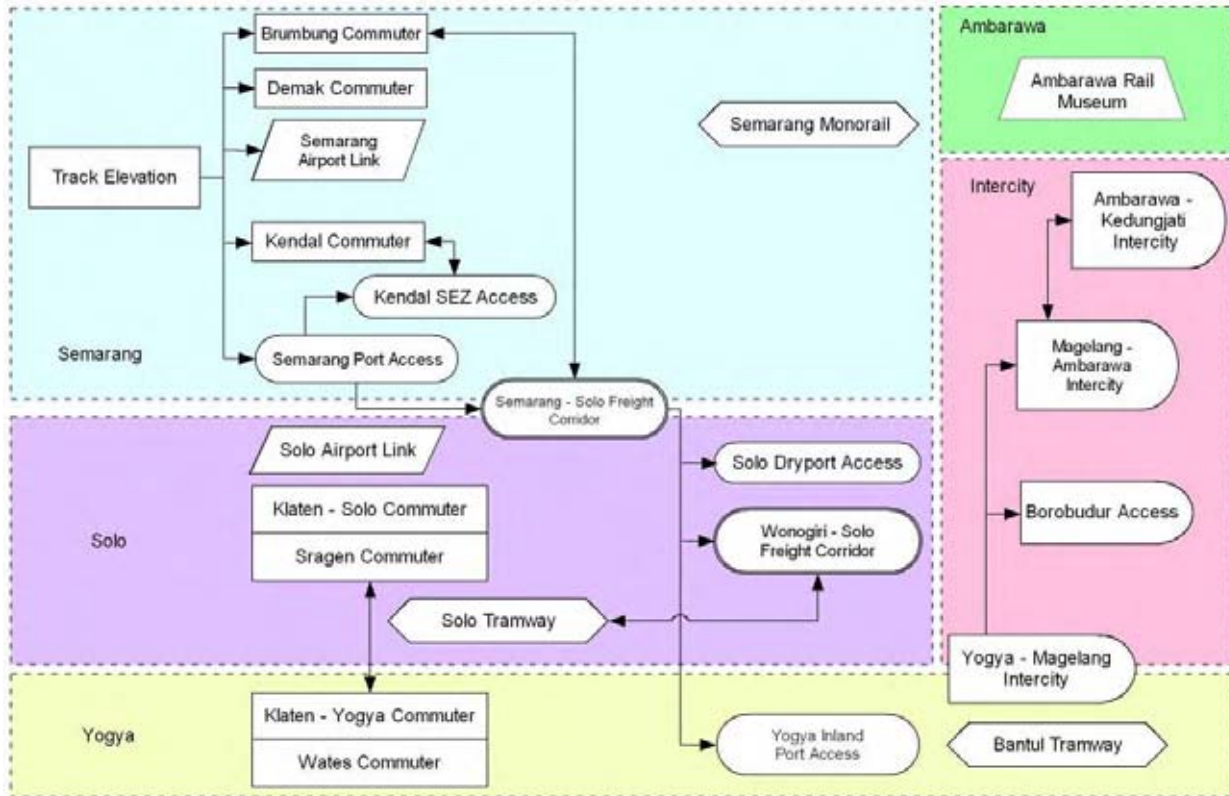


### 8.3 Phasing Project

Relationships between the potential projects described in Section 8.1 are shown below. Some projects start after the completion of other projects and some projects share parts of railway lines or stations.



- A → B Project A can be started after the completion of Project B
- A ↔ B Project A and B have common section partially or terminal station and project sequence would affect project evaluation.

**Figure 8.3.1 Relationship between Projects**

Considering these relationships and also features of these projects, they are consolidated into packages as shown in the following Table.

Since commuter trains are targeting urban dwellers within each metropolitan area, they are grouped by their core cities: Semarang, Solo and Yogyakarta. Although Demak Commuter is a project within Semarang metropolitan area, it is combined with Demak – Rembang intercity trains as a package of projects, namely “Semarang – Demak – Rembang Intercity” trains because they use same track between Semarang - Demak.

While the project costs are estimated for alternative 2 of Kendal Commuter line, Alternative 1 is considered as an appropriate option in consideration of accessibility from Kendal city center.

As mentioned above in 8.1.2(1)1), Alternative 1 for Solo Airport link will also be analyzed.

There are 6 projects for freight trains; however, Solo – Semarang – Freight Corridor, Semarang Port Access, Solo Dry Port Access and Yogya Inland Port Access are combined as “Semarang – Solo – Yogya Freight Corridor” package which will function as one freight railway system. Wonogiri – Solo Freight Corridor and Kendal SEZ Access are categorized as optional package for Semarang – Solo – Yogyakarta Freight Corridor project due to its geographical locations and functions as a branch line.

**Table 8.3.1 Consolidation of Project Packages**

Project	ID	Consolidated Projects
<b><i>Commuter Trains</i></b>		
Track Elevation	1-1	An option for 1-1
Kendal Commuter – Alternative 1		Semarang Commuter
Brumbung Commuter		
Klaten – Solo Commuter	1-2	Solo Commuter
Sragen Commuter		
Klaten – Yogya Commuter	1-3	Yogya Commuter
Wates Commuter		
Demak Commuter	5-7	(Combined with Demak – Rembang Intercity)
<b><i>Urban Railways</i></b>		
Semarang Monorail	2-1	Semarang Monorail
Solo Tramway	2-2	Solo Tramway
Bantul Tramway	2-3	Bantul Tramway
<b><i>Airport Link</i></b>		
Semarang Airport Link	3-1	Semarang Airport Link
Solo Airport Link – Alternative 1	3-2	Solo Airport Link
<b><i>Freight Trains</i></b>		
Solo – Semarang Freight Corridor	4-1	Semarang – Solo – Yogya Freight Corridor
Semarang Port Access		
Solo Dryport Access		
Yogya Inland Port Access		
Wonogiri – Solo Freight Corridor	4-2	Wonogiri – Solo Freight Corridor
Kendal SEZ Access	4-3	Kendal SEZ Access
<b><i>Intercity Trains</i></b>		
Yogya – Magelang Intercity	5-1	Yogya – Magelang Intercity
Borobudur Access	5-2	Borobudur Access
Magelang – Ambarawa Intercity	5-3	Magelang – Ambarawa Intercity
Ambarawa – Kedungjati Intercity	5-4	Ambarawa – Kedungjati Intercity
Semarang – Tegal Intercity	5-5	Semarang – Tegal Intercity
Semarang – Cepu Intercity	5-6	Semarang – Cepu Intercity
Demak – Rembang Intercity	5-7	Semarang – Demak – Rembang Intercity (combined with Demak Commuter)

### **8.3.1 Economic Evaluation**

#### **(1) Methodology**

Economic evaluation is one of ways to give priority to the proposed projects. The economic analysis is also used to examine the feasibility of the project from the viewpoint of the national and regional economies. The analysis compares costs and benefits of the cases with and without the project.

The benefits are various favorable results for the national economies when the project is completed, while the costs are national or regional spending necessary for carrying out the project. Only items which can be technically estimated are to be examined. The results of economic analysis are indicated by using the following three representative indexes:

- Economic Internal Rate of Return (EIRR)
- Net Present Value (NPV)
- Benefit to Cost (B/C)

Economic Internal Rate of Return (EIRR) is a discount rate in which the present total value of the annual net benefit of a project becomes zero and which shows the rate of efficiency for national or regional economy.

Net Present Value (NPV) is the total obtained by discounting the net benefit amount as of the base year by the social discount rate of the applicable country. It also shows the total present value of the total social surplus value created by the project.

Benefit to Cost (B/C) is a ratio of total benefit against the total project cost. This ratio is obtained by discounting the benefit and the cost to the present value by the social discount rate mentioned above. Generally, EIRR and B/C indicate economic efficiency and NPV shows the incremental surplus created for the national and regional economy by the project.

The following table indicates benefit items of Railway development that are used in Japan. In general the expected benefits of railway development are categorized as “flow effect” and “stock effect” mainly according to “Evaluation Manual of Railway Development Project in Japan, 2005, Ministry of Land, Infrastructure, Transportation and Tourism (MLIT)”. The flow effect is defined to be revenue from railway business, and generally is covered in financial analysis. On the other hand, the stock effect is defined to be indirect effects from the standpoint of national economy aspect, mainly composed of user’s benefit, supplier’s benefit and

environmental benefit.

**Table 8.3.2 Items of Stock Effect for Railway Development Project**

Evaluation Items			Indicator
User 's Benefits			-Travel Time Saving (TTS) -Transit Time Saving -Operating Time -Vehicle Operating Cost (VOC)
Whole Society's Effect	Residential Life	Accessibility to core cities	- The night population rate
		Accessibility to main links	- The night population rate
		Convenience of life	- The number of life facilities
	Regional Economy	Activation of regional economy	- Increase of goods production - Increase of sightseeing visitors - Increase of market potential
		Enhancement of firm location	- Increase of firm location potential - Increase of collaborative planned projects
	Regional Society	Image improvement	- Willingness to pay for image improvement effect
	Environment	Regional Environmental improvement	- Decrease of NOx, SPM, etc - Achievement of environmental criteria
		Global Environmental Improvement	- Decrease of CO2, etc
	Traffic Safety	Decrease of traffic accident	- Decrease of traffic accidents
Others			- NPV per Amount of Public Subsidy - Decrease of Energy Consumption - Increase of Land Value

Source: CRJJ Study Team, refer to 'Evaluation Manual for Railway Development Project in Japan', 2005, Ministry of Land, Infrastructure and Transportation

## (2) Basic Assumptions

'With the Project' means a case in which a project with the packaging necessary to modernize Central Java Province and DIY railways in Indonesia. "Without the Project" means a case in which such an investment is not made.

