in Table 4.7.2. Although these landfill plans meet current demands for waste disposal, they will not accommodate future wastes. A sustainable SWM method is strongly required for each municipality.¹

(4) Composting and Recycling

The waste in the GKS contains a high volume of organic matter. This makes the waste very suitable for composting. Kota Surabaya has provided 10 waste recycling centers in 10 districts. This activity contributes in reducing waste going to disposal areas (TPA) by 20%. The volume of compost production is shown in Table 4.7.3.

Table 4.7.1 Current Waste Generation in GKS Zone

Regency	Total (ton)	Urban total (ton)	Urban Uncollected	Urban Served (ton)			Collection Ratio (%)	Rural (ton)
				Total	Landfill	Composting		
Kab Sidoarjo	695,959	590,173	511,090	79,083	79,083	0	13.4	105,786
Kab Mojokerto	397,190	150,138	119,810	30,328	30,328	0	20.2	247,052
Kab Lamongan	483,032	66,175	57,109	9,066	8,669	397	16.8	416,857
Kab Gresik	432,257	199,703	119,822	79,881	77,027	2,854	40.0	232,554
Kab Bangkalan	366,027	56,734	43,799	12,935	12,314	621	22.8	309,293
Kota Mojokerto	45,548	45,548	7,607	37,941	37,320	621	83.3	0
Kota Surabaya	1,093,076	1,093,076	181,451	911,625	902,876	8,749	83.4	0
GKS	3,513,089	2,201,547	1,040,688	1,160,859	1,147,617	13,242	52.7	1,311,542

Source: JICA Study Team Calculation based on data from East Java Office and Province Action Plan, PUCKTR, 2008

¹ Local government in GKS zone needs a plenty of landfill, however they try to acquire a necessary landfill site in 5-year development plan.

Table 4.7.2 Existing Landfill Capacities and Future Expansion Plans

Area	Existing	Mid-term Plan	Long-term Plan
Kab Sidoarjo	7.66 ha (one of them is closed, while others will be closed by 2009)	10 ha expansion	Provision of composting facilities (100 units)
Kab Mojokerto	10.5 ha (No data on capacity)		Landfill management improvement 0.5–1.0-m height
Kab Lamongan	6.68 ha (No data of how much available)	1 ha expansion and composting facilities	Construction of landfill infrastructure
Kab Gresik	6 ha	Secured 15 ha landfill site	
Kab Bangkalan	2.25 ha	Transfer to a new landfill site	Infrastructure repair
Kota Mojokerto	3.5 ha (it will be closed by 2011)	2.8 ha (to be opened in 2012)	Improvement of landfill management
Kota Surabaya	37.4 ha (full by 2012)	Expansion 15 ha (operated from 2012) new design for a new landfill in the east	

Table 4.7.3 Compost Production

Area	Capacity for Composting (m3/d)	Compost Production (m3/d)	No. of Compost Centers
Kab. Sidoarjo	28.0	14.0	3
Kab. Mojokerto	15.0	5.0	1
Kab. Lamongan	36.2	18.1	5
Kab. Gresik	59.0	25.1	3
Kab. Bangkalan	6.5	3.3	4
Kota. Mojokerto	5.0	2.5	2
Kota Surabaya	87.5	44.6	13

Source: Interview by JICA Team with DKP

4.7.2 Future Demand for Sanitary Landfill Sites

(1) Forecast of Future Waste Generation

It was estimated that by 2030 the generated solid waste would amount to 5.35 million tons, compared with 3.51 million tons in 2007, as shown in Table 4.7.4 and Figure 4.7.1.

Table 4.7.4 Forecast of Generated Solid Waste in GKS Zone

Area	2007	2010	2020	2030
Kab. Sidoarjo	695,959	758,487	994,860	1,212,730
Kab. Mojokerto	397,190	424,534	530,304	615,440
Kab. Lamongan	483,032	496,313	605,025	668,316
Kab. Gresik	432,257	455,881	583,580	711,316
Kab. Bangkalan	366,027	387,862	484,511	590,654
Kota. Mojokerto	45,548	47,878	58,377	71,147
Kota. Surabaya	1,093,076	1,119,799	1,299,575	1,478,756
GKS Total	3,513,088	3,690,754	4,556,232	5,348,367

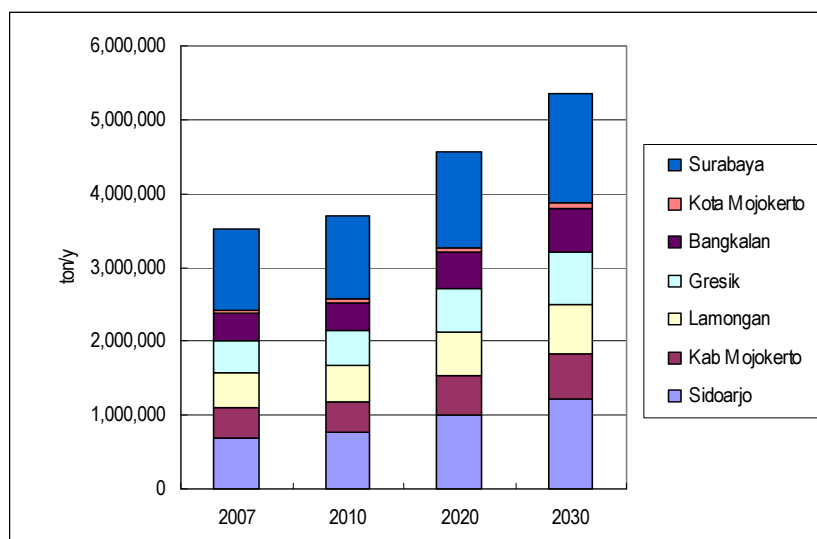


Figure 4.7.1 Forecast of Generated Solid Waste in GKS Zone

(2) Reducing Waste through the 3R Movement

Reducing the amounts of generated solid waste is vital for future societies. So-called 3R (reuse, reduce and recycling) measures should be institutionalized by mobilizing communities and all stakeholders. The 3R targets are assumed in Table 4.7.5.

The 3R measures will dramatically reduce landfill amounts from 35.8 million tons/year to 1.63 million ton/year by 2030, halving the required landfill area.

Table 4.7.5 Targets of the 3R Measures in GKS Zone

Area	Composting Rate (%)	Recycling Possibility Ratio (%)	Waste Generation (Kg/Capita/Day)		
			2010	2020	2030
Kab Sidoarjo	60	7	1.0	0.9	0.8
Kab Gresik	50	30	1.0	0.9	0.8
Kab Lamongan	70	13	1.0	0.9	0.8
Kota Mojokerto	75	10	1.0	0.9	0.8
Kota Surabaya	50	30	1.1	1.0	0.9

Source: JICA Study Team

(3) Required Landfills in a 3R Movement

As shown in Table 4.7.6, large landfill tracts will be required by 2030, especially in Surabaya, Gresik, and Sidoarjo. Regencies are trying to secure landfills in their mid-term development plans, but they have yet to envision a long-term demand forecast. These plans should include long-term target for landfill requirements.

The 3R activities should be encouraged with utmost effort; otherwise, about 1,200 ha will be required for landfills in the GKS Zone. Even with a strong 3R measures, 970 hectares of land will still be needed in the GKS, out of which 645 ha for Surabaya alone is needed to accommodate its growing waste. New landfills should be established through the following options, with careful environmental study and stakeholder agreement:

- 1) **New Landfills in Swamp Areas:** Wetlands will be well-used for landfill sites. Swamp areas in eastern Kota Surabaya can be a candidate. After the Keptih closed in eastern Surabaya, the Benowo landfill in the west has accommodated all wastes from Surabaya. In order to efficiently collect and transport waste, a landfill in eastern Surabaya will be needed. Benowo is located very far from the eastern area.
- 2) **Landfill Reclamation/Excavation:** In Kota Mojokerto, disposed garbage is being planned to be excavated to be reused in the landfill. This could be recommended for other regencies as well. Some of the contingent issues are how much amount could be used as compost fertilizers and how much they could contribute to waste reduction.

Table 4.7.6 Required Final Disposal Areas with Intensive 3R Measures

Kota/Regency	Without Intensive 3R		With Intensive 3R		Incremental Capacity (ha) by Mid-term Plans	Requirement Factor
	Cumulated Waste from 2010 to 2030 ('000 tons)	Required Landfill Area (ha)	Cumulated Waste from 2010 to 2030 ('000 tons)	Required Landfill Area (ha)		
	(A)	(B)	(C)	(D)		
Kab Sidoarjo	3,505	117	2,835	95	10	10
Kab Mojokerto	1,281	43	1,208	40	5	8
Kab Lamongan	601	20	522	17	1	17
Kab Gresik	4,036	135	3,098	103	15	7
Kab Bangkalan	1,462	49	1,167	39	-	-
Kota Mojokerto	1,136	38	925	31	2.8	11
Kota Surabaya	23,097	770	18,974	632	15	43
GKS	35,118	1,171	28,730	957	49	20

Source: JICA Study Team

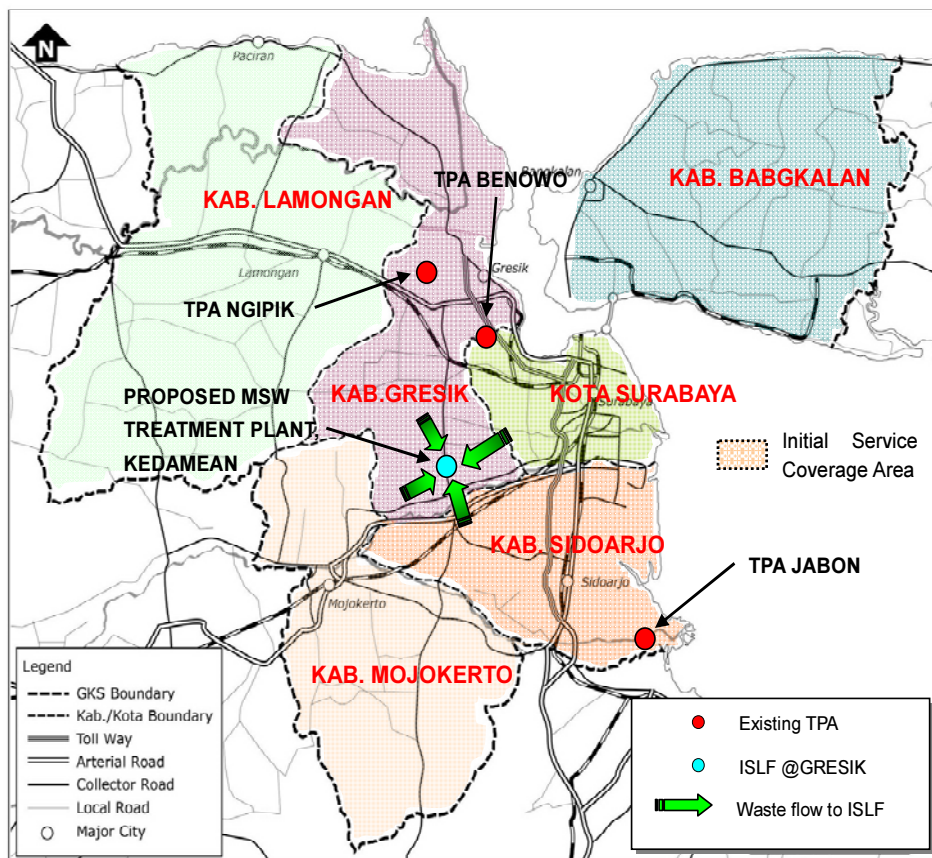
(4) Adoption of Inter-regency Disposal System

In principle SWM places implementation responsibility on local governments. Considering the complexity of waste management in the GKS, it might be more efficient to treat waste by cooperating with neighboring regencies. This practice has been done in Japan and it brings the advantage of consistent facility operation and budget sharing.

In the GKS, the “**Environment Recycling Park**” (**ERP**) is being considered, but it has been derailed because of land acquisition difficulties. The project, which was initiated by the provincial government, is expected to be supported by all regencies in the GKS, not only Kab. Gresik, as a prototype of an inter-regency disposal system.

(5) Privatization Scenario for SWM Operations

When a disposal site can be acquired at some cost, a possible scenario is for a private company to manage it. An important step underlying this scenario is to set appropriate prices for the services, taking into account site cost, disposal cost, management costs, and loan interest, among others. For example, a disposal cost ranging from US\$20/ton to US\$38/ton will possibly make landfill development and management by the private sector viable.



Source: Public Works Department, Human Settlement & Spatial Planning, East Java Province

Figure 4.7.2 Location of Planned Final Disposal Sites

4.7.3 SWM Strategies and Priority Actions

Based on the findings above, the following strategies are relevant and should be undertaken:

- 1) Paradigm shift from “end-of-pipe” approach to **3R method**
 - Mobilize communities to promote people’s awareness about and cooperation for the 3R movement.
- 2) Upgrading of SWM Quality and Service
 - Rehabilitate infrastructure, improve regulations and institutional capacities, and manage educational curriculum.
- 3) Introduction of **Appropriate 3R Technologies**
 - Recycling and composting technologies in particular.
- 4) Improvement of the **SWM Data Management System** by the provincial government and the respective regency.
- 5) Improvement of **Institutional Capacities**
 - Facilitate a comprehensive capacity development, covering administration, financing, information management, and human resource development.
 - Promote an interagency approach for a practical solution to land acquisition for sanitary landfills.
 - Seek proper privatization scheme for total SWM services.

- 6) Introduction of **New Technology** on waste reduction, taking account of limited available landfill sites, including incineration technologies in the long term

Table 4.7.7 Priority SWM Actions in GKS Zone

	Priority Project/Program	Action	Relevant Agency
1	Improvement of Existing Facilities and Equipment	- Conduct a survey and rehabilitation planning for existing facilities and equipment.	- DKP
2	Disposal Capacity Development	- 3R Enhancement Plan: Discharge/ collection system; Intermediate treatment system renovation. - Public Awareness Promotion: Mobilization of communities for the 3R Movement. - New Waste Reduction Technology Plan: New technology introduction. - New Landfill Plan: Development of final disposal methods.	- BAPPEPRO - BAPPEKO - DKP - Community
3	Development of Interagency Disposal System	- Facilitate the “ Environment Recycling Park (ERP) ” project. - Organize a project cooperation committee to seek joint approaches to SWM solutions.	- BAPPEPRO - BAPPEKO - BAPPEDA
4	Development of an Information Network on SWM	- Build SWM database at the provincial level with joint effort of member regencies in the GKS. - Provide the national government with technical support and donor cooperation.	- BAPPEPRO - PUCKTR - DKP
5	Institutional Capacity Development	- Institutional capacity development. - Public awareness-raising program.	- BAPPEDA - BAPPEKO
6	Formulation of SWM Master Plan in the GKS	- Explore long-term solutions.	- DKP - BAPPEKO

Source: JICA Study Team

5. SPATIAL PATTERN IN GKS ZONE

5.1 Land Use Evaluation for Spatial Carrying Capacity Analysis

5.1.1 Objective and Methodology of the Analysis

The objectives of the land use evaluation analysis are to identify spatial carrying capacity and assure a balanced land use pattern in the whole GKS Zone. Environmentally sensitive areas were fully considered following important precepts on natural resource conservation and protection. The analysis pursued a land use balance between economic development and environmental protection.

5.1.2 Methodology of the Analysis

A land use analysis was carried out, by using a GIS technique. Evaluation criteria were classified into two groups: the **environmental components** group which comprised the areas for protection, conservation/reservation against urban development activities; and the **development-potential components** group which comprised accessibilities and/or availabilities of urban services such as transportations, service centers and infrastructures. The former group was labeled as “constraint factors” against development, while the latter group was considered as “positive potential” for development.

The criteria in the analysis are as shown in Table 5.2.1 for constraint factors (or environmental components) and Table 5.2.2 for development potential factors. The table show several ranked scores for each criterion which are reflected by their level of importance.

In theory, a unit land (= a cell of 200m x 200m) has two kinds of negative and positive scores, and a sum of two is the indigenous score given to the land. A negative sum given to a land, means that the land should be protected, even though it is endowed with a certain level of development potentials, and vice-versa. Thus, each cell's score was computed with the following formula:

$$LP_i = \alpha_j \sum_1^N PF_i + \beta_k \sum_1^N CF_i$$

Where,	<i>i</i> :	Land or area being evaluated (<i>i</i> -cell)
	LP _{<i>i</i>} :	Total score of <i>i</i>
	PF _{<i>i</i>} :	Score of development potential factor of <i>i</i> (<i>positive</i>)
	CF _{<i>i</i>} :	Score of development constraint factor of <i>i</i> (<i>negative</i>)
	α_j :	Weight given to development potential factor
	β_k :	Weight given to development constraint factor

Figure 5.1.1 shows the GIS methodology for the land use analysis as discussed above. The figure shows that the current pattern of constraint factors (as of 2009) is identical to those in the future, (2030), which implies that environmental values did not lessen over time. On the other hand, the development potential pattern will be drastically changed by 2030, given a new transport infrastructure network.

Table 5.1.1 Constraint Factors for Land Evaluation

Mangrove area	Existing Mangrove area + 1km Euclidean distance area
Military area	Existing Military area + 1km Euclidean distance area
Porong Mud Flow area	Porong mud flow area +5km Euclidean distance area
Swamp/ Fish pond	Existing swamp/ fish pond area
Irrigated agriculture	Existing irrigated agriculture area
Dumping site	Existing dumping site + 2km Euclidean distance area
Forest	Existing forest area + 1km Euclidean distance area
Flood potential area	JaTIM flood potential area
Airport	Airport + 5km Euclidean distance area
Production forest	JaTIM production forest area
Protection forest	JaTIM protection forest area
Soil Condition (erosion)	JaTIM soil condition
Land stability	GKS-ISP land stability analysis result
Water catchment	JaTIM water catchment area
Conservation area	JaTIM conservation area

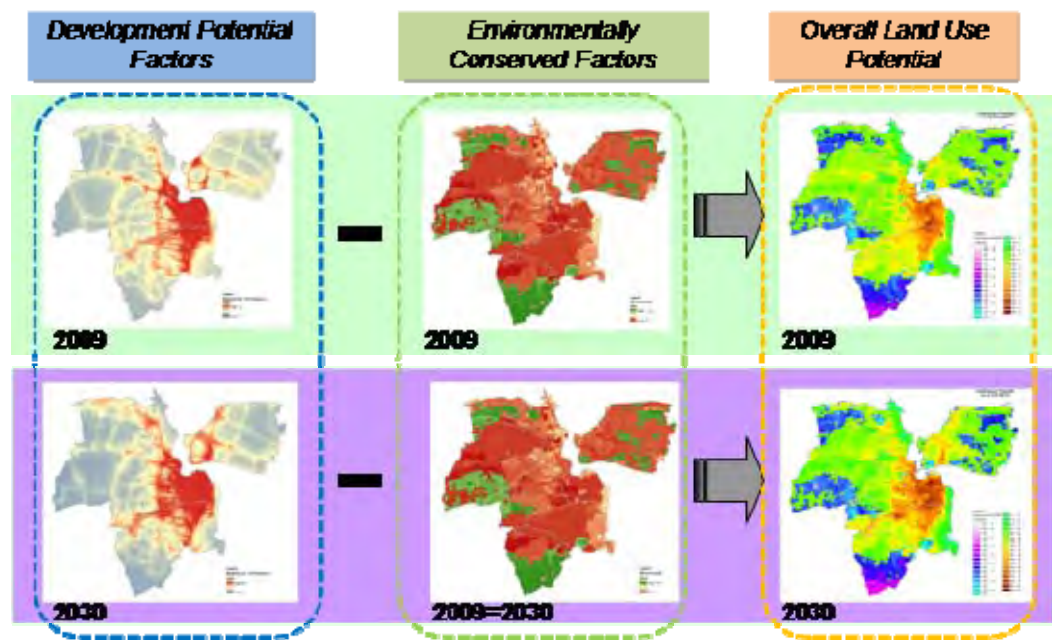
Source: JICA Study Team

Table 5.1.2 Development Potential Factors for Land Evaluation

	Analysis factors for Year 2009	Analysis factors for Year 2030
Accessibility to/ from Urban Center	Distance from Surabaya city center	Distance from Regional center
	Distance from Gresik/ Sidoarjo	Distance from SMA level center
	Distance from Bangkalan/ Labang/ Mengal/ Kerian	Distance from GKS Kab .center
	Distance from Lamongan/ Mojokerto/ Gempol/ Babat	Distance from GKS sub-center/ SMA sub-center/ other Kab. Sub-center
Accessibility to/from Bus Service	Distance from Bus terminal (Inter Prov.)	Distance from Bus terminal (Inter Prov.)
	Distance from Bus terminal (2nd level Bus terminal)	Distance from Bus terminal (2nd level Bus terminal)
	Distance from Bus terminal (3rd level Bus terminal)	Distance from Bus terminal (3rd level Bus terminal)
	Distance from bus routes	Distance from bus routes
	-	Distance from bus sub-terminal
Distance from Port	Distance from Port (1st level Port)	Distance from Port (1st level Port)
	Distance from Port (2nd level Port)	Distance from Port (2nd level Port)
Accessibility to/ from Railway Service	Distance from Railway Station	Distance from Railway Station
Distance to/from Industries and Cargo Terminal	Distance from Industrial Estate	Distance from Industrial Estate
	Distance from freight terminal	Distance from freight terminal
Road Accessibility	Distance from secondary arterial road	Distance from secondary arterial road
	Distance from toll road	Distance from toll road
	Distance from collector road	Distance from collector road
	Distance from ramp	Distance from ramp
	Distance from local road	Distance from local road

	Analysis factors for Year 2009	Analysis factors for Year 2030
	Distance from arterial road	Distance from arterial road
Distance from airport	Distance from airport	Distance from airport
Time-Distance to/from the Center of Surabaya	Time-distance 60 min. area	Time-distance 60 min. area
	Time-distance 30 min. area	Time-distance 30 min. area
Accessibilities to/from other services	-	Distance from committed project
	-	Distance from New bus transit corridor
	-	Distance from New bus transit station
	-	Distance from commuter shelter

Source: JICA Study Team



Source: JICA Study Team

Figure 5.1.1 GIS Technique for Overall Land Use Analysis

5.1.3 Land Distribution with Constraints (2009-2030)

The GIS technique revealed land distribution patterns with high development constraints, as illustrated in Figure 5.1.2, showing gradations with respect to accumulated negative scores. In the figure, the higher negatively scored land is colored dark brown, while the lower negatively scored land, is dark green. From this map, areas to be given careful consideration against urban development, or land conversion, are easily identifiable in the GKS Zone.