The project is aimed at better transportation efficiency and expanded transportation capacity, passenger and freight. Hence the assumptions should be the same through all projects except freight train. The other assumptions applying to all projects are indicated below.

**Table 8.3.3 Basic Assumption for Economic Evaluation**

Items	Contents	
Future Demand	Passenger	Refer to Chapter 7.1
	Freight	Refer to Chapter 7.2
Cost	Initial	Refer to Chapter 8.1.3
	O&M	Refer to Chapter 8.1.3
Benefit	Fuel (VOC) Savings	Diesel Price: 5,500/ Rp./ liter (Based on current price, Nov 7 2008) Diesel Consumption unit: =3 km/l, Bus =0.5 km/l and Truck =0.5 km/l (Based on 'Blue Print of Railway Development', Directorate General of Railway, Ministry of Transportation)
	Decrease of Accidents	Amount loss of accident by mode: Bus=3.63 million Rp/ Person., Train=1.74 million Rp./ Person (Based on 2007 insurance company's record in Semarang and Yogyakarta) Ratio of Accident by mode: Bus=47.17 PAX* million km, Train=77.35 PAX*million km (Based on data from Dinas Purubungang in Bus and DAOP IV, VI in Train in2007)
	CO2 Emissions	Emission Unit: 2,623.0 kg-CO2/(Diesel) kl (Based on IPCC (Intergovernmental Panel on Climate Change) Evaluation Report) Price of Emission: 19 US\$/ ton (Based on a bid price of Japanese companies for CERs in spot delivery, Nov. 10 2008)
	Travel Time Savings (TTS)	<Vehicle Speed> Bus and Truck: 30 km/hour (Inter-city), 20km/hour (Inner-city) Train: 60 km/hour (Inter-city), 45 km/hour (Inner-city), 65 km/hour (freight) <Value of Time> - Passenger: Rp. 7,000./Hour/PAX, increase annually according to growth rate of GRDP per capita mentioned in Chapter 7 - Freight: Rp. 236,360./Hour/TEU, increase annually according to growth rate of GRDP per capita mentioned in Chapter 7 (Based on Study Result from 'Impact Evaluation Paper of International Hub-Port Policy', Workshop of Future Vision of International Hub-Port , Ministry of Land, Infrastructure and Transportation, Japan)
	Road Damage Reduction	<Design Method> Pavement damage is calculated by deducting pavement material cost with project from the cost without project. Major pavement repair works was assumed every 10 years. All roads were assumed to be flexible pavement and Japanese Technical Standard of Pavement Design was utilized. <Unit Cost> Surface Layer: 250,334 Rp/Ton, Base Course: 293,822 Rp/Ton, Upper Sub-Base: 239,978 Rp/m3, Lower Sub-Base: 217,251 Rp/m3 <Vehicle Weight Composition> Weigh bridge survey by the CJRR Study Team <Road Inventory Data> IRMS (Interurban Road Management System) <Traffic Volume Data> Road Traffic Survey by CJRR Study Team, 2008 and IRMS.
Others	Projects Life	All project life is assumed be 30 years after start of operation. The residual value is assumed to be 10%. - Construction Year : 2009 - Operation Start Year: 2010
	Price	The base year for the prices of cost and benefit is set at 2008 - 1 USD is equivalent to Rp. 11,500.0 (Based on current price, Nov 12 2008)

		- 1 JY is equivalent to Rp. 118.2 (Based on current price, Nov 12 2008)
	Social discount rate	12% annually

Source: CJRR Study Team

### (3) Benefit Estimation

#### 1) Future Demand

The following table summarizes future demand forecast of railway use. The results of demand forecast by project are the basis for benefit estimation. In addition, passenger demand is included city-developed demand.

**Table 8.3.4 Summary of Demand Forecast**

Project Name	2010	2015	2020	2025	2030
Commuter Train (PAX*km/day)					
1-1 Semarang Commuter	225,838	277,025	335,366	408,886	507,268
1-2 Solo Commuter	270,836	332,222	402,188	490,357	608,342
1-3 Yogya Commuter	361,389	443,300	536,658	654,307	811,739
Urban Train (PAX*km/day)					
2-1 Semarang Monorail	61,678	75,658	91,591	111,670	138,539
2-2 Solo Tramway	69,206	77,001	84,769	93,321	102,736
2-3 Bantul Tramway	63,041	77,330	93,615	114,138	141,601
Airport Link (PAX*km/day)					
3-1 Semarang Airport Link	74,095	107,342	136,790	165,288	170,988
3-2 Solo Airport Link	29,354	39,775	50,425	61,419	68,016
Freight Train (TEU*km/day)					
4-1 Semarang Solo Yogya Freight Corridor	42,219	67,833	83,569	102,804	128,211
4-2 Solo – Wonogiri Freight Corridor	2,724	3,475	4,323	5,357	6,731
4-4 Kendal SEZ	3,607	7,880	9,684	11,885	14,809
Inter-city Train (PAX*km/day)					
5-1 Yogya - Magelang Intercity	633,951	777,638	941,407	1,147,788	1,423,956
5-2 Borobudur Access	30,294	37,160	44,986	54,848	68,045
5-3 Magelang - Ambarawa Intercity	262,420	321,899	389,690	475,120	589,438
5-4 Ambawara - Kedungjati Intercity	268,853	329,790	399,243	486,768	603,888
5-5 Semarang-Tegal Intercity	653,998	802,230	971,178	1,184,085	1,468,986
5-6 Semarang-Cepu Intercity	254,793	312,543	378,363	461,310	572,306
5-7 Demak-Rembang Intercity	642,711	788,384	954,416	1,163,649	1,443,633

Source: CJRR Study Team

\*: Including Semarang Port, Solo Dry port and Yogyakarta Dry port

Ton as a unit of bulk cargo was converted to be TEU (1TEU is set to be equivalent to 15 ton) as a unit of container

#### 2) Benefit Estimation

##### a. Benefit Items

The Study Team conducted preliminary examination under most of the same conditions as for project prioritization. The following table indicates quantitative benefit items for this

examination based on the useful data concerned.

**Table 8.3.5 Quantitative Benefit Items of Preliminary Examination**

	VOC(1)	VOC(2)	Accident	TTS(1)	TTS(2)	CO2	Road Damage
Commuter Train	*	*	*	*	*	*	-
Urban Train	*	*	*	*	*	*	-
Airport Link	*	-	*	*	-	*	-
Freight Train	*	-	-	*	-	*	*
Inter-city Train	*	-	*	*	-	*	-

Source: CJRR Study Team

Footnote1: [\*] is signed to consider as benefit items

Footnote2: The Benefit of VOC (1) covers diversion passenger and freight demand, and that of VOC (2) covers parallel road passenger and freight remained

Footnote3: The benefit of TTS (1) covers diversion passenger and freight demand, and that of TTS (2) covers parallel road passenger and freight remained

**b. Benefit Estimation**

In this examination, the quantifiable items were estimated based on results of demand forecast and preconditions mentioned in previous section.

The following table summarizes benefit estimation results by implementing the proposed project. In general railway development makes a huge contribution to decreasing of traffic congestion. Accordingly, the largest benefit items in this preliminary estimation is Travel Time Savings (TTS); this means that railway development, especially commuter railway development, would make a large contribution to reducing future traffic congestion problems. Reduction of fuel consumption is thought to be a large benefit in future under soaring fuel prices in the international market in recent years.



**Table 8.3.6 Summary of Estimated Benefits (In 2030)**

(Unit: Million Rupiah)

Project Name	VOC(1)	VOC(2)	Accident	TTS(1)	TTS(2)	CO2	Road Damage* 1
<b>Commuter Train</b>							
1-1 Semarang Commuter	11,810	157,213	1,498	66,478	176,981	13,176	-
1-2 Solo Commuter	9,584	154,472	1,797	63,776	255,849	12,789	-
1-3 Yogya Commuter	12,788	162,419	2,398	106,379	358,130	13,658	-
<b>Urban Train</b>							
2-1 Semarang Monorail	764	108,125	409	18,156	54,791	8,488	-
2-2 Solo Tramway	566	27,109	303	13,464	37,827	2,157	-
2-3 Bantul Tramway	781	66,288	418	18,557	108,644	5,228	-
<b>Airport Link</b>							
3-1 Semarang Airport Link	2,694	-	505	22,408	-	210	-
3-2 Solo Airport Link	1,072	-	201	8,914	-	84	-
<b>Freight Train</b>							
4-1 Semarang Solo Yogya Freight Corridor	136,830	-	-	469,715	-	10,667	53,455
4-2 Solo - Wonogiri Freight Corridor	5,118	-	-	24,659	-	399	2,596
4-4 Kendal SEZ	11,260	-	-	54,255	-	878	3,532
<b>Inter-city Train</b>							
5-1 Yogya - Magelang Intercity	22,433	-	4,206	177,928	-	1,749	-
5-2 Borobudur Access	1,072	-	201	5,762	-	84	-
5-3 Magelang - Ambarawa Intercity	9,286	-	1,741	49,913	-	724	-
5-4 Ambawara - Kedungjati Intercity	9,514	-	1,784	51,137	-	742	-
5-5 Semarang-Tegal Intercity	23,143	-	4,339	124,392	-	1,804	-
5-6 Semarang-Cepu Intercity	9,016	-	1,690	48,462	-	703	-
5-7 Demak-Rembang Intercity*2	47,589	-	4,264	241,966	-	3,710	-

Source: CJRR Study Team

\*1: The reduction of road damage is accounted by one time per 10 year from operation start year

\*2: '5-7 Demak-Rembang Intercity' includes the benefit of freight transport between Demak-rembang

#### (4) Economic Price

For the economic analysis, prices are express in economic price reflecting border price concept. In this study, the standard conversion factor (SCF) is adopted as 0.8. The project cost must be converted from market price into economic price for economic analysis. Social discount rate is set to be 12% for economic evaluation.

#### (5) Result of Economic Evaluation

According to results of economic evaluation in the following table, some 'Commuter Train' and 'Freight Train' projects are positive. The B/C value of Semarang Commuter and Solo Commuter is slightly negative; however quantitative indicator in this economic evaluation is not definitive, and actual benefits of these projects the Study Team set are thought to be larger under normal conditions.

Three projects are positive projects based on this economic evaluation. For Commuter Train

projects, '1-3 Yogya Commuter' projects is positive. For Freight Train Projects, '4-1 Semarang-Solo - Yogya Freight Corridor (including Tanjung Emas Port, Solo and Yogyakarta Dry Port access line)' are positive projects as well as have high potential to contribute to regional economy by supporting transport of materials and products of manufacturing industry along the corridor. Generally, railway transport has an economic advantage in freight transport for long haulage over truck transport. If the freight corridor is connected to the entire railway network of Java Island, the potential of economic development along the corridor could be further stimulated.

**Table 8.3.7 Results of Economic Evaluation**

Project Name	NPV (Mill. Rp.)	EIRR	B/C	Priority
<b>Commuter Train</b>				
1-1 Semarang Commuter	-	8.6%	0.765	A-
1-2 Solo Commuter	-	8.2%	0.870	A-
1-3 Yogya Commuter	728,457	15.0%	1.355	A+
<b>Urban Train</b>				
2-1 Semarang Monorail	-	-	0.365	B
2-2 Solo Tramway	-	2.3%	0.437	B
2-3 Bantul Tramway	-	1.0%	0.339	B
<b>Airport Link</b>				
3-1 Semarang Airport Link	-	-	0.229	C
3-2 Solo Airport Link	-	-	0.047	C
<b>Freight Train</b>				
4-1 Semarang Solo Yog Freight Corridor	131,932	13.1%	1.078	A
4-2 Solo Wonogiri Freight Corridor	-	-	0.253	B
4-4 Kendal SEZ	-	-	0.305	B
<b>Inter-city Train</b>				
5-1 Yogya - Magelang Intercity	-	0.3%	0.265	B
5-2 Borobudur Access	-	-	0.125	C
5-3 Magelang – Ambarawa Intercity	-	-	0.141	C
5-4 Ambawara - Kedungjati Intercity	-	-	0.212	C
5-5 Semarang-Tegal Intercity	-	-	0.476	B
5-6 Semarang-Cepu Intercity	-	-	0.160	C
5-7 Demak-Rembang Intercity	-	3%	0.433	B

Source: CJRR Study Team

\*: 'Demak-Rembang Intercity' includes benefit of freight transport between Demak-rembang transportation

### 8.3.2 Preliminary Environmental Impact Evaluation on Proposed Programs

IEE (Initial Environmental Examination) Study was conducted in order to identify environmental impact possibly caused by the proposed programs in the Case Study.

#### (1) Study Purposes

The purpose of the IEE Study is to assess environmental impact previously identified by the railway improvement examined in the Case Study. The IEE Study has the following purposes:

- To grasp the current environmental aspects in the Case Study area.
- To make consensus building among stakeholders.
- To clarify and recommend further issues for proceeding to AMDAL, e.g.

**(2) Study Methods and Results**

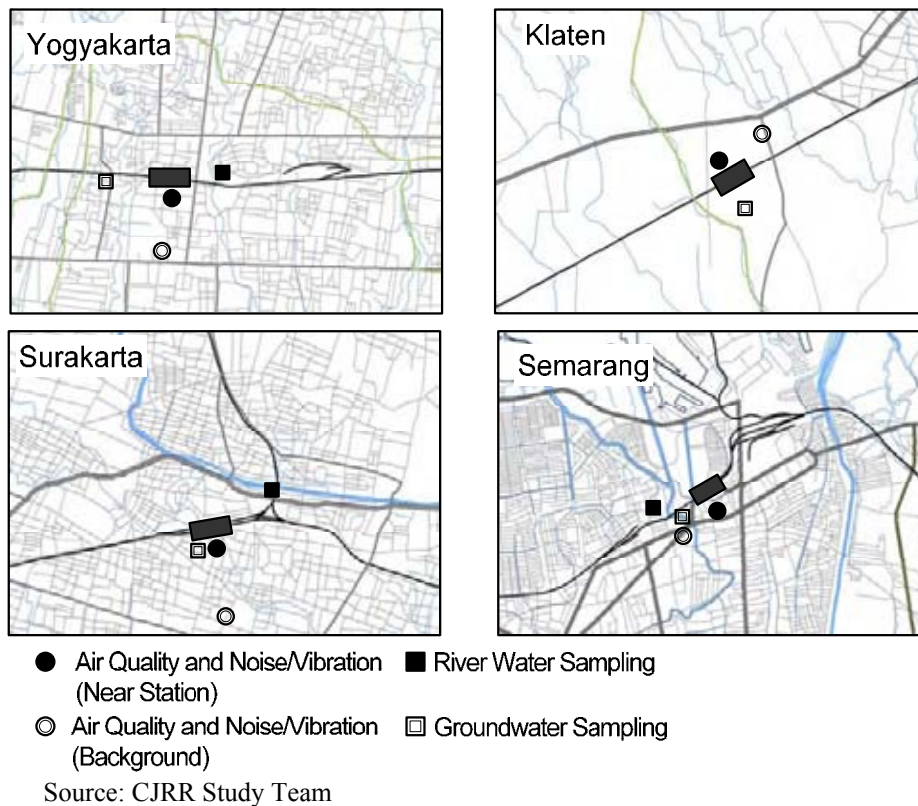
**1) Air Quality, Noise and Vibration Survey**

**a. Method**

Air quality and noise/vibration survey was carried out on the following date in each station. Survey locations are shown in Figure 8.3.2. Two measurement points were selected at each location, one was beside station, and another was set away the station to measure the background level.

**Table 8.3.8 Location and Date of Air Quality and Noise/Vibration Survey**

Location	Date of Survey (WIB)
Yogyakarta (Tugu) Station	19 <sup>th</sup> October 07:00 – 21 <sup>st</sup> October 07:00
Klaten Station	26 <sup>th</sup> October 07:00 – 28 <sup>st</sup> October 07:00
Solo Balapan Station	2 <sup>nd</sup> November 07:00 – 4 <sup>th</sup> November 07:00
Semarang Tawang Station	9 <sup>th</sup> November 07:00 – 11 <sup>th</sup> November 07:00



**Figure 8.3.2 Survey Location of Air Quality and Noise/Vibration**

Measurement items and method are summarized in Table 8.3.9. The methods followed the Indonesian standard method.

**Table 8.3.9 Measuring Method of Air Quality and Noise/Vibration Survey**

Measurement Item	Method
SO <sub>2</sub>	Pararosaniline (Spectrophotometer) Method
NO <sub>2</sub>	Salzman Method
TSP	Gravimetric Method
CO	CO Analyzer (NDIR)
O <sub>3</sub> (Ozone)	Spectrometric Method
Noise/Vibration	Direct Measurement

Source: CJRR Study Team

Air quality survey was undertaken for one weekday and one day on weekend for 24 consecutive hours. Samples for measurement of noise level were taken every 2 hours. Noise and vibration survey was also undertaken at the same locations and date as those for the air quality survey.

## b. Result

### Air Quality

The following figure and table shows daily average of air quality, and describes hourly variation of NO<sub>3</sub> and TSP (Dust) concentrations.