5.1.4 Land Distribution with Development Potentials (2009 and 2030)

The GIS analysis also depicted distribution patterns of development potentials for 2009 and 2030, as shown in Figure 5.1.3. In the figure, the higher scored lands are colored dark brown in a gradation scale with respect to accumulated positive scores. The assumption is that land development potentials will significantly expand along with the development of the proposed future transport network. Notable changes between 2009 and 2030 take place in the western suburban Surabaya, the northern coastal areas along Gresik and Lamongan, and the Suramadu Bridge Corridor in Bangkalan.

5.1.5 Overall Evaluation of Land Use Potentials

An overall evaluation picture on land use potentials is fleshed out in the superimposition of the two maps, as shown in Figures 5.1.5. These land use potentials will serve as the basic conditions in land use planning and environmental policy building.

The distribution patterns of the scored land areas are tabulated in Table 5.1.2. Again, it was assessed that an area that garnered a negative score must strictly be conserved or preserved, because its negative factor is stronger than its positive factors. (Only with an overall positive score would an area be able to have development activities??) While, given a great positive overall score, the area could accept development activities somewhat. In this sense, the negative-scored area accounts for a total of 165,000ha, or 26.0% share of the entire GKS Zone for 2030, while the positive-scored areas totaled 470,000ha, or 74.0% share of the entire zone in 2030. It should be noted that the positive scored areas includes agricultural land.

Table 5.1.3 Overall Evaluation Result of Land Use Potentials and Constraints in GKS Zone

Score	Attribute	Y2009		Y2030		Y2030		Y2030	
		Area (ha)	Categorized Area	Area (ha)	Categorized Area	Area (ha)	Categorized Area	Area (ha)	Categorized Area
less than -81	High	288	0.0%	157,188	24.8%	520	0.1%	164,892	26.0%
-71 - -80	Constained	652	0.1%			424	0.1%		
-61 - -70	↑	5,460	0.9%			8,424	1.3%		
-51 - -60		4,960	0.8%			4,272	0.7%		
-41 - -50	↓	18,856	3.0%			23,880	3.8%		
-31 - -40		72,020	11.3%			71,448	11.3%		
-21 - -30		28,604	4.5%			21,068	3.3%		
-11 - -20	Low	4,024	0.6%			5,952	0.9%		
-1 - -10	Constrained	22,324	3.5%			28,904	4.6%		
0-10	Low Potential	50,028	7.9%			477,712	75.2%		
11-20	↑	235,028	37.0%	197,956	31.2%				
21-30		111,012	17.5%	99,392	15.7%				
31-40	↓	38,796	6.1%	46,148	7.3%				
41-50		18,820	3.0%	29,824	4.7%				
51-60		High	18,420	2.9%	24,252			3.8%	
more than 60	Potential	5,608	0.9%	14,264	2.2%				
		634,900	100.0%	634,900	100.0%	634,900	100.0%	634,900	100.0%

Source: JICA Study Team

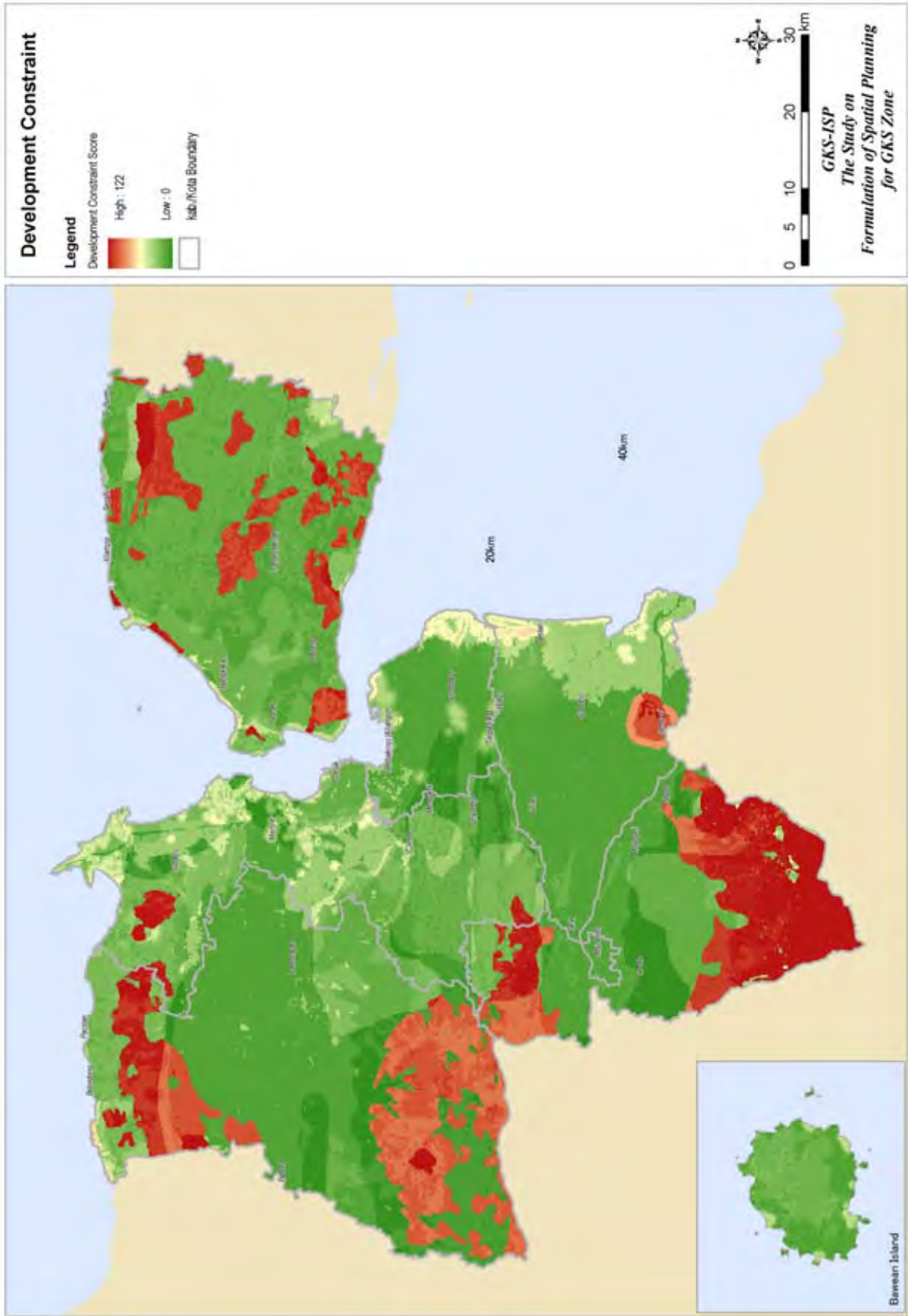


Figure 5.1.2 Distribution Pattern of Land with Development Constraints

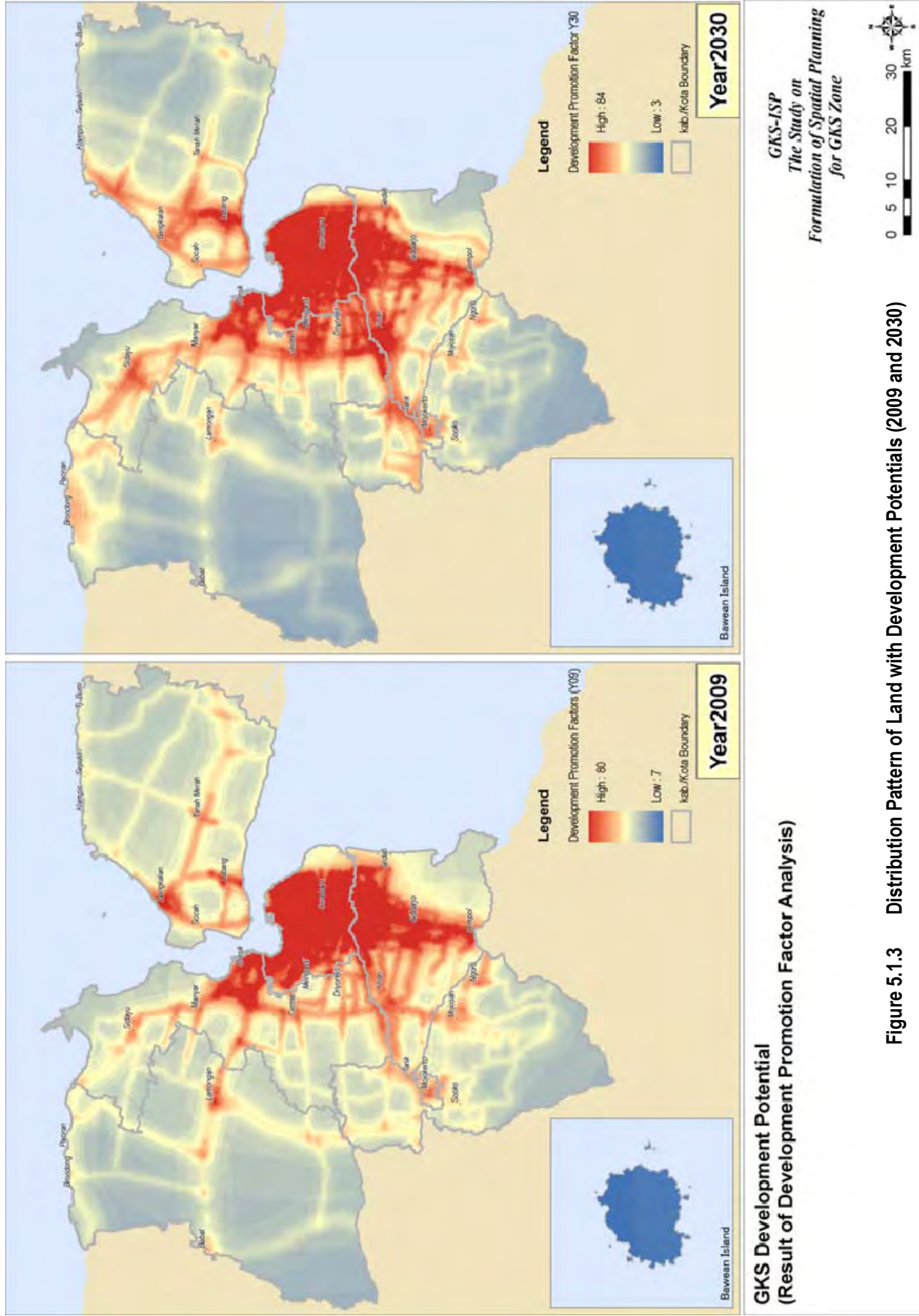


Figure 5.1.3 Distribution Pattern of Land with Development Potentials (2009 and 2030)

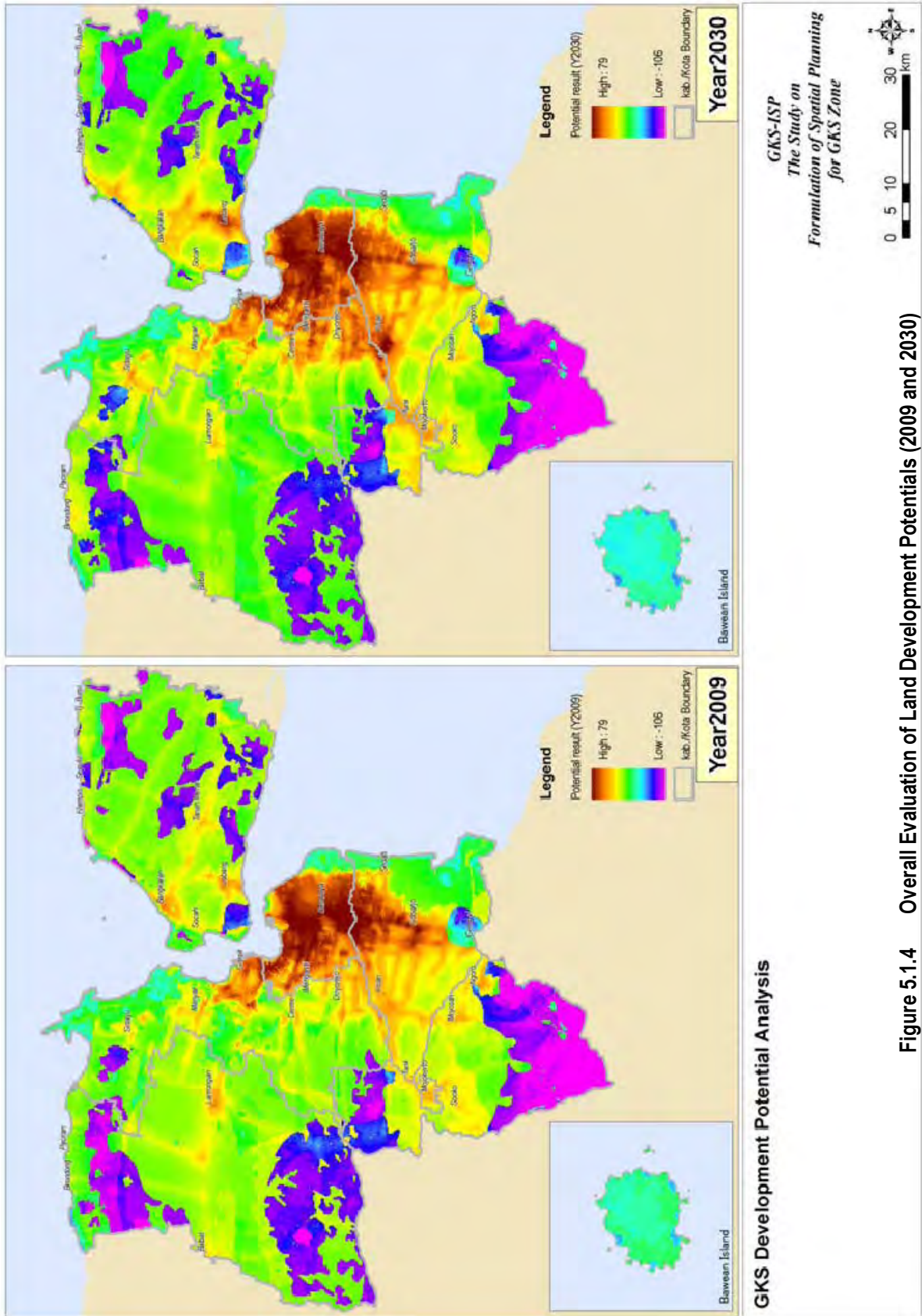


Figure 5.1.4 Overall Evaluation of Land Development Potentials (2009 and 2030)

5.2 Land Use Control and Environmental Management

5.2.1 Land Use Control Measures for Environmental Protection

Development constraints should be given attention, taking note of land suitability, natural disaster and environmental vulnerability through the prism of environmental protection, conservation and rehabilitation and in accordance with national and local laws on environmental management. These elements are vital for food security, water resource environmental and disaster managements. Even though the local society currently pays opportunity costs, necessary protection and conservation should be undertaken, otherwise more social costs will be shouldered by the next generations.

Figure 5.2.1 indicates such evaluation factors in spatial pattern or land use planning. The analytical results in Section 5.1 useful implications on land use policy building, of which the following were the land use control measures:

(1) Environmental Protection Areas

Although the GKS had no national protection areas, some provincial protection areas should be established like the Great Forest Park national park (Taman Hutan Raya) in the mountains of Kabupaten Mojokerto.

(2) Forest Protection Areas

Types of forest protection areas in GKS include the following:

- Protected forest area (*Kawasan Hutan Lindung*)
- Production forest area (*Kawasan Hutan Produksi*)
- Conservation forest area (*Kawasan Hutan Conserve*)

These forest protection areas should be strictly conserved to protect watersheds, guard against soil erosion and flooding. Their protection is decreed by Law No. 41, 1999.

Protected forest areas should be strictly managed in compliance with the law, while production forest areas may be included into conservation areas where some social and economic activities are allowed in a controlled manner.

(3) Regulated Green and Open Spaces

Law No. 26, 2007, on Spatial Management, states that at least **30%** of open areas should be kept in each watershed. These areas should be conserved, and buffer zones should be established in the areas surrounding them.

(4) Wellhead Protection and Water Catchment Areas

Wellhead protection forests and water resource cultivation areas should be strictly protected through legal enforcement. Most of them are listed in the "Protected Forest Areas" mandated by Law No. 41, 1999. However, some remain non-regulated and communities should be mobilized to conserve these areas.

(5) Irrigated Agricultural Lands

The policy of the Agriculture Department of East Java on existing agricultural land emphasizes the

need for these lands to be maintained. This policy instills the effort to negate increasing urbanization pressures that lead to the conversion of agricultural land into residential and/or industrial lands. This concern is especially critical in irrigated lands where accumulated agricultural investments are equated with food security. Another rationale against agricultural land conversion is that the change in uses is irreversible and that economic losses are sometimes larger than accrued economic benefits.

(6) Coastal Swamp Areas and Flood-prone Areas

Vast coastal swamp areas stretch over the zone's eastern and northern coasts. These areas should be conserved due to their ecological uniqueness, bio-diversity, and symbiosis with fishing activities.

Likewise, the vast flood-prone area along the Solo River should be conserved, while controlling the land use conversion for housing, industrial and commercial purposes. Instead, agricultural use should be encouraged with the necessary engineering designs for drainage.

(7) Lapindo Mud Blowout Area

The Lapindo mud blowout in Sidoarjo has a large direct and indirect impact on East Java and on the GKS. The blowout has prompted the Indonesian government to create the Badan Penanggulangan Lumpur Sidoarjo/BPLS (Agency for the Mitigation of Sidoarjo Mud) with the following mandates: (a) Mitigate effects of the mud blowout, (b) Handle efforts to avert mud inundation, (c) Manage social impacts, and (d) Manage impacts to infrastructures.

The ***lapindo area*** should be conserved for the time being until the phenomenon ceases and its stability is guaranteed from the geological standpoint. In the future, the area may be developed for recreation and tourism purposes, when geological stability is already guaranteed.