**Table 8.3.10 Daily Average of Air Quality**

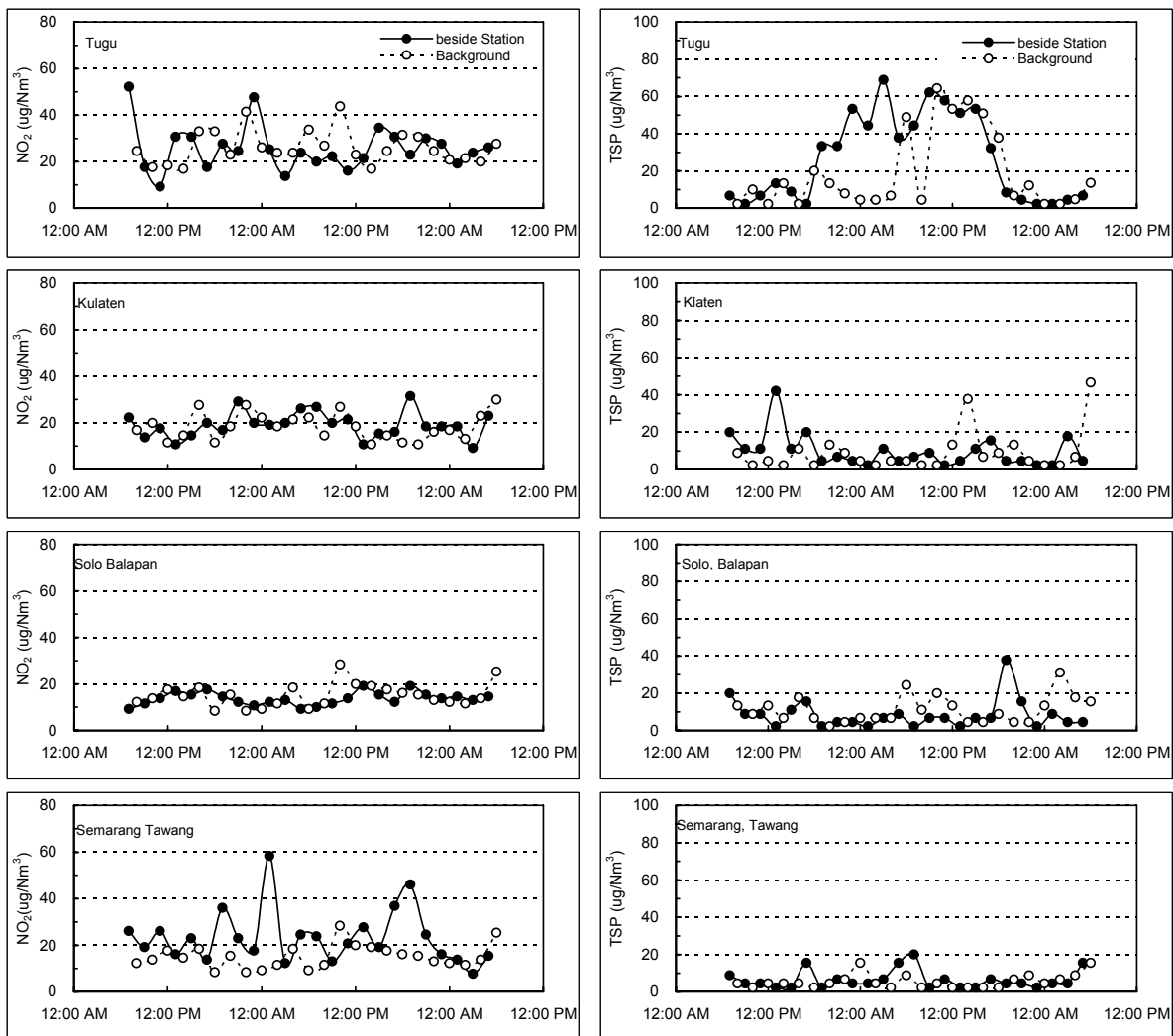
Location Parameter	Yogyakarta (Tugu)		Klaten		Ssolo Balapan		Semarang Tawang		Standard ( <sup>1</sup> )	
	Weekend	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend	Weekday		
CO (ppm)	A	26	12	8	4	7	3	8	4	(9)*
	B	16	14	9	8	12	8	9	8	
NO <sub>2</sub> (µg/Nm <sup>3</sup> )	A	28.7	23.8	18.3	19.7	13.6	13.8	18.3	19.7	150
	B	26.0	26.2	18.5	18.2	13.6	15.8	18.5	18.2	
SO <sub>2</sub> (µg/Nm <sup>3</sup> )	A	32.8	32.9	64.0	48.9	57.0	69.7	64.0	48.9	365
	B	28.8	24.0	74.5	68.9	105.8	60.6	74.5	68.9	
O <sub>3</sub> (µg/Nm <sup>3</sup> )	A	8.7	9.1	6.7	11.0	13.4	9.7	6.7	11.0	(157)*
	B	10.9	8.7	5.8	8.4	14.9	10.4	5.8	8.4	
TSP (µg/Nm <sup>3</sup> )	A	18	32	15	7	9	8	14	7	230
	B	9	23	7	10	9	12	7	10	

Source: CJRR Study Team

Daily Standard in Baku Mutu Udara Ambien berdasarkan Lamp Keputusan Gubernur DIY No. 153 Tahun 2002, except (\*) for 8 hours.

A: beside station, B: background

The survey results indicate that concentrations of all parameters except CO meet the air quality standards. This implies that air quality conditions around each station were not faced with serious pollution at that time. In addition, the survey results did not show significant differences between weekend and weekday, and beside-station and background. Hence it is assumed that railways activity is not a major pollution source.



Source: CJRR Study Team

**Figure 8.3.3 Daily Trends of Concentrations of NO<sub>2</sub> and TSP**

### Noise and Vibration

Noise level varied from 59 to 91 dBA and the level exceeded the Standard Level (70 dBA) in most hours of day surveyed. The following figure and table shows daily average of noise level and hourly variation.

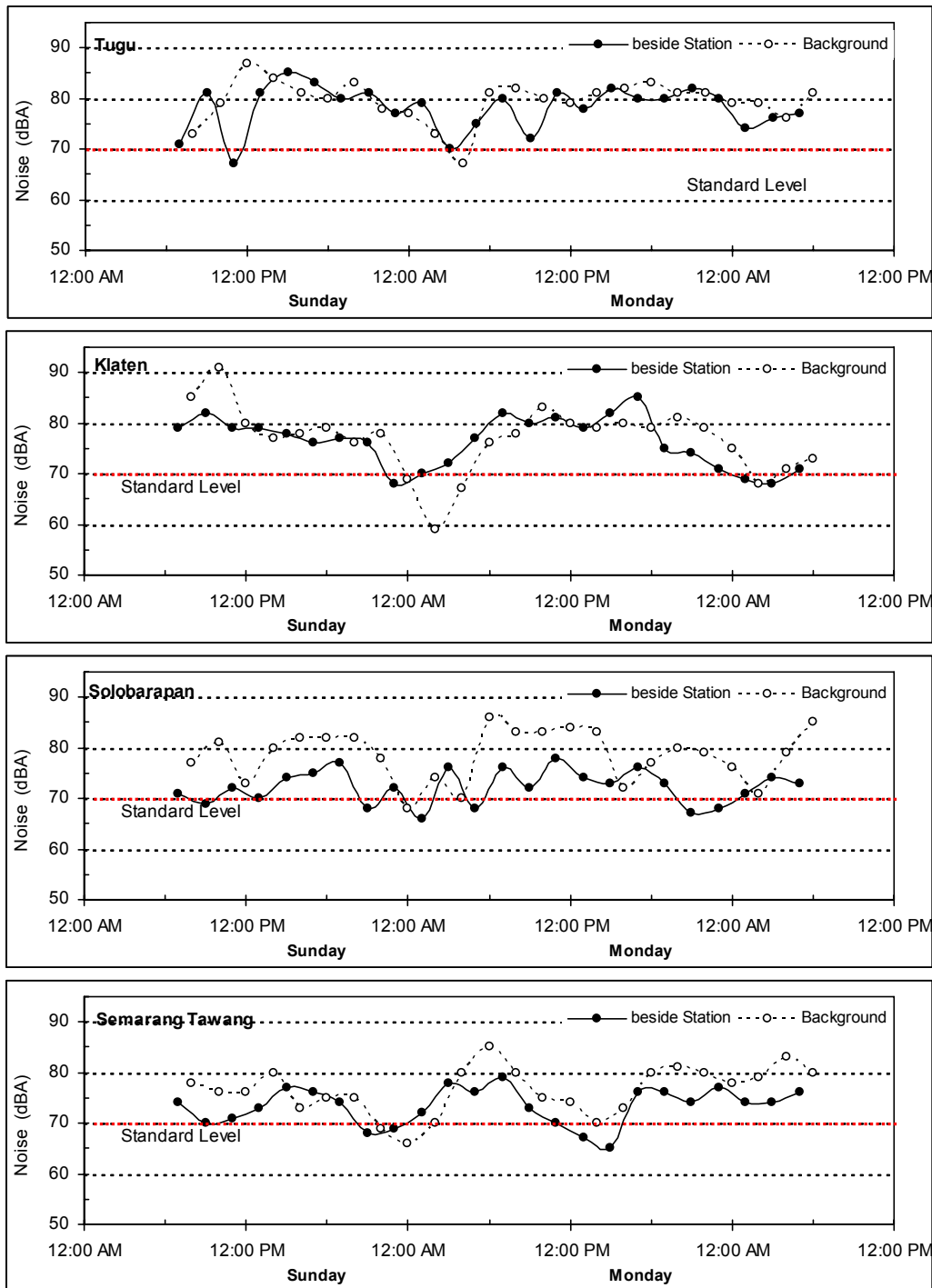
**Table 8.3.11 Daily Average of Noise Level at Each Station**

Location		Weekend		Weekday	
		Day-time	Night-time	Day-time	Night-time
Yogyakarta (Tugu)	A	81	75	80	77
	B	82	75	82	79
Klaten	A	79	73	81	71
	B	86	72	79	74
Solo Balapan	A	73	73	75	72
	B	82	73	81	77
Semarang Tawang	A	74	75	74	77
	B	78	73	77	79
Standard		70			

Source: CJRR Study Team

A: Beside stations, B: Background

Daily average in daytime showed relatively higher level than that at night except at Semarang Tawang Station. According to the public hearing, feelings and opinions of residents against noise disturbance might be different among the locations. In Semarang, the results of public hearing showed that the residents might not recognize noise disturbance as serious environmental impact. There are various noise sources around Tawang Station, and some residents pointed out noise disturbance from port activities.



Source: CJRR Study Team

**Figure 8.3.4 Hourly Variation of Noise Level**

There was no significant difference of noise levels between the points beside-station and background. This situation can lead the conclusion that train activities are not a major noise source due to existence of various noisier sources such as road transportation, building construction, business activities. However intermittent noise when trains pass exceeds 90

dBA; therefore, it is suggested to install sound proofing measures, and/or to select least noisy equipment and train.

Vibration level was measured at the time when train passed and did not pass. Though train passes, noise levels in the station parking areas satisfied standard level.

## 2) Water Quality Survey

### a. Method

Water quality survey was undertaken at 3 rivers and 4 wells near station as shown below.

**Table 8.3.12 Location and Date of Air Quality and Noise/Vibration Survey**

Location	Date	Sampling	
		River Water	Groundwater
Yogyakarta (Tugu) Station	5 <sup>th</sup> November, 2008	Code River	Yogyakarta (Tugu) Station
Klaten Station	24 <sup>th</sup> October, 2008	-	Klaten Station
Solo Balapan Station	24 <sup>th</sup> October, 2008	Pepe River	Solo Balapan Station
Semarang Tawang Station	31 <sup>st</sup> October, 2008	Semarang River	Semarang Tawang Station

Source: CJRR Study Team

Sampling items and method are summarized in Table 8.3.13, the methods followed the Indonesian standard method.

**Table 8.3.13 Measuring Method of Water Quality**

Sampling Item	Method
pH	Electrometric method
DO <sup>(1)</sup>	Titrimetric method
TSS	Gravimetric method
TDS	Gravimetric method
BOD	Titrimetric method
COD	Titrimetric method
Oil and Grease	Gravimetric method

Source: Decree of MenLH, No. 37 of 2003.

(1) Except groundwater

### b. Result

Laboratory data of river water and groundwater quality is shown in Table 8.3.14, and concentration of COD is described in Figure 8.3.5.



**Table 8.3.14 Result of Water Quality Measurement**

**River Water**

Location River Parameter	Yogyakarta Code	Klaten	Surakarta Pepe	Semarang Semarang	Standard (DIY) <sup>(1)</sup>	Standard (National) <sup>(2)</sup>
pH	6.0	-	6.0	6.5	5.0-9.0	6.0-9.0
DO	4.3	-	2.5	0.5	>3	>3
TSS	157	-	148	147	400	400
TDS	645	-	568	756	1000	1000
COD	7.8	-	23.3	22.7	10	50
BOD	2.9	-	8.1	7.9	5	6
Oil and Grease	2	-	2	1	N.D.	1

(1) Keputusan Gubernur Kepala Daerah Istimewa Yogyakarta 214/KPTS/1991

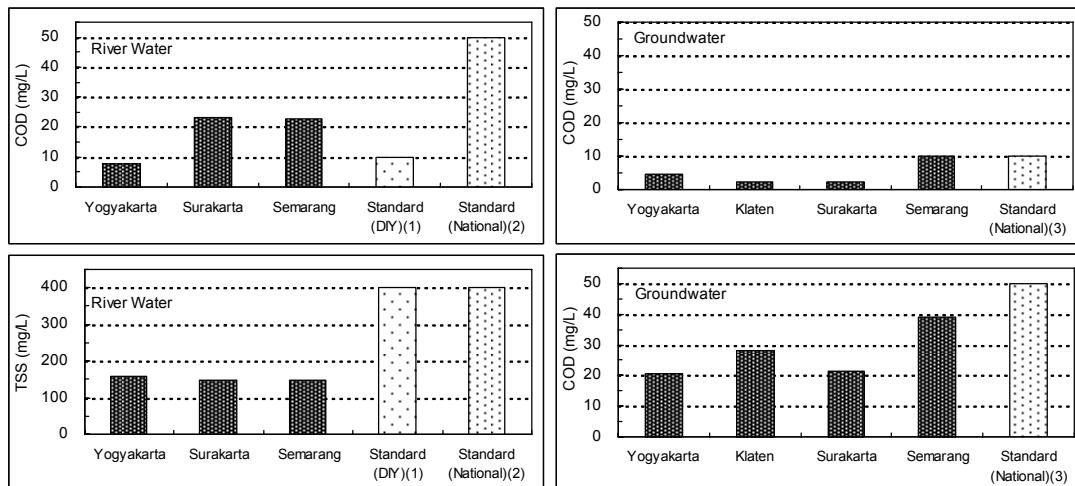
(2) Peraturan Pemerintah No. 82 Tahun 2001 (Class III)

**Ground Water**

	Yogyakarta	Klaten	Surakarta	Semarang	Standard (National) <sup>(3)</sup>
pH	6.3	7.0	6.8	7.4	6.0-9.0
DO					
TSS	20.5	28.2	21.6	38.9	50
TDS	405	500	556	356	1000
COD	4.7	2.2	2.2	10.0	10
BOD	1.8	0.8	0.8	3.5	2
Oil and Grease	N.D.	1	N.D.	N.D.	N.D.

(3) Peraturan Pemerintah No. 82 Tahun 2001 (Class I)

Source: CJRR Study Team



Source: CJRR Study Team

**Figure 8.3.5 Concentration of COD in River Water and Groundwater**

COD in Code River (near Yogyakarta (Tugu) Station) showed the lowest concentration, 7.8 mg/L, while that in Pepe River (near Solo Balapan Station) gave the highest level, 46.2 mg/L.

In comparison with National standard and Standard in Yogyakarta Special Province (DIY), all the data did not exceed the standard level. In addition, concentrations of TSS also satisfied the standard level. However concentrations of DO in all rivers showed lower values in the range between 0.5 and 4.3 mg/L. In addition, contamination of oil and grease was detected. Therefore it can be assumed that organic pollution has been proceeding.

Concentration of COD of groundwater near Yogyakarta (Tugu) Station and Solo Balapan Station showed lower level, while those in Klaten and Semarang indicate organic pollution.

### **3) ROW Survey**

#### **a. Method**

Right-of-Way (ROW) Survey was conducted by field observation and measurement with delineating property conditions within ROW. ROW boundary was identified by benchmarks and secondary data collection. Property condition was categorized as shown below:

- Residential house
- Business property such as warung
- Farm land
- Public market
- Social property such as Mosque, school
- Public infrastructure such as road
- Open space such as park, green space, vacant; and
- Others.

#### **b. Result**

The following three figures describe land status within ROW around Yogyakarta (Tugu) Station, Solo Balapan Station and Semarang Tawang Station.

##### *Yogyakarta (Tugu) Station, and Klaten Station*

Railway corridor between Kutoarjo – Yogyakarta (Tugu) – Solo Balapan has been installed double-tracking, and approximately 14 m width of ROW is lined. In the area to the west from Yogyakarta (Tugu) Station, some small residential gardening areas occupy ROW, however it seems to be in temporary use. Basically most of ROW has been kept clear.

Land status around Klaten station also indicated similar aspects. Though several residential occupations were observed, basically ROW has been secured.

*Solo Balapan Station, Purwosari Station and Solo Jebres Station*

Along the railway corridor from Solo Balapan station up to Jl. Mayjend. Dipanjatan, with a length of approximately 500 m, there are many small houses sticking over ROW boundary. Number of properties totals approximately 50 units. From this road until Jl. Urip Sumoharjo, the railway corridor is located lower than side roads. ROW boundary may stick out to the roads. The area ROW from Solo Balapan Station up to Jl. Cokroaminto (east direction) is occupied by approximately 100 house units.

The ROW from Solo Balapan station to the north are also occupied by many properties. Approximate number of occupations along the corridor between Solo Balapan station and Jl. Kyai Mangun Sarkoro was 420 units.

On the other hand, there are no illegal occupations between Solobarapan and Purwosari stations.

*Semaran, Tawang Station and Semarang Poncol Station*

The railway corridor from Tawang station to the east is located in flood prone area, and many ponds, marsh and so on occupy the ROW. Some ponds are used for fishing. It was observed that approximately 130 properties occupied the area along the corridor to the east up to Jl. Raden Patah. Along the corridor further to the east, pond occupies north side, while residential houses densely occupy south side.

Though there were several properties occupy ROW along the corridor between Tawang and Poncol stations, basically ROW has been kept clearance.

Many houses occupy the ROW between Poncol station and Banjir Kanal Barat; they total more than 300 units. In addition, community roads pass in the ROW along the corridor.

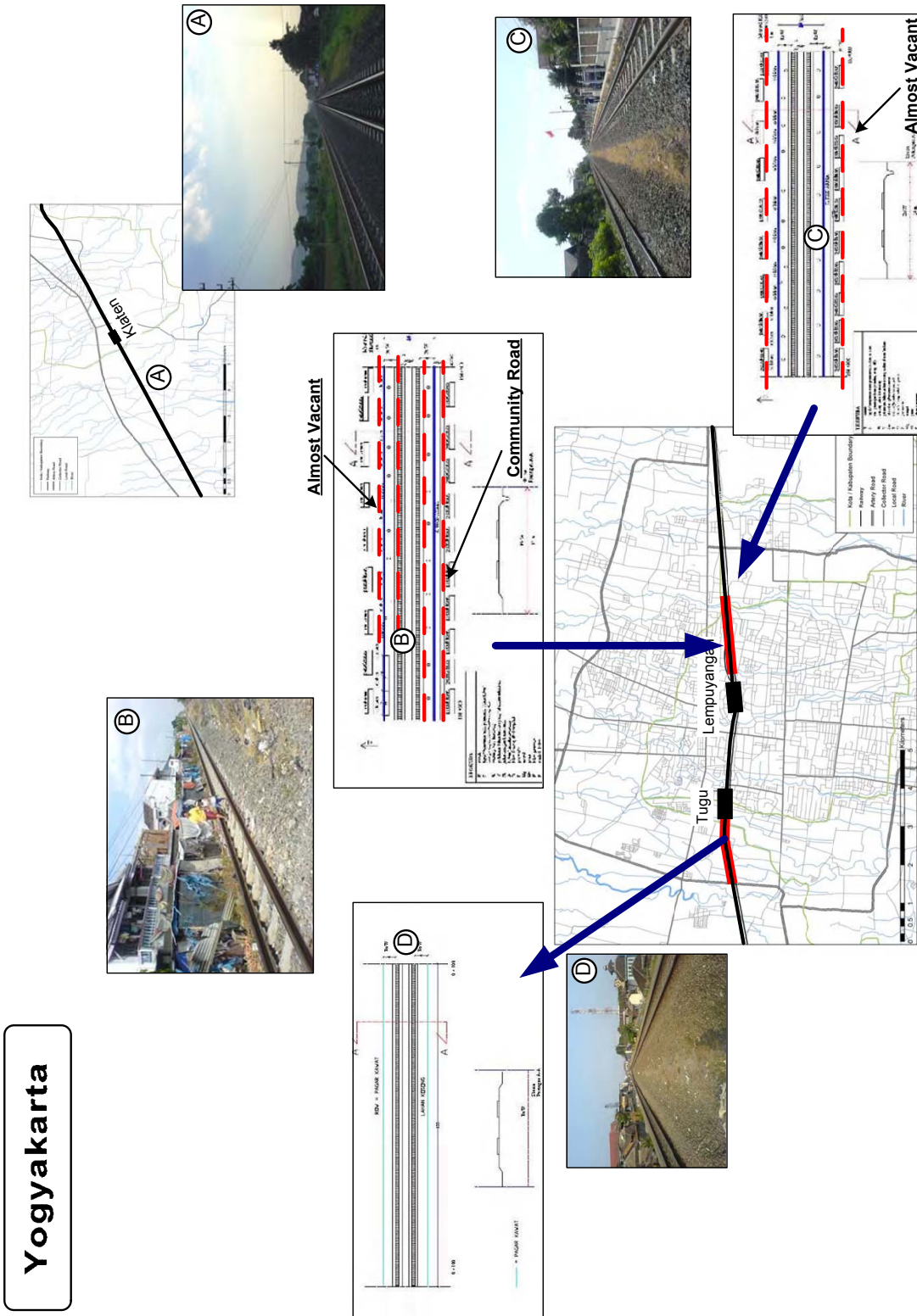


Figure 8.3.6 Land Status (Yogyakarta, Klaten Area)