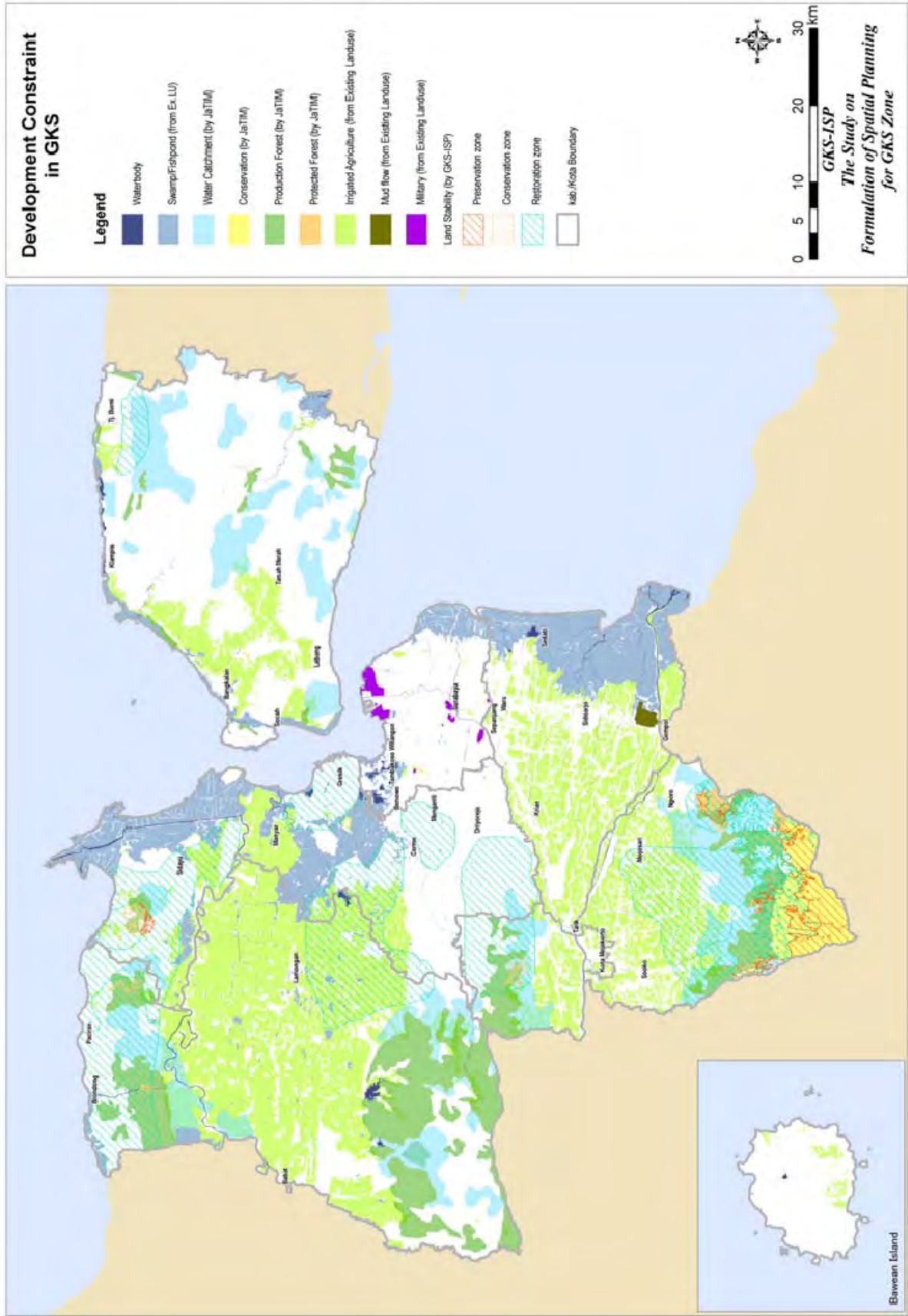


Figure 5.2.1 Environmental Factors to be Considered for Preservation and Conservation

5.2.2 Strategies for Environmental Management

(1) Environmental Problem Structure in GKS Zone

The structure of the major environmental problems in the GKS is shown in Figure 5.2.2. The environmental problems in the GKS Zone mainly depend on topographic conditions and land use. Such as the problem structure in hilly areas, rural and urban areas. In hilly areas, for example, problems are related to forest and soil conservation, particularly in Mojokerto. In urban areas, these problems are related to population growth, and collectively caused by industrialization, urbanization and increasing population.

Development pressures in the GKS mostly move from downstream to upper stream. Manifestations of this pressure include decreased agricultural lands in favor of industrial and housing expansions. On the other hand, forest cover in hilly areas has been decreasing due to illegal conversion of forest areas into agricultural lands. The environmental impact flow differed when development pressure came from upper stream to downstream.

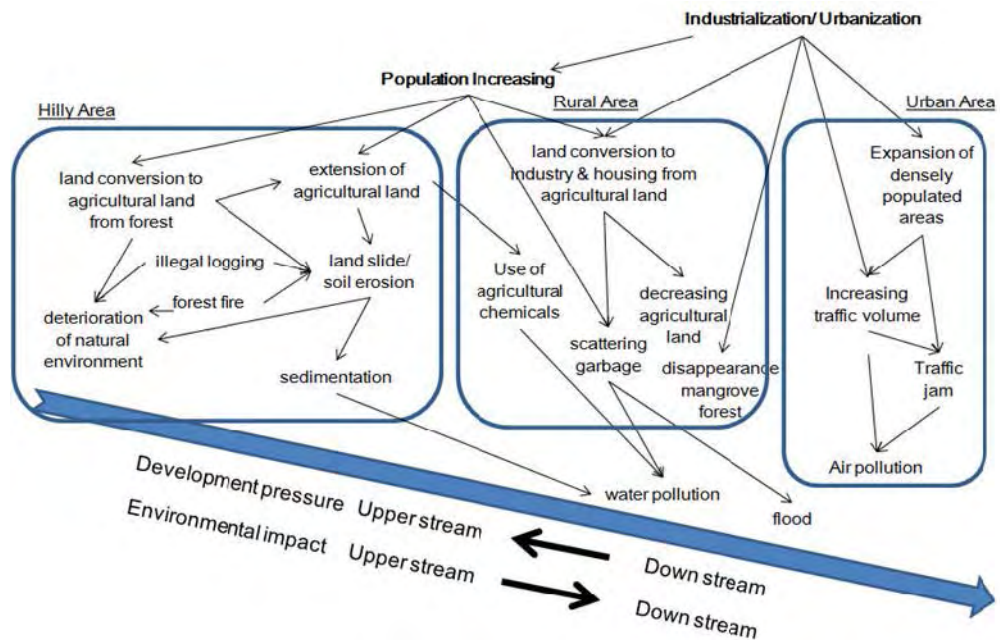


Figure 5.2.2 Structure of Environmental Problems in GKS Zone

(2) Needs for Functional Environmental Management Strategy

During the past decade the economy of the GKS has grown rapidly and this growth has given rise to consequent environmental problems due to industrialization and urbanization. Environmental problems will grow more seriously in the future if the necessary actions to avert them are not taken.

Since the above scenario might be the norm in highly urbanized areas in Indonesia, the GKS could function as a model of sustainability on area development in the country. That is the position in that it could take in Indonesia, the mantle of a sustainable economic zone with the essential elements that balances economic growth and environmental protection. In this aspect the following environmental policy issues were considered:

- Symbiosis with environment for sustainable prosperity.
- Ensuring integrity of the natural environment and restoration of the damaged environment.
- Contributing to global environmental issues especially on climate change.

5.2.3 Environmentally Sensitive Area Management

(1) Identification of Environmentally Sensitive Areas in GKS Zone

The introduction of an Environmentally Sensitive Area (ESA) Management System is a strategic approach to sustainable area development, taking into account valuable and/or vulnerable landscapes and ecosystems from the standpoint of environmental protection.

An ESA map, which indicates locations of environmentally sensitive areas, was used as one of the common zoning maps. The ESA map identified the areas that needed to be preserved, conserved or restored, identifying them through the following environmental and conservation delineations:

- To preserve environmentally important and critical areas, and their unique features;
- To protect critical habitats, ecosystems and ecological processes;
- To separate conflicts of human activities; and
- To minimize effects of human activities in inland and coastal waters.

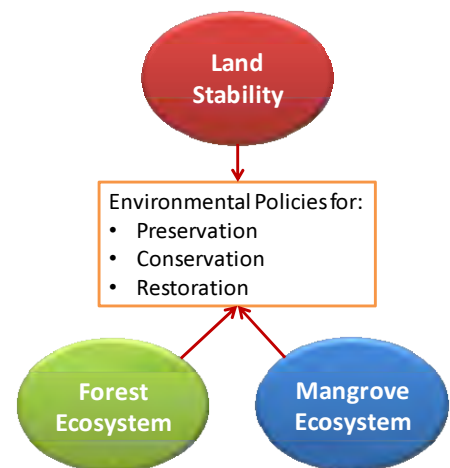
(2) Planning Implications of the ESA Map

It is important to ensure the balance among development demand, socio-economic situation and environmental conservation. As mentioned earlier, an ESA Map shows the direction of the areas that should be preserved, conserved and restored from the viewpoint of environmental conservation. The ESA Maps formed the basis for land use planning and infrastructure development to achieve sustainable area development through environmental sustainability. The map also acted as a reference in the formulation of guidelines for spatial planning, infrastructure development, and environmental impact assessment studies.

In particular, the ESA Map delineated three environmental ecosystems:

- “Land Stability,” to avert disasters, such as land slide and floods.
- “Forest Ecosystem,” to protect critical habitats and ecological processes.
- “Mangrove Ecosystem,” to protect coastal resources.

Figure 5.2.3 shows the proposed ESA Map based on the elements above.



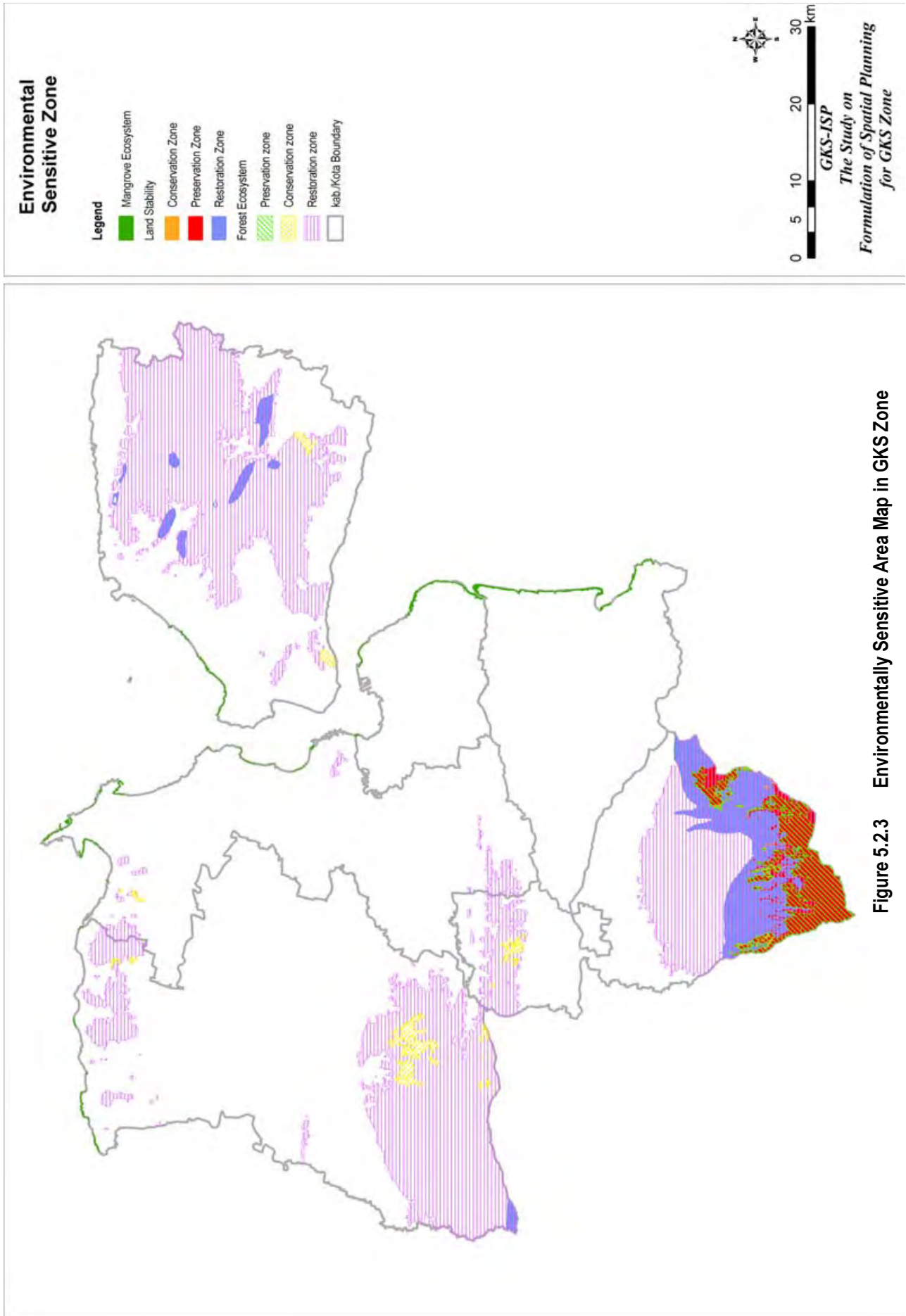


Figure 5.2.3 Environmentally Sensitive Area Map in GKS Zone

5.3 Urbanization Scenarios and Urban Land Use Demands

5.3.1 Land Use Demands for Housing and Urbanized Areas

(1) Population in 2030

Because urbanization commonly engenders uncontrolled land conversions economic and social development should be concomitant to proper land use demand. Future population forecast translates to future land use demands.

As discussed in Chapter 3, the population framework in 2030 is shown in Table 5.3.1. By 2030 the population in the GKS is expected to be 14,117,500, compared with 9,345,655 in 2008. The incremental population up to 2030 is about 4.77 million, which will require new residential areas in the zone.

Table 5.3.1 Population Forecasts for 2030 in GKS Zone

Kab/Kota	2008	2030	Increment
Sidoarjo	1,920,312	3,257,400	1,337,088
Mojokerto	1,074,879	1,653,100	578,221
Lamongan	1,302,605	1,795,100	492,495
Gresik	1,169,347	1,910,600	741,253
Bangkalan	990,711	1,586,500	595,789
Kota. Mojokerto	123,566	191,100	67,534
Kota. Surabaya	2,764,245	3,723,700	959,455
GKS	9,345,665	14,117,500	4,771,835

Source: JICA Study Team

(2) Urbanization Scenarios

The population distribution analysis showed that 39% of the total population will reside in the rural villages, and 61% will live in the urban and suburban areas, which has resulted to the assumption that the total urbanized areas will accommodate 61% of the total population, or 8,629,800, while the rural areas will absorb the balance of 5,487,700 in GKS Zone.

(3) Land Use Demands for Housing and Urban Services

A residential density analysis projected land use demands. Commonly, the population density in the rural area is about 60 persons/ha, which is regarded as a spontaneous trend of human settlement.

Three classified areas were assumed for the urban areas namely: high density; middle density; and low density areas. The classified areas were respectively given their assumed densities: 180, 120 and 60 persons/ha. Although highly populated areas showed remarkably high densities of over 200, or 400 persons/ha, especially in the CBD and its vicinities, the average density of about 180 persons/ha was the ideal assumption for the highly dense areas. Low density areas were assigned the same density ratio as those in the rural areas, 60 person/ha.

The land use demand for housing and urban services in 2030 was projected based on these analytical assumptions and are summarized in Table 5.3.2. The analysis showed that a total of

170,590ha will be required to accommodate future population in the GKS, while 79,090 ha shall be dedicated for urbanized areas, and 91,500 ha will be converted into villages in the rural areas, as illustrated on Figure 5.3.1.

Table 5.3.2 Land Use Demands for Housing and Urban Service Areas in GKS in 2030

Area	Classification	Land Requirement		Density	Population Distribution	
		(ha)	(%)	(prs/ha)	Residents	(%)
Urban	High Density	11,870	7.0%	180	2,136,600	15.1%
	Middle Density	41,000	24.0%	120	4,920,000	34.9%
	Low Density	26,220	15.4%	60	1,573,200	11.1%
	Urban Total	79,090	46.4%	109	8,629,800	61.1%
Rural	Villages	91,500	53.6%	60	5,487,700	38.9%
Total		170,590	100.0%	83	14,117,500	100.0%

Source: JICA Study Team

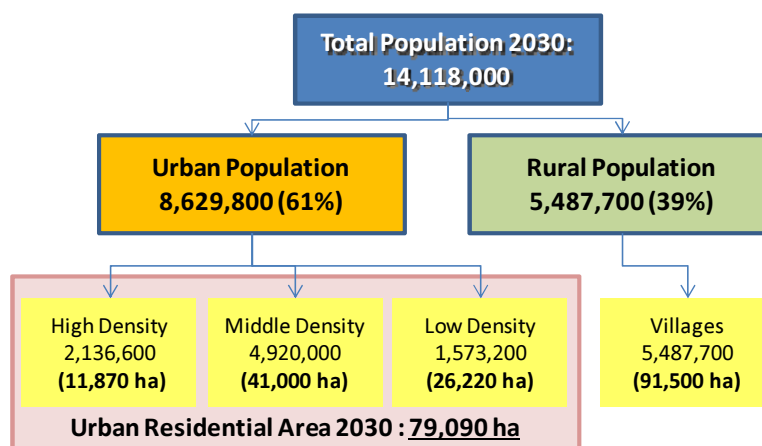


Figure 5.3.1 Land Use Demand Forecast for Housing and Urban Services in GKS Zone in 2030

(4) Land Use Demand for Industry

Land use requirement for industrial activities was computed based on employment forecasts in the industrial sector. From 2007 to 2030, a total of 777,000 jobs will be created in the formal industrial sector in the GKS. Out of this, 612,000 employments, or 78.8%, will be provided by large-scale industries, and 164,000, or 21.2%, will be provided by small scale industries, as shown in Table 5.3.3. In this table, the small scale industries were classified into two, namely: micro-enterprise (with less than 10 employees) and small-medium enterprise (SME: with less than 30 employees).

The micro-enterprise include cottage and household industries. The cottage industries that employed 1~4 persons or 5~9persons, were not taken into account in the calculation of demands for the industrial land areas, because most of them did not operate in a specific industrial estates but in mixed-use buildings.

Table 5.3.3 Incremental Employment in the Formal Industries (2007-2030) by Company Size

Kab/Kota	No. of Employees				Assumed Ratio	
	Micro-enterprise	SME	Large	Total	Micro+SME	Large
Bangkalan	17,483	23,462	10,236	51,181	80.0%	20.0%
Gresik	1,477	37,387	220,231	259,095	15.0%	85.0%
Lamongan	6,773	34,528	10,325	51,627	80.0%	20.0%
Mojokerto	514	20,896	49,956	71,366	30.0%	70.0%
Sidoarjo	2,991	9,470	236,755	249,216	5.0%	95.0%
Kota Mojokerto	82	150	2,086	2,317	10.0%	90.0%
Kota Surabaya	1,453	7,743	82,765	91,961	10.0%	90.0%
GKS	30,773	133,636	612,354	776,763	21.2%	78.8%

Source: JICA Study Team

Notes: Micro-enterprise is defined to be an industry with less than 10 employees; and SMEs, with less than 30 employees.

Additional land requirements that support formal industrial activities were computed, based on the “employment density” assumption by company size. According to 2007 statistics, the present average employment density of selected existing industrial estates was **83** persons/ha.

The projections are summarized in Table 5.3.4, which shows a total of **8,682 ha** will be additionally required for industrial activities between 2007 and 2030. Out of this total **7,654 ha** will be absorbed by large scale industries, located inside industrial estates or industrial parks where environmental utilities are well-developed, and the balance of about **1,000 ha** will be used up by the SMEs in GKS.

In the distribution of demands, industrial estates for large-scale enterprises were greatly in demand in Sidoarjo (2,959 ha), Gresik (2,753 ha) and Surabaya (1,035 ha). While industrial areas for SMEs were required in Lamongan (258 ha), Bangkalan (256 ha) and Gresik (243 ha).

The projection process of such industrial land use demand is illustrated on Figure 5.3.2.