Yogyakarta

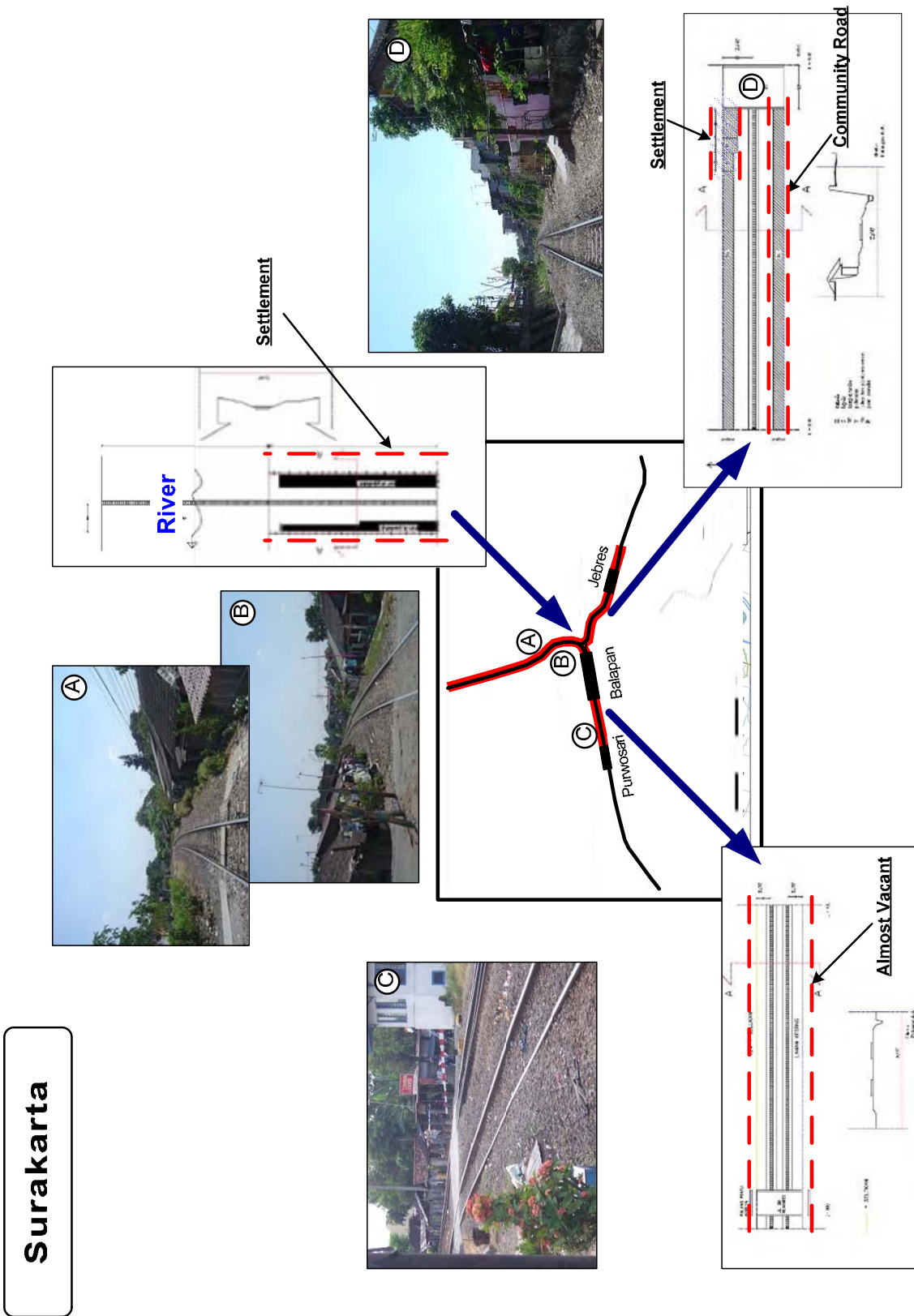


Figure 8.3.7 Land Status (Solo Area)

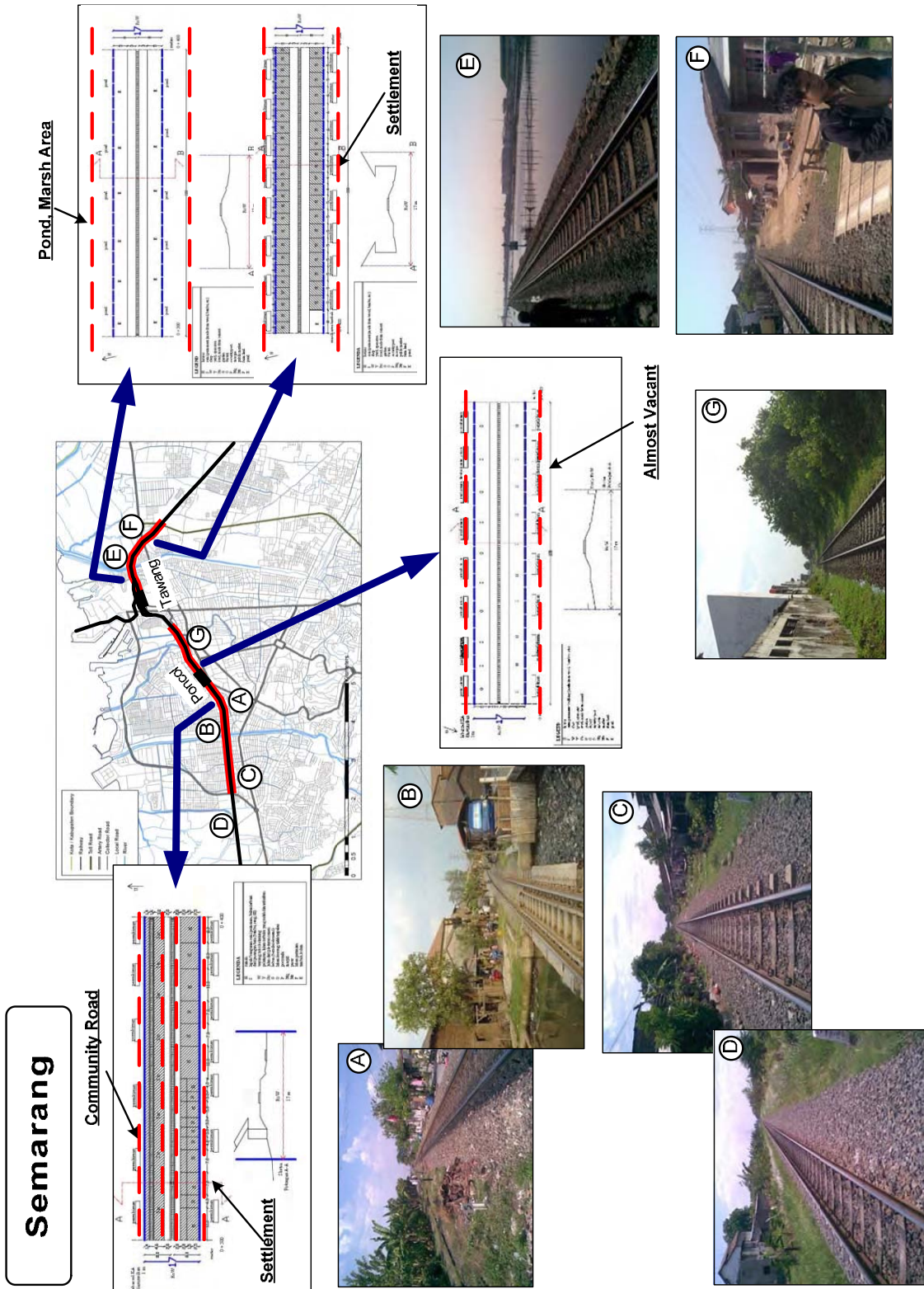


Figure 8.3.8 Land Status (Semarang Area)

**4) Public Hearing (Socialization)**

**a. Method**

Public hearing (Socialization) was held at 3 sites where significant impact are predicted because of high density. The table below lists location, date and number of participants.

**Table 8.3.15 Location of Public Hearing**

Location	Area Participated	Date	Number of Attendances
Yogyakarta	Kel. Sosromenduran	3 <sup>rd</sup> November, 2008	50
Solo	Kel. Kestalan	6 <sup>th</sup> November, 2008	50
Semarang	Kel. Tanjung Mas	11 <sup>th</sup> November, 2008	50

Source: CJRR Study Team

At the same time of public hearing, questionnaire survey was also carried out. Major points in the questionnaire are:

- What do you expect and request in railway service development?
- What environmental issue do you concern caused by railway service?
- What issues do you think shall be required in the implementation of railway service development?