Table 5.3.4 Demand for Additional Land in the Industrial Sector up to 2030

	Large Scale (ha) (80 pax/ha)	SMEs (ha) (160 pax/ha)	Total (ha)
Bangkalan	128	256	384
Gresik	2,753	243	2,996
Lamongan	129	258	387
Mojokerto	624	134	758
Sidoarjo	2,959	78	3,037
Kota Mojokerto	26	1	28
Kota Surabaya	1,035	57	1,092
GKS	7,654	1,028	8,682

Source: JICA Study Team

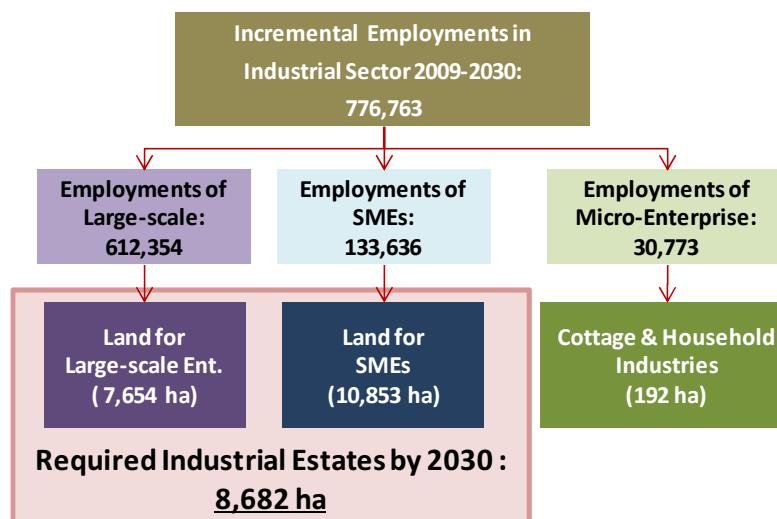


Figure 5.3.2 Incremental Land Use Demand for New Industrial Locations between 2009 and 2030 in GKS Zone

5.4 Land Use Plan for 2030 in GKS Zone

5.4.1 Methodology

A long-term land use plan up to 2030 was formulated for the GKS Zone based on properties derived from the evaluation of land use potentials and constraints (Section 5.1), considerations of environmentally sensitive area analysis (Section 5.2) and urbanization and land use demand analysis (Section 5.3).

(1) Proposed Land Use Zoning Categories

A land use mapping with a categorized color-coding system was designed for spatial planning by BAKOSURTANAL. However, the designed breakdown of land use categories were not relevant, because of two reasons: 1) The mapping scale for GKS spatial planning is 1/250,000; and 2) The land use pattern depicted in the GKS spatial plan is a general guideline at the macro level which should be useful for spatial plans at the regency level. Therefore, a consolidated land use zoning with 10 categories was proposed, as shown in Table 5.4.1, and the categorization system in BAKOSURTANAL's land use norm was used as an attachment to the table.

(2) Basic Directions for Land Use Planning

Although a number of directions were considered for land use planning, the following are the seven major directions in land use planning in the GKS Zone:

- 1) **Legally Protected Forests** should be strictly protected through legal enforcement.
- 2) **Environmentally Sensitive Areas (ESAs)** shall be identified, and these areas should be environmentally managed with special policy emphasis.
- 3) **Conservation Areas**, including swampy, flood-prone, coastal, salt-farming areas and Lapindo mud blowout areas, should be controlled against urban development activities.
- 4) **Land Conversion from Irrigated Areas** to land for urban uses should be minimized against strong urbanization pressures.

- 5) **Agricultural Lands** should be utilized for more diversified and versatile activities, including animal and dairy husbandry in Bangkalan and Mojokerto.
- 6) **Green-rich Urbanization with Green Network** should be formed over urbanized areas.
- 7) **Water-saving and Pollution-free Industries** should be promoted to induce high development potential areas, but should not be located in ESA (Environmentally Sensitive Area).

Table 5.4.1 Proposed Land Use Zoning Categories for Spatial Planning in GKS Zone

Land Use Category	Objective/Attribute	Note	
1	Protection Zone	<ul style="list-style-type: none"> To legally protect natural resources and critical ecosystems from disorderly development and illegal land conversion. To mitigate disasters, keeping the existing natural conditions and pattern protected 	Refer to the environmentally sensitive area (ESA) map
2	Conservation Zone	<ul style="list-style-type: none"> To conserve natural resources and ecological assets through institutional measures on development control and land use management, taking account of environmental considerations. 	Including mud flow area and salt farms
3	Forest Zone	<ul style="list-style-type: none"> To manage forest areas with the legal framework of three (3) categorized forests: protection forest, conservation forest, and production forest. 	Should comply with laws and regulations
4	Irrigated Agricultural Zone	<ul style="list-style-type: none"> To promote agricultural activities with a well-managed water use system 	
5	Non-irrigated Agricultural Zone	<ul style="list-style-type: none"> To encourage more diversified agricultural activities, including animal husbandry and agro-processing. Fishpond and salt-farming pond 	
6	Buffer Zone	<ul style="list-style-type: none"> To reserve open space and environmental resources to serve as green networks for a more livable metropolis. 	Including areas reserved for urbanization beyond 2030.
7	Human Settlement & Urban Development Zone	<ul style="list-style-type: none"> To facilitate the development of areas for housing and urban services under three types based on population density: high density, medium density, and low density. To develop rural villages as human settlement areas. 	Including all public services such as parks, schools, health and government facilities.
8	Industrial Zone	<ul style="list-style-type: none"> To encourage and facilitate industrial development in the form of industrial estates/parks or special industrial zones. 	Sewerage and drainage systems to be provided.
9	Mining Zone	<ul style="list-style-type: none"> To promote proper environmental management for gas and oil exploitation as well as mineral mining and quarrying. 	No specific areas exist in the GKS Zone.
10	Special Zone	<ul style="list-style-type: none"> Including military use and cemeteries. 	

Source: JICA Study Team

A. PROTECTION ZONE

- A.1 Great Forest Park
- A.2 Cultural Preservation and Science Preservation
- A.3 Spiritual Protected Areas and Local Wisdom
- A.4 Coastal Boundary
- A.5 River Bank
- A.6 Area Around the Lake or Reservoir
- A.7 Water Catchment Area, and Water Spring Area
- A.8 Landslide Zone

B. CONSERVATION ZONE

- B.1 Mangrove Coastal Zone
- B.2 Flood Zone
- B.3 Mud Disaster Zone
- B.4 Flood Prone Zone; Water Reservoir
- B.5 Forest Fire and Typhoon Prone Zone
- B.6 Coastal Abrasion Prone Zone
- B.6 Salt-farming

C. FOREST ZONE

- C.1 Protection Forest
- C.2 Production Forest Zone
- C.3 Conservation Forest Zone

D. AGRICULTURAL (Irrigated) ZONE

- D.1 Irrigated Land

E. AGRICULTURAL (Non-irrigated) ZONE

- E.1 Non-irrigated land
- E.2 Plantation Land Zone
- E.3 Animal Husbandry Zone
- E.4 Fishery Zone

D. BUFFER ZONE

- D.1 City Forest
- D.2 Green Open Area

E. URBAN DEVELOPMENT AREA

- E.1 High Density Urban Settlement
- E.2 Medium Density Urban Settlement;
- E.3 Low density Rural Settlement
- E.4 Tourism Zone
- E.5 Mainstay Zone
- E.6 New Town and Waterfront City
- E.7 City Park

F. INDUSTRIAL ZONE

- F.1 Industrial Zone

G. MINING ZONE

- G.1 Karst Mining
- G.2 Gas, Oil and Mineral Mining Zone

H. SPECIAL ZONE

- H.1 Defense and Security Zone



5.4.2 Proposed GKS Land Use Plan 2030

(1) Overall Land Use and Spatial Patterns 2030

A long-term 2030 land use plan for the GKS Zone was formulated, as shown in Figure 5.4.1, and a corresponding land use zoning structure was tabulated, as shown in Table 5.4.2. From this table, the followings critical zones were noted:

- Protection Zone, Conservation Zone and Forest Zone, including three categorized forests, will share 10.1%, 2.4% and 10.3% respectively, thus, a total of **22.8%** of the entire GKS Zone is recognized as environment-conscious areas.
- Irrigated Zone will occupy 20%, and non-irrigated agricultural zone, 30.5%, meaning that the agricultural land covers half (50.5%) of the GKS Zone. Thus, agriculture is/shall be of the most significant land use.
- Human Settlement & Urban Development Zone will account for 74,944 ha, sharing 11.8% of GKS, and the land for rural villages, 58,540 ha, or 9.2%. Hence, a total of 21% of the land will be used for human settlement and urban activities.
- Industrial Zone, which will total 13,328 ha in 2030, shares 2.1% of the entire GKS Zone.

In general, the assessment showed that the proposed land use plan struck an effective balance between environmental conservation and urban development.

Table 5.4.2 GKS Land Use Zoning Structure in 2030

Land Use Zoning Category	Area	Share (%)
1. Protection Zone	63,948	10.1%
2. Conservation Zone	15,472	2.4%
3. Forest Zone	65,132	10.3%
<i>Protection Forest</i>	<i>(1,292.0)</i>	<i>(0.2%)</i>
<i>Conservation Forest</i>	<i>(11,108.0)</i>	<i>(1.7%)</i>
<i>Production Forest</i>	<i>(52,732.0)</i>	<i>(8.3%)</i>
4. Agricultural (Irrigated) Zone	126,880	20.0%
5. Agricultural (Non-irrigated) Zone	193,448	30.5%
6. Buffer Zone	21,660	3.4%
7. Human Settlement & Urban Development Zone	74,944	11.8%
<i>High Density</i>	<i>(11,068.0)</i>	<i>(1.7%)</i>
<i>Middle Density</i>	<i>(38,936.0)</i>	<i>(6.1%)</i>
<i>Low Density</i>	<i>(24,940.0)</i>	<i>(3.9%)</i>
8. Rural Villages	58,540	9.2%
9. Industrial Zone	13,328	2.1%
10. Mining Zone	0	0.0%
11. Special Zone	1,548	0.2%
Total	634,900	100.0%

Source: JICA Study Team

(2) Changes in Land Use Patterns between 2009 and 2030

A land conversion analysis from 2009 to 2030 was made, and a matrix of land use changes was delineated as shown in Table 5.4.4. This matrix indicated what specific uses the existing lands will shift to by 2030.

The analysis showed the changes in the existing irrigated agricultural lands, as shown in Table 5.4.3. Following the important dictum in land use planning that avoiding diminution or fragmentation of agricultural lands from the onslaught of urban pressures is the better strategy, the table will show that out of the total existing irrigated lands of **168,104 ha**, **126,536 ha (75.3%)**, will remain as irrigated lands, and 14,680 ha (8.7%) will be converted into environment-oriented lands, including protection and conservation areas, while **12,768 ha (7.6%)**, will be converted into urban development areas, and **2,520 ha (1.5%)** will be shifted into industrial uses. A mere 9% of the existing irrigated lands would be converted for urban and industrial purposes. Such a change seems reasonable and relevant, taking into account the strong urbanization pressure anticipated in coming decade.

Table 5.4.3 Land Conversion of Irrigated Agricultural Lands from 2009 to 2030

Land Use Category		Existing 2009		
		Irrigated Agricultural Area 2009 (ha)	Composition (%)	
Land Use 2030	Protected area	10,144	14,680	8.7%
	Conservation area	736		
	Production forest	3,800		
	Agriculture (Irrigated)	126,536	75.3%	
	Agriculture area	2,376	1.4%	
	Buffer	9,224	5.5%	
	Urban Dev't Area (High Density)	464	12,768	7.6%
	Urban Dev't Area (Middle Density)	5,080		
	Urban Dev't Area (Low Density)	7,224		
	Industrial area	2,520	1.5%	
Total		168,104	100.0%	

Source: JICA Study Team

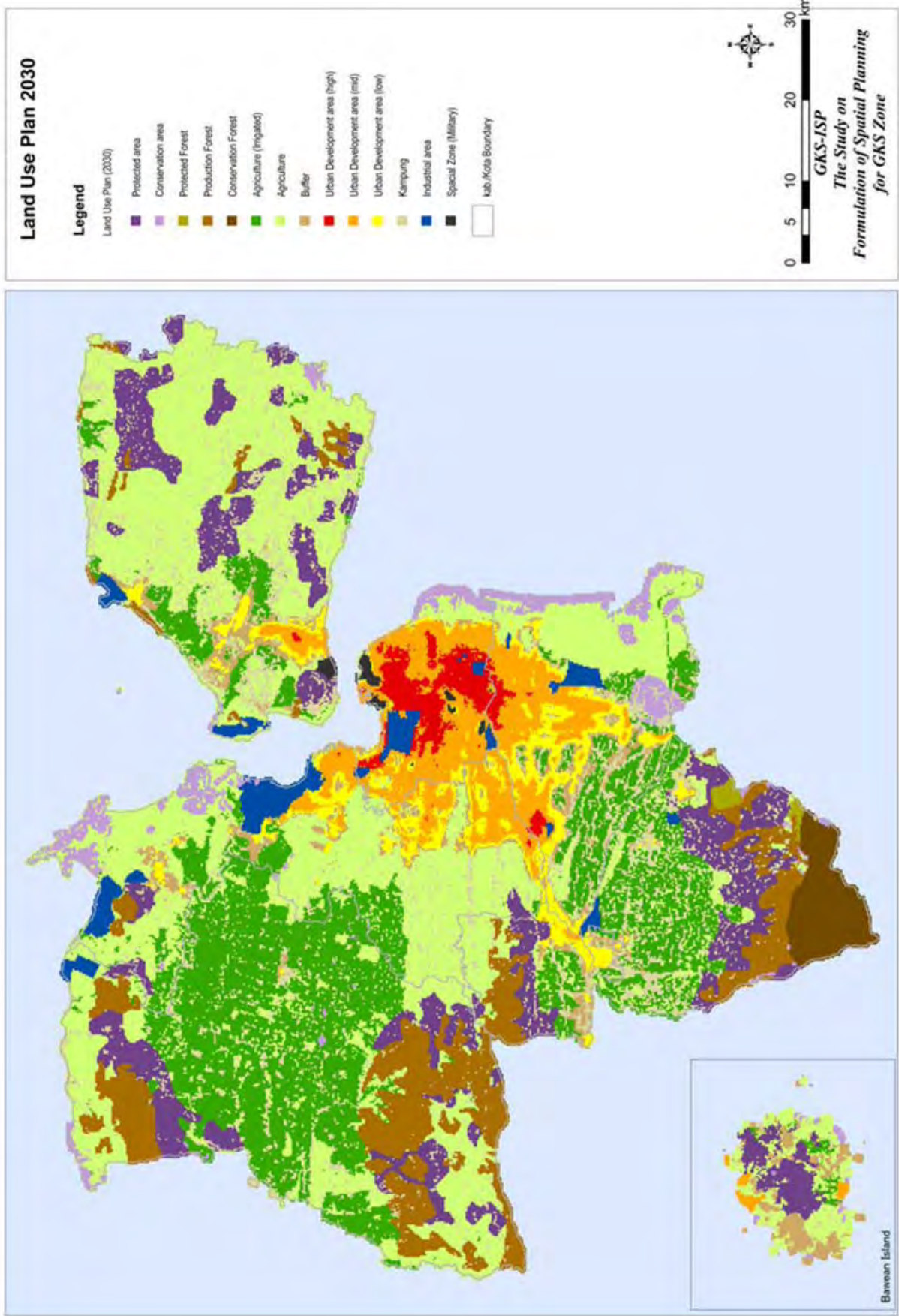


Figure 5.4.1 Land Use Plan 2030 in GKS Zone

Table 5.4.4 Land Use Changes from the Existing Pattern to the Land Use Plan 2030 in GKS Zone

Land Use Category	Existing Land Use 2009 (ha)														Total							
	Agriculture	Agriculture (Non-irrigated)	Agriculture (Irrigated)	Cemetery	Commercial	Dumping Site	Fish Pond	Grassland Shrub	Housing Settlement	Industry	Mangrove	Military	Open Space	Porong Mud Disaster		Public Institution	Recreation/ Sports	Sea Sand	Swamp	Transportation	Vacant Land	Water-body
1 Protected area	8,292	35,992	10,144	0	20	0	160	8,348	0	56	0	0	0	0	0	0	96	608	0	4	228	
2 Conservation area	68	272	736	0	8	0	10,664	488	0	8	1,736	0	0	584	0	0	8	736	0	0	164	
3 Agriculture (Irrigated)	92	108	126,536	0	0	0	0	124	0	0	8	0	0	0	0	0	4	8	0	0	0	0
4 Agriculture area	23,688	118,964	2,376	24	128	4	35,696	6,312	0	372	1,132	0	68	20	8	32	68	1,180	172	40	3,264	
5 Protected forest	68	72	0	0	0	0	0	1,152	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6 Production forest	18,236	19,076	3,800	0	0	0	400	10,972	0	4	0	0	0	0	0	0	0	140	0	4	100	
7 Conservation Forest	1,872	172	0	0	0	0	0	9,084	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 Buffer	1,980	3,744	9,224	0	72	32	776	4,940	0	280	24	0	76	0	44	8	20	56	136	24	244	
Urban development area (High Density)	76	72	464	0	896	0	28	476	6,944	768	0	0	376	0	400	48	0	0	52	336	132	
Urban development area (Middle Density)	1,892	5,152	5,080	0	1,044	0	292	1,516	15,460	2,904	4	4	1,780	0	692	112	8	64	220	2,280	432	
Urban development area (Low Density)	1,372	5,648	7,224	0	172	40	724	592	7,156	784	4	0	368	0	36	48	8	88	180	116	380	
Village (Kampung)	0	0	0	0	0	0	0	0	58,540	0	0	0	0	0	0	0	0	0	0	0	0	0
Industrial area	68	3,016	2,920	0	92	0	2,340	476	1,220	2,816	168	0	0	0	24	0	0	236	0	136	216	
Special zone	0	8	0	0	0	0	0	0	12	0	0	1,528	0	0	0	0	0	0	0	0	0	0
Total	57,704	192,296	168,104	24	2,432	76	50,880	44,460	89,332	7,972	3,076	1,532	2,668	604	1,204	248	212	3,116	760	2,840	5,160	
	9.1%	30.3%	26.5%	0.0%	0.4%	0.0%	8.0%	7.0%	14.1%	1.3%	0.5%	0.2%	0.4%	0.1%	0.2%	0.0%	0.0%	0.5%	0.1%	0.5%	0.8%	

Source: JICA Study Team

5.5 Strategic Development Zones for Equitable Economic Growth

5.5.1 Definition and Projects of the Strategic Development Zone

The Spatial Planning Law articulates that strategic development zones should be identified to realize visions and missions, as envisioned at the beginning of spatial planning process. Based on such a direction, Strategic Development Zone (SDZ) and major projects in the SDZ were assigned the following functions:

- **Anchor projects** to realize defined development visions
- **Key projects** to boost the regional economy of GKS and East Java
- **Large/medium-scale projects** which require a massive public and/or private investment
- **Priority projects** to be commenced with special policy emphasis

Major projects in SDZs will include the following:

- Industrial estates/zones
- Transportation nodes and traffic generators such as port, airport, railway stations, bus terminal and cargo-distribution terminals and so on.
- Commercial and business centers
- Tourism destinations to attract both international and domestic tourists
- New towns, urban sub-center and/or new settlement centers
- Major utility infrastructures such as reservoir, water intakes, sewerage and drainage
- Facilities for Solid Waste Management (final disposal sites, inter-mediate transfer facilities, recycling centers, composting plants, etc.)
- Other crucial facilities/services indispensable for achievement of the visions.

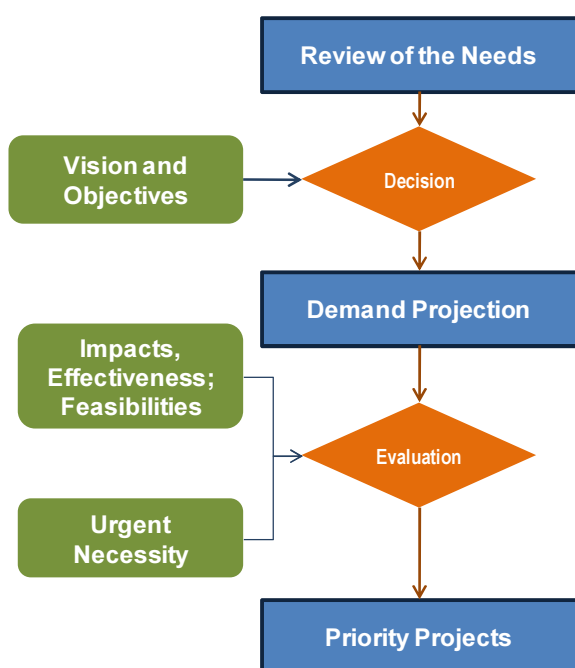


Fig. 5.5.1 Prioritization Procedure of Strategic Zones/Projects Proposed by Kota/Kabupaten

5.5.2 Assessment of Proposed Strategic Projects

Each spatial plan for the kabupaten and kota has a number of proposed strategic medium- and large-scale projects. These projects are tabulated in Table 5.5.1, and they were reviewed and prioritized through the evaluation process as shown in Figure 5.5.1. The criteria of the evaluation process were: 1) relevance to vision and objectives of GKS development as a whole, 2) expected impacts, effectiveness and implicit feasibility; and 3) urgent necessity to enhance commerce.

Most regencies likewise expected to develop massive industrial estates. However, the incremental demand for industrial land area is computed at about 8,680 ha until 2030. Thus, prioritizing development scheme is important to avoid over investment as well as over development of existing lands. One caveat is that the conversion of agricultural lands into industrial uses is often an irreversible process.

Moreover, planned projects that fell into the "Protection Zones" as designated in the land use plan, were either omitted, partially cut or relocated, due to crucial environmental

considerations.

5.5.3 Proposed Strategic Zones towards 2030 in GKS

After prioritizing the strategic projects of the kabupaten/kota spatial plans, the zones where the these projects were located, were labeled as Strategic Zones for 2030. In addition, a number of strategic projects were proposed through this GKS spatial planning process in the transportation and infrastructure sectors. This where likewise considered as Strategic Zones.

Figure 5.4.3 shows the proposed GKS strategic development zones towards 2030, which includes:

- Central Commercial/Business Development Zone;
- Green Development Zone;
- Public Facilities Development Zone;
- Industrial Development Zone;
- Military Zone;
- Other Strategic Project Locations; and
- Transportation Facilities Development Zone (proposed by JICA Study Team)

Table 5.5.1 Large- and Medium-Scale Strategic Development Projects Proposed in Spatial Plans by Regency and their Priorities

Kota/Kab	Ref. # ¹⁾	PROJECT NAME	PROJECT SECTOR	LOCATION	AREA (Ha)	STATUS	SCALE	PRIORITY ²⁾
GRESIK	1	Ujung Pangkah Industry	Industry	Ujung Pangkah	4,984.38	Planned up to 2028	Large	H
	3	Manyar Industry	Industry	Manyar	1,489.00	Planned up to 2028	Large	M/L
	2	Sidayu Industry	Industry	Sidayu	1,000.00	Planned up to 2028	Large	M/L
	15	ERP (Environment Recycling Park)	Solid Waste	Kedamean	120.00	Feasibility Study 2010	Medium	H
	4	Housing & Settlement	Human Settlement	Dijorejo, Kedamean, Menganti, Cerme	4,000 of total 29,207.00	Planned up to 2028	Large	M/L
BANGKALAN	25	Sembayat Barrage (water reservoir)	Natural Resource	Bungah	64.00	Start 2011	Medium	H
	16	TOL road Legundi-Manyar	Transportation		172.50		Medium	M/L
	12	Suramadu Bridge Foot	Tourism, Service	Labang	600.00	Start 2011	Medium	H
	5	Tanjung Bulupandan Port Hub	Transportation	Klampis	1,000.00	Maybe start in 2012	Large	H
MOJOKERTO	13	Blega Reservoir	Natural Resource	Galis	966.30	Water supply Capacity: 0.39 m3/sec; Catchment Area: 122 Km2.	Medium	H
	14	MISI Port	Transportation	Socah	?	Planned up to 2028	Medium	M
	6	Ngoro Industrial Park	Industry	Ngoro	440.00	Operate since	Medium	H
	6	Mojoanyar Industrial Estate	Industry	Mojoanyar	1,555.00	Planned up to 2028	Large	M
SIDOARJO	6	Jetis Industrial Estate	Industry	Jetis		Planned up to 2028		M
	7	Housing & Settlement	Human Settlement	Sooko, Gecek, Mojosari, Pacet	18,807 of total 31,058.1	Planned up to 2028	Large	M/L
	17	TOL road SUMO	Transportation	Waru-Diyorejo-Krian-Mojokerto	311.20	Start in 2009	Medium	M
	21	Regional Main Market for Agrobusiness (PIA)	Industry	Jemundo	50.00	Construction started in 2010	Medium	H
LAMONGAN	20	JUANDA Airport II (Expansion)	Transportation	Sedati	10.00	Plan to be developed in 2012	Medium	H
	8	Siborian Industrial Estate & Zone	Industry	Sidoarjo-Jabon-Krian	2,450.00	Plan to be developed	Large	L
	9	New Town Development	Human Settlement	Sukodono	1,716.80	Plan to be developed	Large	M
	18	Waterfront City	Human Settlement	Sedati	N/A	Plan to be developed	Medium	M/L
KOTA MOJOKERTO	22	Tarik Riverside City	Human Settlement	Tarik	N/A	Plan to be developed	Medium	M
	19	Gemopolis (Gem Industry)	Industry	Sedati	300.00	Plan to be developed	Medium	M
	26	Lamongan Integrated Shore-base	Industry	Paciran	100.00	Operating in 2010	Medium	H
	25	Sembayat Barrage (water reservoir)	Natural Resource	Laren	10.00	Start 2011 (a part of Gresik location)	Medium	H
KOTA SURABAYA	27	TOL road Gresik-Lamongan-Tuban	Transportation		375.00	Planned up to 2028		M/L
		Air Port Alternative for Juanda extension	Transportation			Discourse	Medium	L
	12	Suramadu Bridge Foot	Commercial	Tambak Wedi	600.00	Start 2011	Medium	H
	11	Lamongan Bay Port for Container	Transportation	Lamongan Bay	55.50	Start 2011	Medium	M
KOTA SURABAYA	12	Waterfront Residential Settlement	Human Settlement	Lamongan Bay, Suramadu Bridge Foot, East Coast	400.00	Planned up to 2028	Medium	M/L
	23	TOL road	Transportation	Eastern Ring Road	320.50	Planned up to 2028	Medium	H
	10	Suramadu Bridge	Transportation	Tambak Wedi	5.40 Km	Finish and Operate since 2009	Large	Completed

Source: Cited from Kab/Kota spatial plans

Notes: 1) Ref. # can refer to the numbers on Figure 5.4.2.

2) Priority scale (H: High priority; M: Middle; and L: Low), evaluated by JICA Study Team

Location of Large and Medium Projects by Kabupaten /Kota RTRW:

LARGE PROJECT:

1. Ujung Pangkah Industrial Estate
2. Sidayu Industrial Estate
3. Manyar Industrial Estate
4. Housing & Settlement in Driyorejo, Kedamean, Menganti, Cerme
5. Tg. Bulupandan International Port Hub
6. Mojoanyar, Jetis Industrial Estate
7. Housing & Settlement in Sooko, Gedek, Mojosari, Pacet
8. Siborian Industrial Estate & Zone
9. Sukodono New Town Development
10. Suramadu Bridge

MEDIUM PROJECT:

11. Lamong Bay Container Port Terminal & Waterfront City
12. Surabaya-Bangkalan Suramadu Bridge Foot
13. Blega Reservoir
14. MISI Soeah Port
15. Environmental Recycling Park Kedamean
16. Manyar-Legundi Toll Road
17. Sumo Toll Road
18. Waterfront City
19. Gemopolis (Gem Industry)
20. Juanda II Development
21. PIA Regional Main Market for Agrobussiness
22. Tarik Riverside City
23. Surabaya Eastern Outer Ring Road
24. Perak Toll Road
25. Sembayat Barrage
26. LIS (Integrated Port)
27. Lamongan-Tuban Toll Road

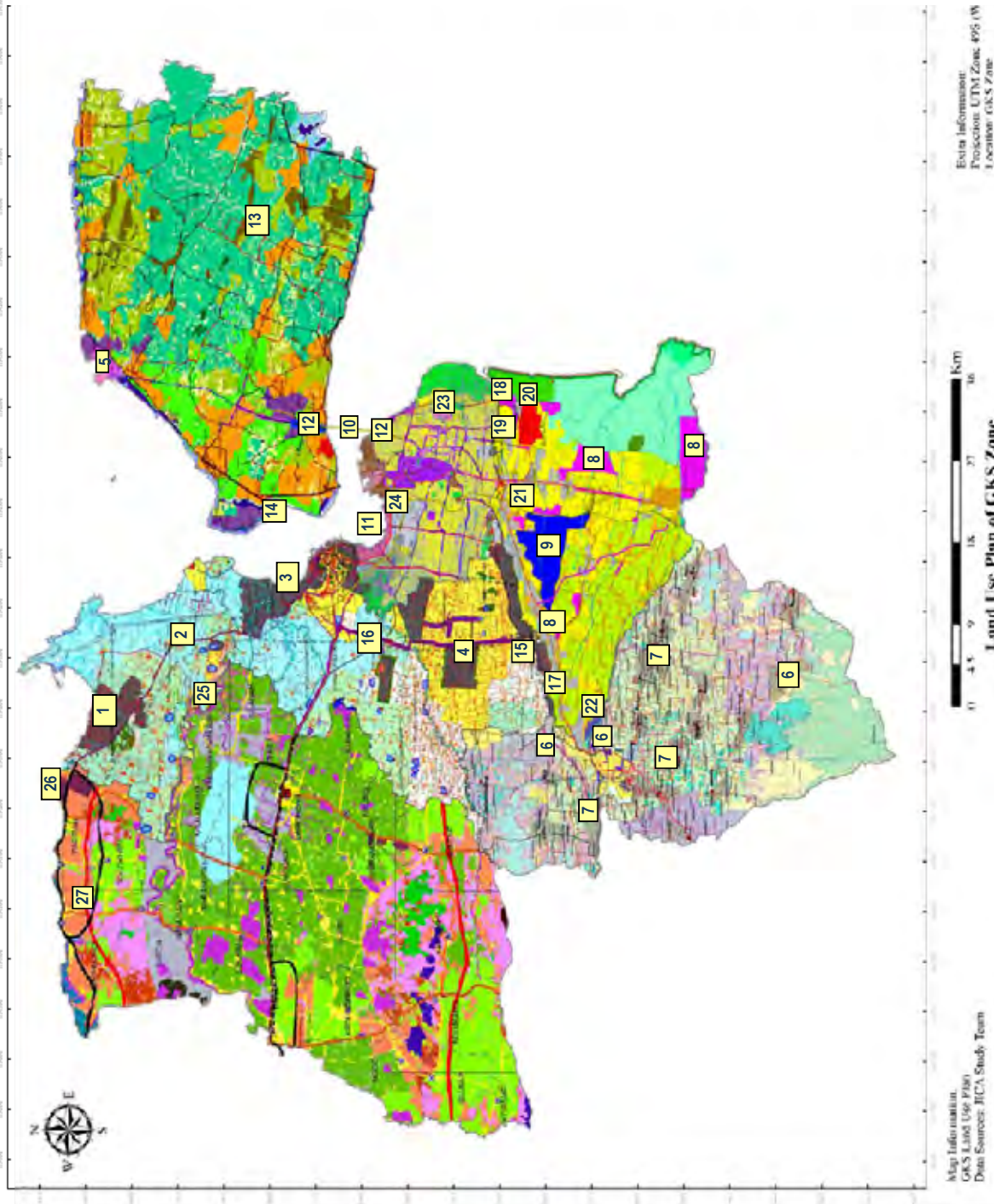


Figure 5.5.2 Large- and Medium Scale Strategic Projects Proposed by Regency Spatial Plans

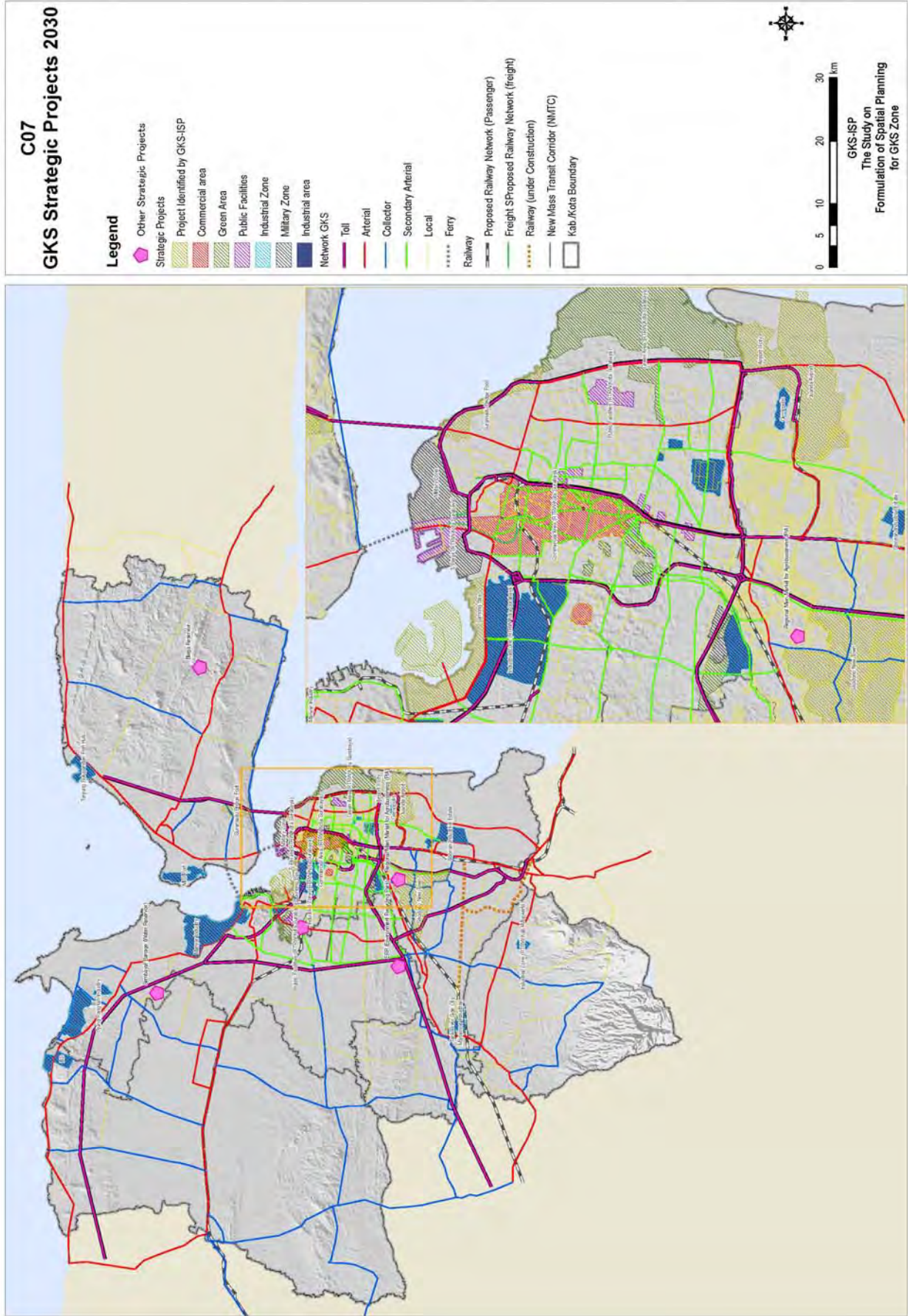


Figure 5.5.3 Proposed Strategic Development Zones towards 2030 in GKS Zone

5.6 Spatial Plan 2030 for GKS Zone

As seen in the other sections, the following were the main components in the delineations of the analyses, directions, components and details of the GKS Spatial Plan, as follows:

- 1) Visions, Policies and Strategies (Section 1.4 and Sections 2.5-2.7)
- 2) SWOT of GKS (Section 2.4)
- 3) Socio-economic Framework in 2030 (Chapter 3)
- 4) Urban Center Hierarchical System (Section 4.1)
- 5) Transportation Network (Section 4.2)
- 6) Infrastructure Network (Sections 4.3-4.7)
- 7) Land Evaluation: Potentials and Constraints (Section 5.1)
- 8) Environmental Management System (Section 5.2)
- 9) Land Use Demand Projection in 2030 (Section 5.3)
- 10) Land Use Plan (Section 5.3)
- 11) Strategic Development Zones (Section 5.4)

Based on all properties above, a spatial plan 2030 in GKS zone is proposed as shown in Figure 5.6.2.

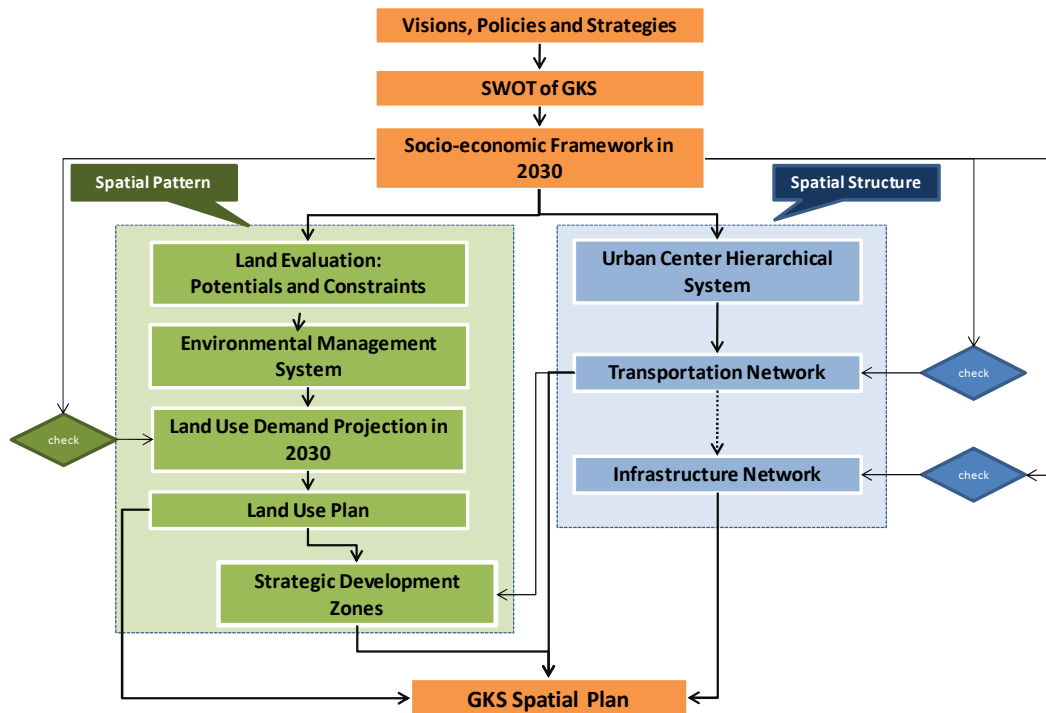


Figure 5.6.1 Logical Process to Formulate GKS Spatial Plan

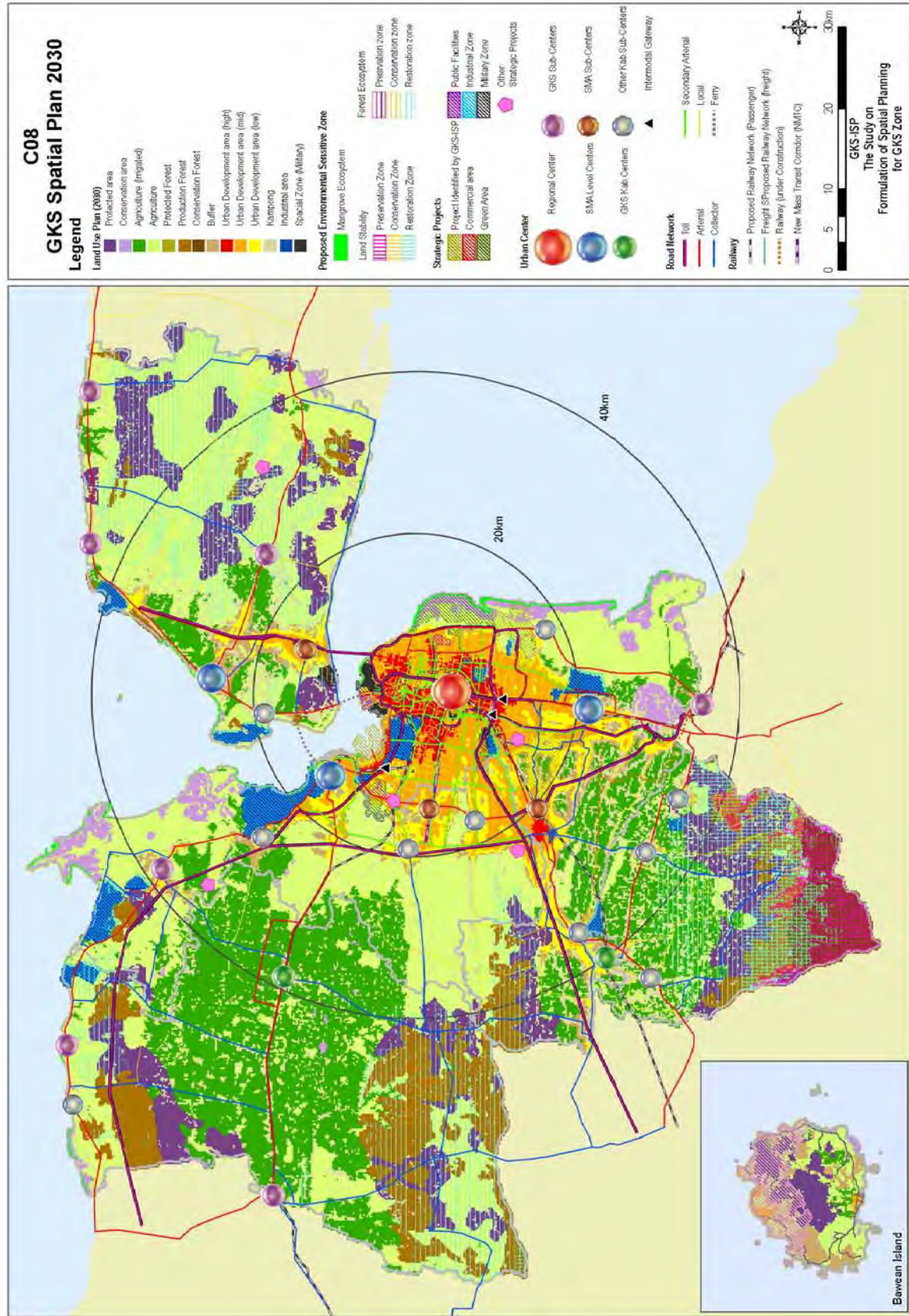


Figure 5.6.2 Proposed GKS Spatial Plan 2030

6. Directions of Spatial Utilization and Control

6.1 Indicative Programs and Projects for GKS Zone Development 2010-2030

The major projects and programs to be implemented in the GKS Spatial Plan 2030, are listed in Table 6.1.1. This list includes the long-term (2008-2030) selected projects in the spatial plans of each kabupaten/kota and those proposed in the GKS spatial plan. However, the list is still indicative and is subject to further clarification among the relevant authorities.