**b. Result**

Attendance lists and minutes of meeting are attached in Appendix. Public comments in the socializations are summarized as below:

A: Yogyakarta

- Generally all participants agreed with railway development presented in the Case Study. However their concern was possibility of negative impact especially regarding social and economic impacts such as disturbance on business and unemployment problems.
- Basically residents do not want to be involved with land acquisition. In case land acquisition is required, they would like the developer not to hinder any process on land acquisition.
- Participants suggested to have careful consideration on station building construction to raise safety and conformity of train service.
- Participants strongly recommend to use environmentally friendly trains for reducing noise and vibration.

- Participants pointed out water pollution by oil split from Yogyakarta (Tugu) Station.

B: Solo

- Though all participants agreed on the development plan, they requested to take further socialization to various levels of people.
- The participants suggested harmonizing with tourism development plan in/around Solo (Surakarta). They also suggested to design railway route for easy access to tourism spots.
- Residents mentioned that parking space in Solo Balapan Station is too small so it leads traffic congestion in front of the road. They suggested considering to provide enough parking spaces during station development.
- Residents also mentioned water pollution around stations.
- Residents suggested not hindering any process of land acquisition.
- Participants strongly suggested improving railway services provided by PT. KA.
- Participants are highly concerned with safety especially at railway crossings.

C: Semarang

- Participants basically agreed with the railway system development plan presented in the Case Study.
- Residents requested the Government to solve land conflict between residents and PT. KA in Kampung Kebonharjo (behind Tawang Station). In this place, both residents and PT. KA. have asserted their land ownership.
- Though noise and vibration shows high level, residents do not recognize noise disturbance as serious impact.
- Participants expressed high concern for safety and security especially in/around level crossings.
- Residents complained that no effective countermeasure has been taken against flooding around Tawang Station.

Results of questionnaire survey are:

*Expectation on Railway Development*

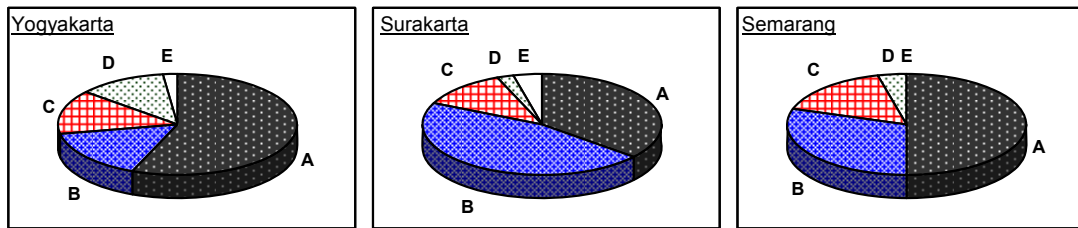
Basically the participants in three areas showed positive thinking for the proposed railway



development plan. Especially they expected mitigation of traffic congestion and economic development. In the socialization they mentioned the need for new buildings and/or rehabilitation of station facilities and services.

**Expectation on Railway Development**

		Yogyakarta	Surakarta	Semarang
A	Train becomes an alternative mode of public transportation	28	18	25
B	Economic activities will increase in Central Java region	8	23	15
C	The cost of public transportation will be cheap	7	6	8
D	Mobilization in the area will be easy and efficient	6	1	2
E	No opinion	1	2	0



Source: CJRR, Public Hearing, 2008

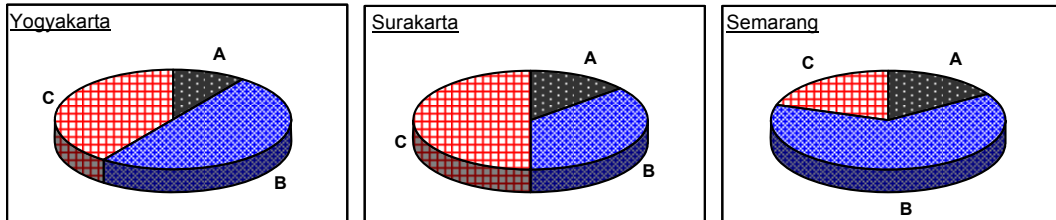
**Figure 8.3.9 Expectation on Railway Development**

Pollution

Most of participants recognised a certain level of air pollution, water pollution and noise disturbance; however, they do not think degree of impact is crucial. The participants in Semarang recognized pollution as relatively more seriously than participants in Yogyakarta and Solo (Surakarta).

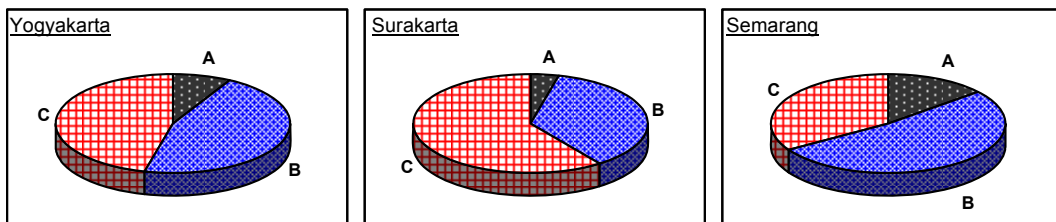
**Perception on Air Pollution**

		Yogyakarta	Surakarta	Semarang
A	Polluted	5	7	8
B	Rather polluted	25	18	32
C	Clean	20	25	10



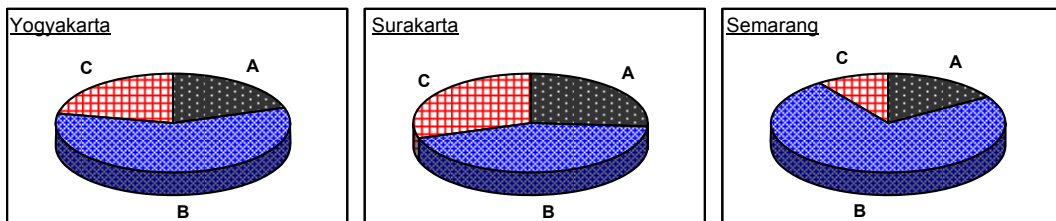
**Perception on Water Pollution**

		Yogyakarta	Surakarta	Semarang
A	Polluted	4	2	7
B	Rather polluted	23	18	26
C	Clean	23	30	17



**Perception on Noise**

		Yogyakarta	Surakarta	Semarang
A	Noisy	10	13	8
B	Rather noisy	29	22	37
C	Natural	11	15	5



Source: CJRR, Public Hearing, 2008

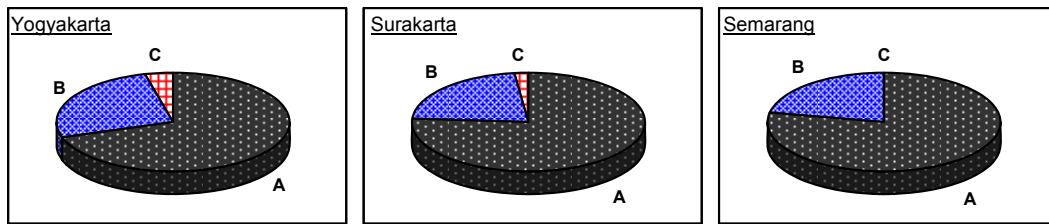
**Figure 8.3.10 Perception on Air Pollution**

Public Information Disclosure and Communication

Almost 100% of participants suggested fair and open disclosure of public information and intensive communication.

**Perception on Public Disclosure**

	Yogyakarta	Surakarta	Semarang
A Important	35	38	39
B Rather important	13	11	11
C Not important	2	1	0



Source: CJRR, Public Hearing, 2008

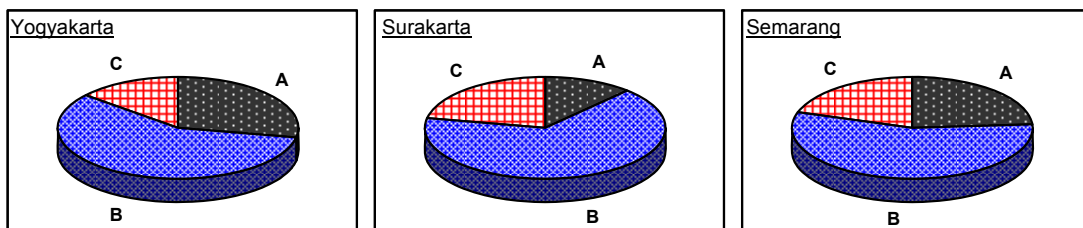
**Figure 8.3.11 Opinions on Public Disclose**

Land Acquisition

Basically participants do not want to be involved with land acquisition; however half of them recognized that land acquisition can be acceptable if the project needs expand to private land.

**Perception on Land Acquisition**

	Yogyakarta	Surakarta	Semarang
A It must be done	14	6	12
B If necessary, it shall be done	29	33	28
C Not acceptable	7	11	10



Source: CJRR, Public Hearing, 2008

**Figure 8.3.12 Opinions on Land Acquisition**

**(3) Conclusion**

The results of IEE Study concluded on the following issues:

- Basically air quality has not indicated serious pollution. River and groundwater are polluted; however basically these levels have still meet the standard.
- Noise level exceeded standard level. The results did not indicate specific impact by railway activities due to existence of various other noise sources.
- There were many houses and/or public properties observed within the area ROW around some major stations such as Barapan, Tawang, Poncol Stations. According to the public hearing in Semarang, residents complained about land conflict between PT. KA, therefore further confirmation regarding legal landowner status will be required. While in peri-urban and rural area, basically area ROW has been kept clear.
- Public hearing and questionnaire give following conclusions:
  - Basically participants welcome the proposed railway programs because they expect improvement of public transportation and economic growth.
  - Though participants recognize air/water pollution and noise disturbance, they do not think the impact is crucial.
  - They strongly suggested taking open and fair public disclosure and close communication.
  - Basically participants can accept land acquisition; however, they request transparency of the process.