Table 6.1.1 Indicative Key Infrastructure Development Projects for GKS Zone for 2010–2030

No	Main Program	Project	Location	Area (Ha) / Length (Km)	Time Frame	Fund Source	Implementing Agency	Priority (Short-term Projects)
I	Transportation Development (Road Network)	Project No. R1 ; Component(s):PA-04	Gresik–Paciran–Tuban	74.19	2010–2015	Government	Central Government	X
		Project No. R1b ; Component(s):PA-06 PA-07 PA-14	Kenjeran–Rajawali–Gresik	9.27	2010–2015	Government	Central Government	X
		Project No. R1t ; Component(s):TR-02 TR-06	Gresik–Paciran–Tuban (Toll)	80.58	2010–2015	Government-Private Sector	Central & Provincial Government, Private Sector	X
		Project No. R2 ; Component(s):PA-05 PA-16	Gresik–Lamongan–Babat	22.72	2010–2015	Government	Central Government	X
		Project No. R3a ; Component(s):SA-03 SA-15	Rungkut–HR, Mohammad–Lakarsantri	24.21	2010–2015	Government	Kota Surabaya & Kabupaten Gresik	X
		Project No. R4a ; Component(s):PA-10 PA-19	Krian–Mojokerto	28.00	2010–2015	Government	Central Government	X
		Project No. R4b ; Component(s):PC-04 SA-08 SA-18	Gunung Sari–Mastrip– Mojokerto	42.58	2010–2015	Government	Provincial Government & Kota Surabaya & Gresik	X
		Project No. R4t ; Component(s):TR-03	Surabaya–Mojokerto (Toll)	40.98	2010–2015	Government-Private Sector	Central & Provincial Government, Private Sector	X
		Project No. R5c ; Component(s):PA-11 PA-15 SA-20 SA-22 SA-23 SA-25SA-26	Indrapura–A Yani–Porong	28.25	2010–2015	Government	Central Government & Kota Surabaya	X
		Project No. R5d ; Component(s):PA-09 SA-01 SA-13	MERR–Sawotratap–Sidoarjo	19.51	2010–2015	Government	Central Government & Kota Surabaya & Kab. Sidoarjo	X
		Project No. R5t ; Component(s):TR-01 TR-10	Surabaya–Gempol (Toll)	29.39	2010–2015	Government-Private Sector	Central & Provincial Government, Private Sector	X
		Project No. R8 ; Component(s):PA-03 PA-08 PA-18	SERR–Purabaya	22.35	2010–2015	Government	Central Government	X
		Project No. R10b ; Component(s):PA-12	Mojokerto–Gempol	28.10	2010–2015	Government	Central Government	X
		Project No. R14 ; Component(s):PA-13	Romo Kalisari–Benowo– Wringinanom	22.31	2010–2015	Government	Central Government	X
		Project No. R15 ; Component(s):SA-02 SA-17 SA-19 SA-21	Benowo–Banyu Urip–ITS	30.38	2010–2015	Government	Kota Surabaya & Kabupaten Gresik	X
		Project No. R16 ; Component(s):SA-04	Margorejo–Wiyung–Mengan ti	22.22	2010–2015	Government	Kota Surabaya & Kabupaten Gresik	X

No	Main Program	Project	Location	Area (Ha) / Length (Km)	Time Frame	Fund Source	Implementing Agency	Priority (Short-term Projects)
I	Transportation Development (Road Network)	Project No. RB2 ; Component(s):PC-03 PC-12	Bangkalan–Trunojoyo	15.65	2010–2015	Government	Provincial Government	X
		Project No. R1a ; Component(s):SA-24	Ngaglik–Kapas Karampung	1.16	2015–2020	Government	Kota Surabaya	
		Project No. R3 ; Component(s):PC-02 PC-17	Benjeng–Mantup–Ngimbang	63.12	2015–2020	Government	Provincial Government	-
		Project No. R5a ; Component(s):SA-07 SA-16	Simogunung–Sidoarjo	20.38	2015–2020	Government	Kota Surabaya & Kabupaten Sidoarjo	-
		Project No. R6a ; Component(s):PA-17 SA-12	Ngagel Jaya–Puliro Agung Wetan–Kedung Cowek	18.14	2015–2020	Government	Central Government & Kota Surabaya	-
		Project No. R6at ; Component(s):TR-11	Labang–Burneh–Arosbaya	26.08	2015–2020	Government-Private Sector	Central Government, Provincial Government, Private Investor	-
		Project No. R7 ; Component(s):PA-01 PC-01	Kamal–Modung–Blega	90.04	2015–2020	Government	Central Government & Provincial Government	-
		Project No. R8st ; Component(s):TR-04	Perak–Suramadu (Toll)	7.94	2015–2020	Government-Private Sector	Central Government, Provincial Government, Private Investor	-
		Project No. R9 ; Component(s):SA-09	Gresik–Krian	27.03	2015–2020	Government	Kabupaten Gresik & Kabupaten Sidoarjo	-
		Project No. R11 ; Component(s):PC-08 PC-11 PC-18	Mojokerto–Babat–Paciran	102.16	2015–2020	Government	Provincial Government	-
		Project No. R12 ; Component(s):PC-14 SA-11	Margomulyo–Taman–Sidoarjo	21.90	2015–2020	Government	Provincial Government & Kota Surabaya & Kabupaten Sidoarjo	-
		Project No. R13 ; Component(s):SA-10	Lamong Bay–Lakarsantri– Driyorejo	18.10	2015–2020	Government	Kota Surabaya & Kabupaten Gresik & Kabupaten Sidoarjo	-
		Project No. R17 ; Component(s):SA-05 SA-06	Rungkut–Sumur Welut–Menganti	24.77	2015–2020	Government	Kota Surabaya & Kabupaten Gresik	-
Project No. RG2 ; Component(s):SA-14	Gresik Ring Road	20.48	2015–2020	Government	Kabupaten Gresik	-		
Project No. R6 ; Component(s):PA-02	Kamal–Bangkalan–Tg.Bumi	59.36	2020-2030	Government	Central Government	-		
Project No. R8at ; Component(s):TR-05	SERR	16.49	2020–2030	Government-Private Sector	Central & Provincial Government, Private Sector	-		
Project No. R8t ; Component(s):TR-12	Juanda Toll Road–Waru	8.28	2020–2030	Government-Private Sector	Central & Provincial Government, Private Sector	-		

No	Main Program	Project	Location	Area (Ha) / Length (Km)	Time Frame	Fund Source	Implementing Agency	Priority (Short-term Projects)
I	Transportation Development (Road Network) Transportation Development (Port & Harbor)	Project No. R9t ; Component(s):TR-07 TR-09	Driyorejo-Krian-Porong	56.99	2020-2030	Government-Private Sector	Central & Provincial Government, Private Sector	-
		Project No. R10a ; Component(s):PC-07 PC-10	Sidayu-Lamongan-Mojokerto	64.96	2020-2030	Government	Provincial Government	-
		Project No. RB1 ; Component(s):PC-05 PC-06	Tanah Merah-Sepulu Tg.Bumi-Blega	53.08	2020-2030	Government	Provincial Government	-
		Project No. RG1 ; Component(s):PC-21 PC-22	Sidayu-Ujung Pangkah-Panceng	26.95	2020-2030	Government	Provincial Government	-
		Project No. RL1 ; Component(s):PC-19 PC-20	Pucuk-Paciran	42.61	2020-2030	Government	Provincial Government	-
		Project No. RM1 ; Component(s):PC-09 PC-23	Mojosari-Trawas-Sooko	47.24	2020-2030	Government	Provincial Government	-
		Project No. RS2 ; Component(s):PC-15 PC-16	Krian-Wonoayu-Cemeng Kalang	18.49	2020-2030	Government	Provincial Government	-
		Tanjung Bulupandan International Port Hub Development	Klampis + surroundings, Bangkalan	1,000.00	2012-2015	Government & Private	BPWS	X
		Lamong Bay Container Terminal Development	Lamong Bay, Surabaya	55.50	2010-2012	Government	Government Enterprise	X
		Socah Industry Port Development	Socah, Bangkalan	?	2012-2015	Private Sector	Bangkalan Government, Private Sector	X
(Airport)	Expansion of Juanda II International Airport Development	Sedati, Sidoarjo	10.00	2011-2015	Government	Province Government	X	
Transportation Development (Railway System)	Feasibility Study for Commuter Train Operator for Surabaya-Mojokerto and Surabaya-Krian Sections	GKS		2012	Central Government	Ministry of Transportation	X	
	Railway and Commuter Train Planning and Development connecting Waru to Juanda	Sawotratap-Juanda		2012-2014	Central Government	Ministry of Transportation	X	
Transportation Development (Intermodal System)	Juanda-Waru-Wonokromo-Gubeng Commuter Train Connection Planning and Implementation	Waru-Wonokromo-Gubeng		2015-2017	Central Government	Ministry of Transportation	-	
	Intermodal Gateway Center Connecting Sidoarjo-Surabaya	Waru, Surabaya		2015-2016	Central Government	Ministry of Transportation	-	
	Intermodal Gateway Center Connecting Lamongan-Surabaya	Benowo, Surabaya		2017-2018	Central Government	Ministry of Transportation	-	

No	Main Program	Project	Location	Area (Ha) / Length (Km)	Time Frame	Fund Source	Implementing Agency	Priority (Short-term Projects)
		Intermodal Gateway Center Connecting Mojokerto-Surabaya	Sepanjang, Sidoarjo		2019-2020	Central Government	Ministry of Transportation	-
		Intermodal Gateway Center Connecting Gresik-Surabaya	Tambak Oso Wilangun, Surabaya		2021-2022	Central Government	Ministry of Transportation	-
II	Water-related Infrastructure Development	Sembayat Barrage Development	Bungah, Gresik	64.00	2010-2012	Central, Provincial Governments	Ministry of Public Work, Province & Kabb./Kota Gover't	X
			Laren, Lamongan	10.00	2010-2012	Central, Provincial Governments	Ministry of Public Work, Province & Kabb./Kota Gover't	X
		Blega Reservoir Development	Galis, Bangkalan	966.30	2012-2015	Central and Local Governments	Ministry of Public Work, Kabb./Kota Government	X
		Inter-province Water Diversion Project (Umbulan Water Transfer Project & Solo River Water Transfer Project))	Gresik, Sidoarjo, Surabaya, Bangkalan, Lamongan, Pasuruan	-	2012-2015	Government-Private Sector	Ministry of Public Work, Province & Kabb./Kota Gover't	X
		Water Supply Facility Expansion and Non-revenue Water (NRW) Reduction Project	Each PDAM	-	2015-2020	Government-Private Sector	Provincial, Kabb./Kota Governments, PDAM	-
III	Waste Water Treatment and Urban Drainage Development	Water Saving Promotion Program	All GKS Zone	-	2012-2015	Provincial and local governments	Provincial, Kabb./Kota Governments, PDAM	X
		Urban Drainage and Waste Water Disposal Master Plan (Including Capacity Development Program)	Selected urban areas in GKS Zone		2012-2015	Central & Provincial Government	Ministry of Public Work, Provincial and Kabb./Kota Governments, PJT1	X
IV	Solid Waste Infrastructure Development	ERP (Ecological Recycling Park) Development for Gresik-Sidoarjo-Surabaya	Kedamean, Gresik	120.00	2011-2015	Government-Private Sector	Province and Local Public Work Agency, Private Sector	X
		Improvement and Expansion of Existing SWM Facilities (including closure project of landfill sites)	GKS	-	2011-2015	Government-Private Sector	Province and Local Public Work Agency, Private Sector	X
		Disposal Capacity Development Program (including 3Rs facilities, Intermediate Transfer System, Technology Innovation for SWM, etc)	GKS	-	2012-2015	Government-Private Sector	Province and Local Public Work Agency, and Private Sector	X
V	Power	Power Supply Enhancement Program towards 2020 (including: Capacity enhancement of Peak Load, Distribution Network and Transformers)	GKS and Other Parts of East Java	-	2010-2020	PLN East Java	PLN East Java	-

No	Main Program	Project	Location	Area (Ha) / Length (Km)	Time Frame	Fund Source	Implementing Agency	Priority (Short-term Projects)
		Alternative and Renewable Energy System Development Program	East Java and over the Nation	-	2010-2030	PLN, Private Sector, International Organizations	Central Government, PLN, Private Sector	X
VI	Controlled Industrial Zone Development	Agro-industry Zone Developments	Ujung Pangkah, Gresik	4,984	2010-2015	Government-Private Sector	Local Government-Private Sector	X
		Industrial Zone Development	Manyar, Gresik	1,489	2015-2020	Public and Private Enterprise	Public and Private Enterprise	-
		Sidayu Industrial Park	Sidayu, Gresik	1,000	2020-2030	Public and Private Enterprise	Public and Private Enterprise	-
		Ngoro Industrial Park	Ngoro, Mojokerto	440	2010-2015	Private Sector	Private Sector	X
		Puspa Agro Regional Market Development	Jemundo, Sidoarjo	50	2010-2015	Government-Private Sector	Public and Private Enterprise	X
		Siborian Industrial Estate and Zone Development	Sidoarjo-Krian	1,500	2012-2025	Government-Private Sector	Public and Private Enterprise	X
		Pengembangan Industri Gemopolis	Sedati, Sidoarjo	300	2015-2017	Government-Private Sector	Public and Private Enterprise	-
VII	Tourism	Lamongan Integrated Shore-base	Paciran, Lamongan	100	2010-2012	Private Sector	Private Sector	X
		Mojoanyar Industrial Estate	Mojoanyar, Mojokerto	555	2015-2020	Private Sector	Private Sector	-
		R&D Center for Agro-processing and Fishery Products and Market Development	Mojokerto, Sidoarjo	Each 50	2012-2015	Government-Private Sector	Public and Private Enterprise	X
		GKS Tourism Circuits Development, networking historical and natural assets (including: tourism spots, information centers, eco-tourism site development)	Surabaya, Mojokerto, Sidoarjo, Gresik	-	2012-2015	Government-Private Sector	Public and Private Enterprise	X
		New Tourism Area Development in Suramadu Bridge Foot Area Project	Surabaya, Bangkalan	-	2015-200	Government-Private Sector	BPWS, Provincial and Kab./Kota Governments	-
		Tarik Riverside City	Tarik, Sidoarjo	300	2015-	Private Sector	Kab./Kota Government, Private Sector	-
		Waterfront Residential Settlement Development	Teluk Lamong, Pantai Timur, Surabaya	400	2015-	Private Sector	Kab./Kota Government, Private Sector	-
VIII	Large-scale Settlements Development	New Housing Complex Development	Driyorejo, Kedamean, Menganti, Cerme	4,000	2020-	Private Sector	Kab./Kota Government, Private Sector	-

No	Main Program	Project	Location	Area (Ha) / Length (Km)	Time Frame	Fund Source	Implementing Agency	Priority (Short-term Projects)
IX	Suramadu Bridge Foot Zone Development	Suramadu Bridge Foot for Bangkalan Zone Development	Labang, Bangkalan	600	2011-2030	BPWS-Private Sector	BPWS, Provincial and Kab//Kota Governments	X
		Suramadu Bridge Foot for Surabaya Zone Development	Tambak Wedi, Surabaya	600	2011-2030	BPWS-Private Sector	BPWS, Provincial and Kab//Kota Governments	X
X	Environmental Management	Comprehensive Program for Capability Building and Strengthening of the Environmental Management in the GKS Zone, including: 1) Establishment of a GKS Council for Environment; 2) Environmental Policy Building; 3) Research of biodiversity status; 4) Establishment of a GKS Protected Area and Management Plan.	GKS		2011-2020	Central and Local Governments	Provincial and Kab//Kota Governments	X
XI	Housing and Social Services	Expanding Implementation of the Comprehensive KIP Program	Selected Kab/Kota other than Surabaya		2012-2020	Governments-Private Sector	Provincial and Kab//Kota Governments	X
		Establishment of Local Institution and Funding Mechanism for Housing Development and Management, including community-driven self-help activities based on a "Tridaya" concept.	GKS, East Java		2012-2015	Central and Provincial Government-Private Sector	Provincial and Kab//Kota Governments, Private Sector	X
		Development of a Hierarchical Park System and Green Network	Each Kab/Kota		2015-2030	Provincial and Kab/Kota Governments, Private Sector	Provincial and Kab//Kota Governments	-
XII	Institutional Development	Establishment of "the GKS Development Cooperation Board" for inter-regency coordination of development	GKS		2011-2012	BKSP GKS	BKSP GKS, Province Government	X
		Training of Spatial Planning and Development of GKS Zone Management	GKS		2011-2015	BKSP GKS	BKSP GKS, Province Government, University	X
		Training for Human Resource Capacity Building of GKS Institution Management to Improve Carrier Ladder	GKS		2011-2030	BKSP GKS	BKSP GKS, Perguruan Tinggi, Pemprov Jatim	
		Training for Cooperation Development Capacity (every two years)	GKS		2011-2030	BKSP GKS	BKSP GKS	X

No	Main Program	Project	Location	Area (Ha) / Length (Km)	Time Frame	Fund Source	Implementing Agency	Priority (Short-term Projects)
XIII	Community-based Economic, Social & Cultural Development	Socio-cultural Rehabilitation for Community impacted by Project Economic Rehabilitation for Community impacted by Project	Each location impacted by project Each location impacted by project		2011–2030 2011–2030	Government-Private Sector Government-Private Sector	BKSP GKS; Central, Province and Kab/Kota Governments BKSP GKS; Central, Province and Kab/Kota Governments	X X
XIV	Capacity Development of the Governance	Economic Capacity Improvement for Local Government through Cooperation Development Activity Monitoring, Evaluation and Control	Each Kabbb./Kota Each project		2011–2030 2011–2030	Government-Private Sector BKSP GKS	Government-Private Sector Inspector, Public	X X

Source: JICA Study Team and Spatial Planning Document of each Kabupaten/Kota in GKS Zone (2008–2030) and The Study of Spatial Planning for GKS Zone 2010–2030

6.2 Control Measures for Spatial Utilization

6.2.1 Rationales

According to Law No. 26, 2007, on spatial planning, zoning regulation is a tool to enforce spatial utilization controls, and that zoning policies should be coherent with the detailed plans of each spatial utilization zone, which implies that regulatory directions of the GKS Zone should cohere with East Java's spatial policies. However, the GKS spatial plan requires the exploration of unique regulations, taking into account the following requirements given to GKS Zone:

- Enhancement of the development of a guided urban growth toward "**Compact City**;"
- Enforce "**Regulations of Land Use Zoning**" for land use management in urbanized or to-be-urbanized areas, stipulating guidelines for land use, land development and physical conditions of buildings and facilities to be newly constructed; and,
- Preparation of **physical regulation** on building construction in accordance with building codes, e.g. building configurations,, floor-area ratios, building coverage ratios, set-backs, etc.

6.2.2 Regulatory Framework for Development Management

The GKS spatial plan has a proposed land use zoning system, as discussed in Section 5.4, Chapter 5, which classified 10 categories of land uses, with the most crucial being the effective management of environmentally sensitive areas against unguided development activities and inappropriate land conversions. In this aspect the following actions are particularly essential:

- 1) Establishment of a legal enforcement system to protect "protection zones" and control inappropriate activities in this zone;
- 2) Provision of a detailed management mechanism for "forest areas", as designated by law, in terms of permissible social, commercial and industrial activities in conservation forest and production forest;
- 3) Establishment of guidelines for permissible and non-permissible land use conversion of irrigated agricultural lands, taking into account existing laws and regulations;
- 4) Provision of housing development guidelines that should be complied in the "urban development zone", in terms of building code, design standard of land uses, utility service facilities to be provided and official engineering inspections;
- 5) Provision of industrial development guidelines for factories to be located in "industrial zones", including environmental quality standards for air emission, wastewater discharge, drainage system, truck access, vibration and noise generation and greenery within the location territory.

A basic framework of administrative tools for land development and spatial utilization control is indicated in Table 6.2.1. One effective administrative tool is a dual-effect tactic: say, promotion and restriction; incentive and disincentive; or fear and favor. The table shows three such administrative tools: 1) general directions on permission issuance, 2) provision of incentives/disincentives and 3) imposition of sanction for land use, land development and use of spatial resource.

Table 6.2.1 Administrative Tools for Land Development and Spatial Utilization Control

Permission Issuance	Incentive/Disincentive Provision	Imposition of Sanction
<ul style="list-style-type: none"> All spatial utilization should obtain the Spatial Utilization Permit in accordance with the Detailed Spatial Plan and Zoning Permit by the respective local government. Spatial Utilization Permit is regulated by the provincial and local governments in compliance with related laws. 	<ul style="list-style-type: none"> Incentives and disincentives should be provided in accordance with laws and regulations for the utilization of spatial activities in line with spatial planning. Incentives or disincentives can be given by: <ul style="list-style-type: none"> Central Government to Local Government; Government to Private/Community Group; Local government to Local Government; Local Government to Private/Community Group Tax holidays, subsidy schemes, and preferential usage of public services are typical incentives. Taxation, a surcharge system on activities and physical restriction on building and development activities are disincentives. 	<ul style="list-style-type: none"> Sanctions are determined by the central government and respective local governments, based on their authority and the financial loss value caused by the activity. Sanctions are applied on spatial utilization activities that intentionally violates the Spatial Structure Plan and Spatial Pattern Plan of GKS Zone.

Source: JICA Study Team

6.3 Strategic Environmental Assessment (SEA)

6.3.1 Rationales of SEA

Law No. 32, 2009, the Protection and Management of the Environment, mandates the utilization of a strategic environmental assessment (SEA) in the formulation of plans or policies, and it requires the national and local governments to conduct a SEA in the formulation of any of the following plans:

- Regional spatial plan (RTRW) along with detailed plans, long-term plans (RPJP), and the medium-term development plan (RPJM) by the national, provincial, and district/city governments; and
- Policies, plans and/or programs that will potentially cause environmental risks.

Ministry of Environment requires Strategic Environmental Assessment (SEA) as mandated under Law No. 27, 2009, through enforcement by the Ministry of Environment, provides the implementing guidelines in carrying out a SEA or an environmental impact assessment (EIA) among national and/or local governments and agencies. Law No. 27 defines SEA as:

- A process of integrating environmentally sustainable development in the decision-making processes, especially among relevant policies, plans, and programs;
- A series of systematic which are holistic and participatory that would ensure that the principles of sustainable development would become a basic and integral factor regional development policies, plans and program; and,
- A self-assessment that determines to what extent the proposed policies, plans and programs proposed by the central and/or local governments, are based on sustainability and how they will affect economic, social and other environmental issues.

However, the implementing guidelines under Law No. 27, lacks a detailed SEA process and methodology.

The provincial government conducted a trial SEA on the GKS spatial plan. A task force and the JICA Study Team developed a methodology and assessment criteria, which were aided by a series of workshops on the GKS SEA. It should be noted that considering the constraints and

limitations, the GKS SEA was not a definitive assessment of the GKS-ISP 2030 but rather allowed the necessary discourse on relevant policies plans, proposals and other contentious issues relative to the implementation of a SEA.

6.3.2 Methodology

(1) Overall Procedure

Being relatively nascent in Indonesia, wherein its corresponding laws and its implementing guidelines are still vague and new, Indonesia has yet to develop a definitive procedure and criteria on a SEA process. The strategic environmental assessment on the GKS spatial plan was conducted with reference to other countries' SEA experiences and was done in the following manner:

- 1) **Screening and Scoping:** The SEA context and objectives were laid down, key environmental issues were identified, and specific stakeholders were identified.
- 2) **Implementing the SEA:** Baseline data were reviewed and collected, impact sources are identified, and the soundness of GKS policies and plans were assessed.
- 3) **Mitigation Measure:** Mitigation measures were identified to counter the environmental problems assessed in the GKS land use policies and plans,. Recommendations were basically on how to enhance opportunities and mitigate impacts.

(2) Sustainability Principle

Law 32, 2009, lays down the environmental sustainability principle, a principle which was adhered to in the conduct of the GKS, and which is translatable into the following elements:

- **Interdependency**, emphasizing the linkage between local, national, regional and global sectors or between biophysical variables;
- **Equilibrium**, the application of balance among aspects, or interests, or between the magnitude of development and the carrying capacity of environment, a balance between the protection and the recovery of natural resources, and a balance between utilization of space and the management capacity; and
- **Justice**, emphasizing policies that do not result in access restrictions and control over natural resources only to a particular group of people or interests.

(3) Participatory Approach

To ensure a participatory approach, a GKS SEA Task Force Team was organized with nine members coming from various government agencies and institutions:

- Department of Environment, East Java
- Department of Spatial Planning
- Department of Development Planning
- Department of Forest
- Department of Agriculture
- ITS Surabaya (University)
- Dewan Kota (NGO)

(4) Series of Workshops and Small Group Discussions

A series of workshop and small group discussions were organized to aid in the assessment of the GKS spatial plan 2030. The activities had clear-cut objectives, as shown in Table 6.3.1.

Table 6.3.1 Schedule of Workshop Series

Date	Activity	Objectives
March 05	SEA Screening and Objective Setting	To determine the context, objectives and appropriateness and relevance of SEA in relation to the development of GKS Spatial Plan
June 15	SEA Scoping	To clarify the target of the SEA, identify relevant criteria and to identify stakeholders.
June 18	SWOT Analysis	To clarify and collect additional baseline data
June 22	Assessment	To identify environmental impact of GKS Land Use Policy 2030 and determine how to mitigate its impacts
June 29	Assessment	To identify environmental impact of GKS Land Use Plan 2030 and determine how to mitigate its impacts
July 05	Assessment	To identify environmental impact of special land use development patterns and determine how to mitigate its impacts

Source: JICA Study Team

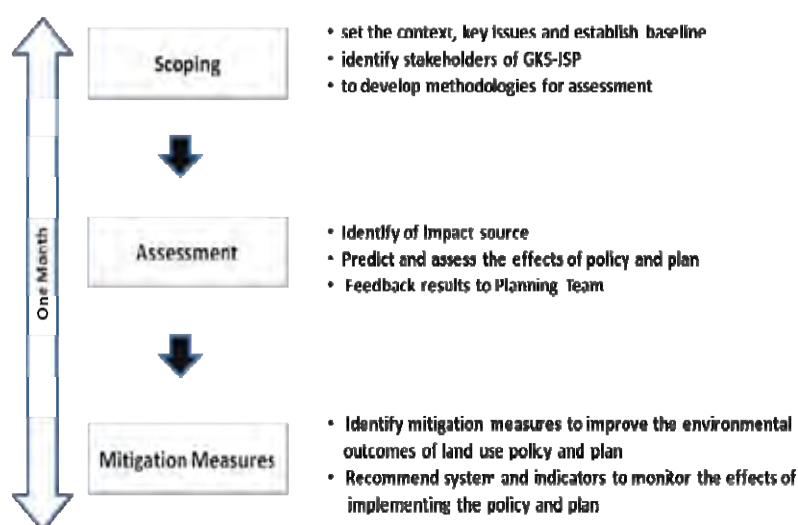


Figure 6.3.1 SEA Process for GKS Spatial Planning

6.3.3 Results

(1) Establishing the Context of GKS SEA

In the scoping process, selected controversial policies and proposals on land use in the GKS Spatial Structure 2030 were assessed, based on the expertise and professional insights of the task force members. The assessment mainly dwelt on qualitative rather than quantitative analysis on the environmental impacts. The targets were as follows:

- GKS SEA Objectives
 - Contribute to the early integration of environmental issues into the preparation of the GKS Spatial Plan;
 - Assess the targets of the GKS spatial plan of its environmental impact;

- Indicate how improvements can be incorporated into the plan to finetune its environmental performance; and,
 - Provide a level of environmental protection and facilitate the sustainable development outcomes of the GKS spatial plan.
- GKS SEA Target Areas

The GKS SEA will provide environmental impact assessment on crucial and controversial policies and plans in the GKS spatial plan through the following target areas:

Policy Level: Assessment of the compact city concept and its attributes, such as high urban amenities, smooth accessibility, and harmony between the urban and rural areas, etc.

Plan Level: Rationalization of the population and economic projections in 2030 and changes in land use patterns, especially agricultural land conversions, etc.

Spatial Development Pattern: Evaluation of the environmental impacts of the large-scale mid-term development projects proposed by the respective kota/kabupaten such as: 1) industrial development; 2) human settlement development; and 3) natural resource development (water reservoir).

(2) Identifying Key Environmental Issues

Two processes were conducted to identify key environmental issues, namely: a) a review of the JICA Reports; and b) a SWOT analysis participated in by the GKS SEA Task Force. The following were the identified key environmental issues:

- Surabaya's population spilling over to Sidoarjo, Gresik and Mojokerto and creating sprawling. A 2.8% population growth of Bangkalan is expected to increase rapidly in the next 2-5 years due to the opening of the Suramadu Bridge;
- Increasing trend in illegal and inappropriate land conversions particularly of agricultural lands, either for urban or industrial use;
- Urbanization and uneven distribution of people across the GKS, leading to the proliferation of slums, lack of public facilities, such as public transport and road networks, traffic congestion and increasing waste generation; and,
- Increasing water and air pollution from industries across the GKS Zone.

(3) Highlights of Assessment Results

As a summary of SEA process, the following points were highlighted for the three target issues, namely 1) land use policy, 2) the land use plan and 3) spatial development pattern. These target issues should be taken into account for the finalization of GKS Spatial Planning.

1) Land Use Policy

- The proposed policy is likely to have a neutral, or minor, adverse impact base on the identified parameters.
- The policy may lead to significant positive effects in the improvement of land resource efficiency.
- The compact city concept will lead to the intensification of development, thereby leading to high population density distributions. Thus, questions arose whether the concept is appropriate alternative for GKS, or will it contribute the GKS goal of sustainability.
- This policy is politically-sensitive and the weak legal environmental framework in the

7. INSTITUTIONAL ISSUES FOR IMPLEMENTATION OF GKS SPATIAL PLAN

7.1 Organizational Mechanism for Coordination and Cooperation

7.1.1 Current Issues

The most important is to implement the spatial plan in practice as planned, not necessarily to build a rational plan (???Note: sentence is vague maybe it can be removed). The indispensable points in organizational mechanism are cohesion of vision, coordination among local governments, and vision sharing. And aside from such vertical coordination, a horizontal cooperation among relevant local agencies is also important to realize equitable development at the local level. But the ideal aside, reality has borne various issues that hobble ideal cooperation among government units and agencies, such as.

- The lack of a coordinating body has resulted in redundancies and duplications among local governments and agencies;
- In the context of decentralization, the focus on policy development, technical assistance, capacity-building and socialization of policies is appropriate. But evidence show that these actions are mere marginal parts of the national budget;
- The root problem in coordination and accountability is the lack of a sector-wide agreement among institutions on the various programs and roles for which they are responsible;
- The narrow administrative boundaries among local governments and the limited role of provincial governments have led to suboptimal investment decisions from the regional and national perspectives; and,
- There is a lack of a coordination between the central and local governments (the province and regencies) in terms of project formulation, budgetary priority and implementation timing.

7.1.2 Existing Legal Basis for Inter-governmental Coordination and Cooperation

Among the general coordinative rigmarole are some noteworthy legal decrees such as **Government Regulation No.50, 2007** which lays down the implementation procedure for cooperation among local governments, and another is **Government Regulation No.19, 2010** which defines the procedures, tasks, authority, and financial authority of the governor as central government representative. The latter is particularly important, in strengthening the provincial government's role and responsibilities. This regulation uniquely stipulates that although the provincial governor is elected by the local people, he/she is an agent of the central government. This means that the provincial government is the nexus in the top-down and bottom-up policies.

The following are other significant legal decrees on inter-governmental coordination:

- Government Regulation No.25, 2000 about the Central Government and Provincial Authority;
- Government Regulation No.38 2007 about Governmental Authority division among the Government, Provincial Government and Regency / City;
- Government Regulation No. 41, 2007 about Local Government Institution Organization;
- Ministry of Home Affairs Regulation No. 69, 2007 about Urban Development Cooperation;

- Ministry of Home Affairs Regulation No.22, 2009 about Local Cooperation;
- East Java Governor Decree No.188/47/KPTS/2009 about the East Java Province Regional Spatial Planning Coordinating Board

7.1.3 Establishment of “GKS Development Cooperation Board”

(1) Rationale

As recognition of the important role the provincial government plays in the implementation of the spatial plan, the **GKS Development Cooperation Board** (GKS-DCB) will be organized. GKS-DCB will function as a nexus in the vertical-horizontal flow of policies and actions in the pursuit of the GKS Zone development, as shown in Figure 7.1.1. The board is an institutional organization working within current legal frameworks, governor decrees, and existing laws/regulations.

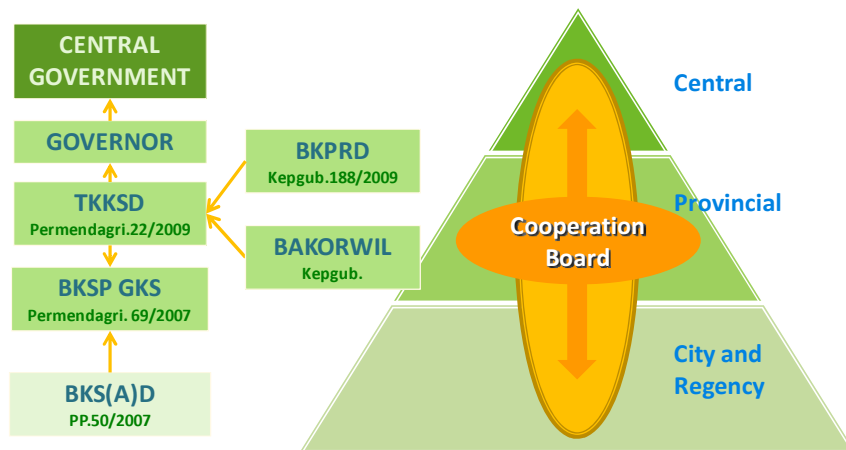


Figure 7.1.1 GKS-Cooperation Board's Function for Inter-governmental Cooperation

(2) Expected Functions

GKS-DCB will have the following functions:

- Conduct strategic development programs as a development entity of the National Strategic Zone, and as required by central government to speed-up national economic growth;
- An assembly of officials and local government representatives in charge of planning and budgeting for development to share inter-government policies, project budgeting priority, executing capacity building and so on;
- Play an important role in facilitating cooperation among local governments and cross-boundary development programs, and undertake countermeasure against unresolved regional infrastructure problems such as:
 - Inter-city road development;
 - River management and environment;
 - Water-supply system development;
 - Drainage and sewerage system development;
 - Solid waste management system improvement (for treatment of hazardous/hospital waste and final disposal sites management in particular);

- Fire-fighting system development;
- Environmental monitoring system;
- New housing and industrial projects to be located in cross-boundary area; and,
- Training program for capacity development of planning officials.

(3) Organizational Structure

The organizational structure of the GKS-DCB is shown in Figure 7.1.2, and it is characterized as follows:

- 1) A Steering Committee will be established outside GKS-DCB to direct the board's decision-making process. Members of the steering committee will be representatives from BAPPENAS, Ministry of Public Works at the central level, and the provincial government and the kota/kabupaten mayors in the GKS Zone.



Source: Outcomes of Workshop on Institutional Reform conducted by JICA Study Team and PU Counterpart Team

Figure 7.1.2 Organizational Structure of GKS Development Cooperation Board (proposed)

- 2) The chairperson will be the BAPPEDA provincial director, while the co-chair will be the head of East Java Public Works, Human Settlement and Spatial Planning Agency. The secretariat will be composed representatives from the cooperation bureau, economic bureau, development administration bureau, the provincial environmental board, and representatives of private associations and the academe.
- 3) Its functions will be supported by three working divisions, namely, Physical and Environment Division; Social Culture Division and Economic Division. These divisions will be responsible for sector projects and programs. Moreover, an Inspection Unit shall be set forth with an independent monitoring power.

7.2 Financial Issues on Strengthening Local Initiatives

7.2.1 Current Issues

In theory, decentralization has given local governments financial autonomy, however, in practice local governments are still dependent on the central government for subsidies and budget allocations. the following problems still prevail in the dichotomy between autonomy and central governance:

- While many institutions have a mandate to monitor sector outcomes, few are financially capable of doing so;
- Strengthening financial capacity of local governments is crucial to carry out their development projects, but no substantial policies have been undertaken for this purpose; and,
- Local government's financing capacity should be further addressed by the central government through the decentralization context.

A variety of funding mechanisms could be available for infrastructure development and services if the private sector will be allowed to take part in them through public-private partnership (PPP) schemes. Practical PPP models should be explored for the GKS spatial development.

7.2.2 Available Funding Schemes

(1) Public Debt Financing

Initial investments on public services were made through a variety of loans sourced from the commercial banks, capital market and/or external aid money, i.e. ODA (Official Development Assistance).

"Incentives for Tax Exemption" is usually applied to reduce a borrower's cost burden of the interest rate and the amount of installments..

(2) Private-Public Equity Financing

PPP aims to combine benefits of the private sector participation (i.e. capital, technology, management skills) with the advantages of government authority (i.e. resources, power, public trust, etc.). Broad PPP schemes has a variety of mechanisms, such as:

- Joint-venture, based on SPC (special purpose company) system;
- Concessionaire: Service Contract, Management Contract and/or Leasing Contract

- Privatization: through BOT (Build-Operate-Transfer)and/or BOO (Build-Operate-Own)
- Divestiture: the private sector takes over the entire control of the entity by buying all the government assets.

(3) Capital Procurement at Bond Market

Along with improving its credibility Indonesia's issuance of the "Surabaya City Development Bond" will be able to procure necessary project capital through the bond market. This approach will be popular as financial institutes become mature in Indonesia.¹ To this end, the central government should explore a policy to realize such an autonomous fund raising system by the local governments.

7.2.3 Proposed Measures for Financial Enhancement

Issues on capacity strengthening are not a local issue, but a vital national issue, which means that substantial discourse is expected at the national level. In this regard, the following were the proposed measures:

- Facilitate "**taxation reform**" to strengthen the local government's financing capacity;
- Establish "**Local Development Fund**" to be earmarked for the implementation of priority projects and programs by local initiatives; and,
- To explore issuance of "**East Java Development Bonds**" at international bond markets with the central government's endorsement for PPP projects in particular.

7.3 Capacity Building Programs

7.3.1 Current Issues

Changes in social systems make public services and public servants more demand-driven and community-responsive, but the administrative system to do so is still weak. Dinas agencies prepare their individual budgets and renstras (policy documents), with little outside consultation compete with each other for limited resources. Budgets are still decided at the kabupaten-level which entails lobbying the Bappeda, the regent's office (Sekda) and local councils (DPRD). To build a demand-driven and community-responsive system at the government sector, human capacity should also be built. Looking into current situation, the following issues are still prevalent :

- There is a mismatch between required skills (i.e. program planning and evaluation) and what is available at regency and provincial levels;
- There is an almost complete absence of in-service training for staff at all levels, especially at the regency and provincial levels; and
- There is a huge expectation for young technical staffs to be more professional and knowledgeable in planning and management.

¹ Issuance of city bonds at international bond markets was popular in Kobe City and Yokohama City, Japan, in order for them to procure a huge amount of capitals for large-scale economic infrastructures in their growing process in 1970s.

7.3.2 Proposed Measures for Capacity Building

Although a carrier development program has been instituted in Indonesia, there is still room to meet the increasing need for professional and managerial capacities in planning and development administration. Two measures are proposed:

- To refine the existing **carrier-ladder mechanism** and allocate a special budget for capacity development programs for young technical staffs at the provincial and regency levels;
- To prepare **periodical training courses** for managerial officials to keep up with technical and administrative knowledge on global issues as well as up-to-date vital issues. A training module to enhance spatial planning administration is proposed, as shown in Table 7.3.1 while a refresher program for managerial officials is shown in Table 7.3.2.

Table 7.3.1 Professional Training Module for Spatial Planning Administration

Training Module	Sub-Module	Duration Plan
1. Overview of Spatial Planning	Introduction of GKS Spatial Planning	2 days
2. Spatial Structure Plan	Urban system planning, urban-rural-linkage system, infrastructure network system, etc.	3 days
3. Spatial Pattern Plan	Reservation and conservation zone, agriculture and cultivation zone, urban land use development zone	5 days
4. Spatial Utilization Direction and Control Direction	Middle to long term project plan, zoning regulation direction, permit direction, incentive and disincentive, and sanction direction	5 days
5. Institution Development	Institution and linkage, organization structure, capacity development, financing mechanism, cooperation strategy	3 days

Source: JICA Study Team

Table 7.3.2 Refresher Programs for Managerial Class

Training Level	Focus and Content	Duration Plan
Top administrators	Policy oriented seminars, workshops on new developments and managerial aids	3 days
Senior level officers	Advanced general management training, refresher courses on new developments	1-2 months
Middle level officers	Specialized programs in functions such as finance, personnel, new management systems and tools, sectors development program	6 months to 18 months (degree prog)
New junior staff	General induction, training in public administration and management with emphasis on field work and specific functions	6 months
Lower-level employees	Work skills and knowledge of procedures and functions	1 month

Source: JICA Study Team

8. The Way Forward

The GKS Zone is a regional economic unit endowed with sufficient resources; its spatial sphere encompasses a 50 km radius. The Surabaya Metropolitan Area (SMA), the core part of the GKS Zone, covers a 20 km radius and has a “compact city” attributes. The SMA, being the second largest urban cluster in Indonesia, has great promise in becoming an economic powerhouse in Indonesia.

Strategic resource allocation into the SMA and GKS, in the medium term, is a feasible policy from a national development point of view; and to realize this, the enhancement of the zones' gateway functions will be critical, especially the expansion of the capacities of its ports and airport(s).

The fleshing out of the spatial plan for GKS revealed that the zone has ample natural attributes and environmental resources that merit protection and conservation through proper management practices. Likewise, its agricultural area holds great potential, and if tended sustainably through sound water management, conscientious land conversion, etc, it will yield robust contribution to the national food security program. An add-on is the large potentials of its auxiliary sectors, such as agro-processing and agro-product diversification, i.e., animal husbandry, fishery, and various other enterprises that will make the zone a well-designed economic, industrial, and agricultural cluster with active agropolitan units, vibrant urban centers, green spaces, well-defined transportation modalities, etc.

This Final Report is a compendium of the major outcomes and recommendations from the spatial plan, which was carried out giving due consideration to striking a balance between economic growth and environmental protection through the vision “Green, Growing, Global GKS.” A vision which is aggregated in the far-ranging strategies and comprehensive measures presented in this report. Although the documentation of the report and the manner of presentation basically followed government guidelines, it could be said that the spatial planning still has room for improvement.

Thus, the report is subject to further clarification by relevant agencies and authorities concerned for the official approval in accordance with the Spatial Planning Law (Law No. 26/2007). Through the process, the Spatial Plan for the GKS Zone 2030 shall be a definitive tool and guide on sustainable development for the people and the government not only in the GKS Zone, but also in Indonesia as a whole.

ANNEX

Relevant Basic Laws to Spatial Planning for GKS Zone

- 1) Law Number 5 Year 1960 about Basic Regulation of Agrarian Affairs (State Gazette of the Republic of Indonesia Year 1960 Number 104, Additional State Gazette of the Republic of Indonesia Number 2043);
- 2) Law Number 5 Year 1984 about Industry Affair (State Gazette of the Republic of Indonesia Year 1984 Number 22, Supplementary State Gazette of the Republic of Indonesia Number 3274);
- 3) Law Number 5 Year 1990 about Conservation of Natural Resources and Ecosystems (State Gazette of the Republic of Indonesia Year 1990 Number 49, Supplementary State Gazette of the Republic of Indonesia Number 3419);
- 4) Law Number 4 Gazette 1992 about Housing and Settlement (State Gazette of the Republic of Indonesia Year 1992 Number 23, Supplementary State Gazette of the Republic of Indonesia Number 3469);
- 5) Law Number 5 Year 1992 about Objects of Cultural Property (State Gazette of the Republic of Indonesia Year 1992 Number 27, Supplementary State Gazette of the Republic of Indonesia Number 3470);
- 6) Law Number 12 Year 1992 about Plant Cultivation System (State Gazette of the Republic of Indonesia Year 1992 Number 46, Supplementary State Gazette of the Republic of Indonesia Number 3478);
- 7) Law Number 36 Year 1999 about Telecommunications (State Gazette of the Republic of Indonesia Year 1999 Number 154, Additional State Gazette of the Republic of Indonesia Number 3881);
- 8) Law Number 41 Year 1999 about Forestry (State Gazette of the Republic of Indonesia Year 1999 Number 167, Additional State Gazette of the Republic of Indonesia Number 3888) as amended by Law No. 19 Year 2004 concerning Determination of Government Regulation No. 1 Year 2004 regarding Amendment on Law Number 41 Year 1999 about Forestry to be a Law (State Gazette of the Republic of Indonesia Year 2004 Number 86, Supplementary State Gazette of the Republic of Indonesia Number 4412);
- 9) Law Number 22 Year 2001 about Oil and Gas (State Gazette of the Republic of Indonesia Year 2001 Number 136, Additional State Gazette of the Republic of Indonesia Number 4152);
- 10) Law Number 3 Year 2002 about Defense (State Gazette of the Republic of Indonesia Year 2002 Number 3, Gazette of the Republic of Indonesia Number 4169);
- 11) Law Number 28 Year 2002 about Buildings (State Gazette of the Republic of Indonesia Year 2002 Number 134, Additional State Gazette of the Republic of Indonesia Number 4247);
- 12) Law Number 27 Year 2003 about Geothermal (State Gazette of the Republic of Indonesia Year 2003 Number 115, Additional State Gazette of the Republic of Indonesia Number 4327);
- 13) Law Number 7 Year 2004 about Water Resources (State Gazette of the Republic of Indonesia Year 2004 Number 32, Supplementary State Gazette of the Republic of Indonesia Number 4377);
- 14) Law Number 18 Year 2004 about Plantation (State Gazette of the Republic of Indonesia Year 2004 Number 84, Supplementary State Gazette of the Republic of Indonesia Number 4411);

- 15) Law Number 31 Year 2004 about Fisheries (State Gazette of the Republic of Indonesia Year 2004 Number 118, Supplementary State Gazette of the Republic of Indonesia Number 4433) as amended by Law Number 45 Year 2009 regarding Amendment on Law Number 31 Year 2004 on Fisheries (State Gazette of the Republic of Indonesia Year 2009 Number 154, Gazette of the Republic of Indonesia Number 5073);
- 16) Law Number 32 Year 2004 about Local Government (State Gazette of the Republic of Indonesia Year 2004 Number 125, Supplementary State Gazette of the Republic of Indonesia Number 4437) as amended several times, most recently by Law Number 12 Year 2008 on the Second Amendment of Law Number 32 Year 2004 on Regional Administration (Statute Book Republic of Indonesia Year 2008 Number 59, Supplementary State Gazette of Republic of Indonesia Number 4844);
- 17) Law Number 38 Year 2004 about Road (State Gazette of the Republic of Indonesia Year 2004 Number 132, Supplementary State Gazette of the Republic of Indonesia Number 4444);
- 18) Law Number 17 Year 2007 about National Long Term Development Plan for the Year 2005 - 2025 (State Gazette of the Republic of Indonesia Year 2007 Number 33, Supplementary State Gazette of the Republic of Indonesia Number 4700);
- 19) Law Number 23 Year 2007 about Railways (State Gazette of the Republic of Indonesia Year 2007 Number 65, Supplementary State Gazette of the Republic of Indonesia Number 4722);
- 20) Law Number 24 Year 2007 about Disaster Management (State Gazette of the Republic of Indonesia Year 2007 Number 66, Supplementary State Gazette of the Republic of Indonesia Number 4723);
- 21) Law Number 25 Year 2007 about Capital Investment (State Gazette of the Republic of Indonesia Year 2007 Number 67, Supplementary State Gazette of the Republic of Indonesia Number 4724);
- 22) Law Number 26 Year 2007 about Spatial Planning (State Gazette of the Republic of Indonesia Year 2007 Number 68, Supplementary State Gazette of the Republic of Indonesia Number 4725);
- 23) Law Number 27 Year 2007 about Coastal Zones and Small Islands Management (State Gazette of the Republic of Indonesia Year 2007 Number 84, Supplementary State Gazette of the Republic of Indonesia Number 4739);
- 24) Law Number 30 Year 2007 about Energy (State Gazette of the Republic of Indonesia Year 2007 Number 96, Supplementary State Gazette of the Republic of Indonesia Number 4746);
- 25) Law Number 17 Year 2008 about Shipping (State Gazette of the Republic of Indonesia Year 2008 Number 64, Supplementary State Gazette of the Republic of Indonesia Number 4849);
- 26) Law Number 18 Year 2008 about Solid Waste Management (State Gazette of the Republic of Indonesia Year 2008 Number 69, Supplementary State Gazette of the Republic of Indonesia Number 4851);
- 27) Law Number 1 Year 2009 about Aviation (State Gazette of the Republic of Indonesia Year 2009 Number 1, Supplement to State Gazette of the Republic of Indonesia Number 4956);
- 28) Law Number 4 Year 2009 about Mineral and Coal Mining (State Gazette of the Republic of Indonesia Year 2009 Number 4, Gazette of the Republic of Indonesia Number 4959);
- 29) Law Number 10 Year 2009 about Tourism (State Gazette of the Republic of Indonesia Year 2009 Number 11, Supplementary State Gazette of the Republic of Indonesia Number 4966);
- 30) Law Number 18 Year 2009 about Animal Husbandry and Animal Health (State Gazette of the Republic of Indonesia Year 2009 Number 84, Supplementary State Gazette of the Republic of Indonesia Number 5015);

- 31) Law Number 22 Year 2009 about Road Traffic (State Gazette of the Republic of Indonesia Year 2009 Number 96, Supplementary State Gazette of the Republic of Indonesia Number 5025);
- 32) Law Number 30 Year 2009 about Electrical Power (State Gazette of the Republic of Indonesia Year 2009 Number 133, Additional State Gazette of the Republic of Indonesia Number 5052);
- 33) Law Number 32 Year 2009 about Environmental Protection and Management (State Gazette of the Republic of Indonesia Year 2009 Number 140, Additional State Gazette of the Republic of Indonesia Number 5059);
- 34) Law Number 41 Year 2009 about Sustainable Food and Agricultural Land Protection (State Gazette of the Republic of Indonesia Year 2009 Number 149, Additional State Gazette of the Republic of Indonesia Number 5068);
- 35) Law Number 45 Year 2009 about Changes in the Law Number 31 Year 2004 about Fisheries;
- 36) Government Regulation Number 69 Year 1996 about Implementation of Rights and Obligations, and the Forms and Procedures for Community Participation in Spatial Planning (State Gazette of the Republic of Indonesia Year 1996 Number 104, Additional State Gazette of the Republic of Indonesia Number 3660);
- 37) Government Regulation Number 10 Year 2000 about Map Accuracy Level for Spatial Planning (Statute Book Republic Of Indonesia Year 2000 Number 20, Supplementary State Gazette of the Republic of Indonesia Number 3934);
- 38) Government Regulation Number 63 Year 2002 about City Forest (State Gazette of the Republic of Indonesia Year 2002 Number 119, Additional State Gazette of the Republic of Indonesia Number 4242);
- 39) Government Regulation Number 16 Year 2004 about Land Utilization Arrangement (State Gazette of the Republic of Indonesia Year 2004 Number 45, Supplementary State Gazette of the Republic of Indonesia Number 4385);
- 40) Government Regulation Number 15 Year 2005 about Toll Road (State Gazette of the Republic of Indonesia Year 2005 Number 32, Supplementary State Gazette of the Republic of Indonesia Number 4489) as amended by Government Regulation No. 44 Year 2009 regarding Amendment on Government Regulation Number 15 Year 2005 on Toll Road (State Gazette of the Republic of Indonesia Year 2009 Number 88, Supplementary State Gazette of the Republic of Indonesia Number 5019);
- 41) Government Regulation Number 16 Year 2005 about Development of Clean Water Supply System (State Gazette of the Republic of Indonesia Year 2005 Number 33, Supplementary State Gazette of the Republic of Indonesia Number 4490);
- 42) Government Regulation Number 36 Year 2005 about Implementing Regulation of Law No. 28 Year 2002 about Building (State Gazette of the Republic of Indonesia Year 2005 Number 83, Supplementary State Gazette of the Republic of Indonesia Number 4532);
- 43) Government Regulation Number 20 Year 2006 about Irrigation (State Gazette of the Republic of Indonesia Year 2006 Number 46, Supplementary State Gazette of the Republic of Indonesia Number 4624);
- 44) Government Regulation Number 34 Year 2006 about Road (State Gazette of the Republic of Indonesia Year 2006 Number 86, Supplementary State Gazette of the Republic of Indonesia Number 4655);
- 45) Government Regulation Number 60 Year 2007 about Conservation of Fish Resources (State Gazette of the Republic of Indonesia Year 2007 Number 134, Supplementary State Gazette of the Republic of Indonesia Number 4779);

- 46) Government Regulation Number 21 Year 2008 about Disaster Reduction Implementation (State Gazette of the Republic of Indonesia Year 2008 Number 42, Supplementary State Gazette of the Republic of Indonesia Number 4828);
- 47) Government Regulation Number 26 Year 2008 about National Spatial Plan (State Gazette of the Republic of Indonesia Year 2008 Number 48, Supplementary State Gazette of the Republic of Indonesia Number 4833);
- 48) Government Regulation Number 42 Year 2008 about Water Resources Management (State Gazette of the Republic of Indonesia Year 2008 Number 82, Supplementary State Gazette of the Republic of Indonesia Number 4858);
- 49) Government Regulation Number 43 Year 2008 about Soil Water (State Gazette of the Republic of Indonesia Year 2008 Number 83, Supplementary State Gazette of the Republic of Indonesia Number 4859);
- 50) Government Regulation Number 45 Year 2008 about Guidelines for Granting Incentives and Ease Investment in Local Area (State Gazette of the Republic of Indonesia Year 2008 Number 88, Supplementary State Gazette of the Republic of Indonesia Number 4861);
- 51) Government Regulation Number 24 Year 2009 about Industrial Area (State Gazette of the Republic of Indonesia Year 2009 Number 47, Supplementary State Gazette of the Republic of Indonesia Number 4987);
- 52) Government Regulation Number 34 Year 2009 about Urban Area Management Guidelines (State Gazette of the Republic of Indonesia Year 2009 Number 68, Supplementary State Gazette of the Republic of Indonesia Number 5004);
- 53) Government Regulation Number 10 Year 2010 about Forest Zone Allocation and Functions Amendment Procedures;
- 54) Government Regulation Number 11 Year 2010 about Neglected Land Control and Utilization;
- 55) Government Regulation Number 15 Year 2010 about Spatial Planning Implementation;
- 56) Government Regulation Number 22 Year 2010 about Mining Zone;
- 57) Government Regulation Number 23 Year 2010 about Mineral and Coal Business Activities;
- 58) Government Regulation Number 24 Year 2010 about Forest Zone Utilization;
- 59) President Regulation Number 36 Year 2005 about Procurement of Land for Development Implementation for Public Interest, as amended by Presidential Regulation Number 65 Year 2006 on Amendment of Presidential Regulation No. 36 Year 2005 concerning Procurement of Land for Implementation of Development for Public Interest;
- 60) President Regulation Number 5 Year 2006 about National Policy on Energy;
- 61) President Decree Number 32 Year 1990 about Protection Zone Management;
- 62) The Ministry of Home Affairs Regulation Number 8 Year 1998 about Implementation of the Local Spatial Planning;
- 63) The Ministry of Home Affairs Regulation Number 9 Year 1998 about Procedures for Public Participation in Spatial Planning Process in Local Area;
- 64) The Minister of State for Agrarian Affairs Regulation Number 2 Year 1999 about Location Permit;
- 65) The Ministry of Public Work Regulation Number 392 Year 2005 about Tol Road Services Standard;
- 66) The Ministry of Environment Regulation Number 11 Year 2006 about Types of Business Plan and / or activity Mandatory to Complete With Environmental Impact Assessment;

- 67) The Ministry of Public Work Regulation Number 21/PRT/M/2007 about Spatial Planning Guidelines for Volcanic Eruption and the Earthquake Prone Zone;
- 68) The Ministry of Public Work Regulation Number 22/PRT/M/2007 about Spatial Planning Guidelines for Landslide Disaster Prone Zone;
- 69) The Ministry of Home Affairs Regulation Number 1 Year 2008 about Urban Area Planning Guideline;
- 70) The Ministry of Maritime and Fisheries Affairs Regulation Number 16 Year 2008 about Coastal Zone and Small Islands Management Plan;
- 71) The Ministry of Public Work Regulation Number 11/PRT/M/2009 about The Substance Agreement Guidelines of the Stipulation Draft Local Regulation on the Provincial Spatial Planning and the Municipality/Regency Spatial Planning, along with Detailed Plans;
- 72) The Ministry of Public Work Regulation Number 15/PRT/M/2009 about Formulation Guidelines for Provincial Spatial Planning;
- 73) The Ministry of Forestry Number P.28/Menhut-II/2009 about Consultation Implementation Procedures for Issuing Approval for Forestry Substance toward Draft of Local Regulation about Local Spatial Plan;
- 74) The Ministry of Home Affairs Regulation Number 50 Year 2009 about Local Spatial Planning Coordination Guidelines;
- 75) The Ministry of Energy Mining Resource Decree Number 1457.K/20/MEM/2000 about Technical Guidelines for Environmental Management in Mining and Energy Sector;
- 76) The Ministry of Settlement and Regional Infrastructure Decree Number 375/KPTS/M/2004 about Road Lane within Primary Road Network Determination According to Its Role as an Arterial Road, Collector Road 1, Second Collector Road, and Third Collector Road;
- 77) The Ministry of Industry Decree Number 41/M-Ind/Per/6/2008 about Stipulation and Procedures for Issuing Industrial Licenses, Expansion Permit, and Industrial Registry;
- 78) East Java Province Regulation Number 11 Year 1991 about Determination of Protected Areas in East Java Province (Gazette of East Java Province in 1991 No. 1, Series C);
- 79) East Java Province Regulation Number 8 Year 2002 about R. Soeryo Forest Park Management (East Java Province Gazette Year 2002 Number 4, Series C);
- 80) East Java Province Regulation Number 4 Year 2003 about Forest Management in East Java Province (East Java Provincial Gazette Year 2003 Number 1, Series E);
- 81) East Java Province Regulation Number 6 Year 2005 about Production Forest Control in East Java Province (East Java Provincial Gazette Year 2005 Number 2, Series E);
- 82) East Java Province Regulation Number 1 Year 2009 about East Java Province Long Term Development Plan in 2005 - 2025 (East Java Provincial Statute Book Year 2009 Number 1, Series E).