### **8.3.3 Environmental Impact on the Railway Development**

Major environmental impacts are summarized below:

#### **(1) Pre-construction Phase**

##### **1) Land Acquisition**

During pre-construction phase, a major significant impact is land acquisition. The IEE study found quite a lot of residents occupied the area ROW near major stations such as Solo Balapan, Semarang Tawanag, Semarang Poncol. This situation will raise community conflict regardless who has exact land ownership or land use right.

##### **2) Decrease of Agricultural Productivity**

The area of land acquisition, especially for construction of stations, will include agricultural/farm land. If farm land is demolished, change of landuse from agricultural use will lead decrease of agricultural productivity. Indonesian National Government has

hammered out protective policy in control of farmland diversion in order to raise food self-sufficiency.

**3) Loss of Job Opportunity**

If the farm lands are acquired, the farmers will lose their income. Local businesses such as a warung are operated near stations and corridors. Their business activities are also degraded.

**4) Land Degradation**

If the land is not properly treated after demolition, the land condition will be degraded. This situation will cause land slide and/or erosion, generation of pest and disease.

**(2) Construction Phase**

**1) Recruitments, Job/Business Disturbance**

Recruitment for construction activity will be expected to hire many and various types of workers. Also construction activities need various type of related business such as transportation service, trading, food services, etc. These are one of the most important positive impacts; many people especially local residents can get new jobs or have the possibility to increase their earnings.

While construction activities may disturb local businesses, also it has the possibility to generate social jealousy in case residents cannot get involved with construction activities.

**2) Traffic disturbance**

Traffic disturbance will occur as the result of mobilization of construction equipment and materials. This impact will occur during construction phase; it leads negative impacts in terms of traffic congestion and traffic accidents.

**3) Waste**

Huge construction waste will be generated by civil works and building constructions. Also base camp operation generates solid and liquid waste, some of them are categorized as toxic and hazard waste (B3). Leachate production by base camp operation discharge can pollute river and underground water surrounding residential site. If waste treatment is not appropriately taken, the impact also causes insect breeding and disease.

#### 4) Noise and Vibration Disturbance

Noise and vibration are one of the most critical impacts during construction. Operation of heavy equipment and vehicles will generate noise and vibration disturbance. These impacts occur not only in the project site but also along the mobilization route. Therefore it is necessary to arrange mobilization route and schedule to avoid sensitive zone such as hospitals, schools.

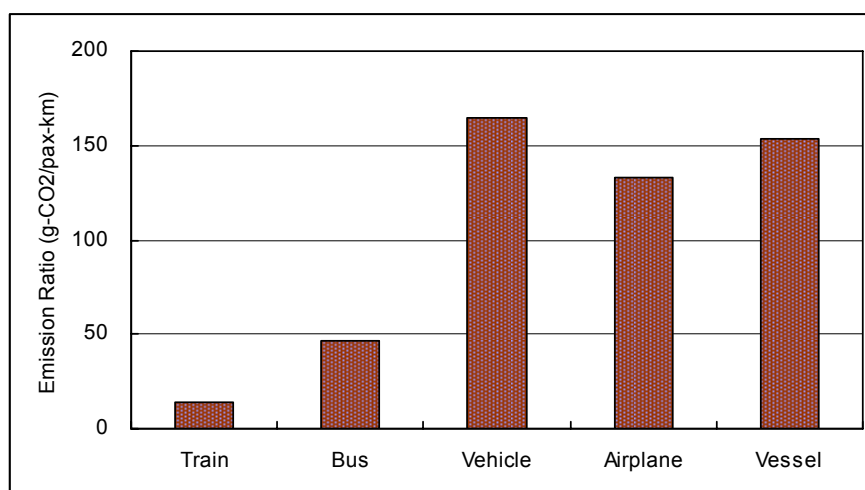
#### 5) Air Pollution

During construction phase, civil works and mobilization of construction materials will generate air pollution, especially dust pollution. This impact is also generated along the mobilization route.

### (3) Operation Phase

#### 1) Air Quality

It is expected that improvement of public transportation such as railway projects can mitigate air pollution during operation phase due to reduction in vehicle transportation load by traffic mode shift from private car and bus transportation to railway transportation. Especially the issue of reduction of CO<sub>2</sub> emission, which is a critical global environmental issue, can be expected. The figure below compares CO<sub>2</sub> emission rate by each transportation mode. As described in the figure, CO<sub>2</sub> emission by railway is only approximately 30% of that of bus transportation, and 9% of that of private car.



Source: CJRR Study Team calculating based on Agency for Natural Resources and Energy Japan, 2004

**Figure 8.3.13 Estimated CO<sub>2</sub> Emission by Transportation Mode**

The Table below shows expected reduction of CO<sub>2</sub> emission by proposed programs. If proposed projects are implemented, it is expected to reduce approximately 350,000 tons of CO<sub>2</sub> annually.

**Table 8.3.16 Expected CO<sub>2</sub> Reduction**

Project	Annual CO <sub>2</sub> Reduction at 2030 (ton-CO <sub>2</sub> /y)
<b>Commuter Train</b>	
Semarang Commuter (67 km)	95,875
Solo Commuter (58 km)	58,531
Yogyakarta Line (58 km)	62,512
<b>Urban Railway and Airport Link</b>	
Semarang Monorail (9 km)	38,849
Solo Tramway (11 km)	9,873
Yogyakarta Tramway (29 km)	23,931
Semarang Airport Link (9 km)	961
Solo Airport Link (7 km)	382
<b>Fright Train</b>	
Semarang - Solo Corridor inc. Semarang Port Access (112 km)	28,077
Wonogiri – Solo Corridor (40 km)	1,826
Solo Dry Port Access (2 km)	8,894
Yogyakarta Inland Port Access (24 km)	11,846
<b>Total</b>	<b>341,557</b>

Source: CJRR Study Team

**2) Noise and Vibration Disturbance**

The Projects will raise frequency of train service; it may lead acceleration of noise/vibration disturbance. This increasing of noise and vibration will cause impacts to the environment in the form of disturbance to the amenities and public health. Also these negative impacts will accelerate community complaints.

**3) Risk on the Railway Accidents**

Increasing frequency of trains, widening ROW by double tracking will raise the risk of railway accidents especially at road crossings. In addition, these impacts will cause split of communities. This situation will raise community complaints.

**4) Water Pollution**

Operation of stations and other related activities, such as shops or food service, beverage stores and canteens for the employees and passengers, will generate domestic waste. Moreover,

workshop activities in the Depot also generate huge waste possibly containing toxic and hazardous materials. If this waste is discharged without appropriate treatment, water pollution will be accelerated.

### **8.3.4 Recommended Mitigation Plans**

#### **(1) Pre-construction Phase**

##### **1) Land Acquisition**

Generally, a railway development project requires large-scale land acquisition, which can occasionally cause delay in project implementation. The related matters listed below need to be paid very serious consideration.

- Adequate compensation price: General procedure of land compensation in public development is based on NJOP price (“*nilai jual obyek pajak*” or average price obtain from normal market sales). However NJOP price is generally lower than market buying price, so that it may be possible that the compensation amount cannot purchase the same grade of land and/or property elsewhere. Hence compensation price should be set to meet realistic and reasonable terms.
- Income recovery: Some residents, such as farmers, may have to change their occupation due to land selling. Also, local business activities beside railway corridor and/or mobilization route will be affected by construction activity. This situation can cause loss of their income level. Income recovery program is useful to support residents to raise their incomes to the current level. Such programs shall be formulated and implemented in coordination with concerned government bodies.
- Support to illegal occupation within ROW: Illegal activities in the ROW of railway corridors in the Central Java region are relatively small compared with those in JABODETABEK area. However in some area such as near Solo Balapan station, many illegal occupants are found, and such residents may claim their rights. Even though their claim is not under legal status, it is necessary to consider their situation. Otherwise it can cause social conflict that obstructs project implementation.

##### **2) Decrease of Agricultural Productivity**

Indonesian National Government has hammered out protective policy in control of farmland diversion in order to raise food self-sufficiency. Total project area will be consisted of less



than 0.1% of paddy field in the Central Java region, therefore it is not expected to adversely affect the food security. However, it is important to harmonize with said policy to minimize area of affected farm land by land acquisition. In addition, it is also recommendable to give a support program for improvement of food security to compensate loss of agricultural productivity, such as technical and/or financial support of installing mechanized farming, efficient irrigation system, e.g.

### **3) Loss of Job Opportunity**

Loss of job opportunity is related land acquisition. In order to mitigate loss of job opportunity, income recovery program, which is explained above section, shall be paid serious consideration.

### **4) Land Degradation**

Below mitigation is suggestible to mitigate land degradation:

- To properly treat the land with cutting bushes, installing temporary drainage to avoid puddle, covering slopes, e.g.

## **(2) Construction Phase**

### **1) Recruitments, Job/Business Disturbance**

Job opportunity and related business chances are expected to bring major positive impact, while it has a possibility to raise jealousy among local communities. To prevent such jealousy and to encourage job opportunities, the following actions are proposed:

- To give employment opportunity to the local community.
- To establish adjustable recruitment conditions with the labor's needs and their education level, skills and types in accordance with Upah Minimum Propinsi (UMP) and conformable with the provisions of labor force.

### **2) Traffic disturbance**

Traffic disturbance will occur around project site including mobilization route. Mitigation or prevention that has to be conducted are as follows:

- To arrange schedule of mobilization and demobilization of equipment to avoid generating traffic congestion, and to avoid busy hours.

- To install traffic signs at the entrance and exit gates of vehicles and heavy equipments.
- To provide adequate parking lots in the base camp, and to forbid parking vehicles on the roadside.

### **3) Waste**

For mitigating the impact, the following plans are recommended:

- To provide temporary waste dumping site.
- To segregate plastic, iron, paper and wooden waste that can be recycled/reused.
- To build closed drainage canal with adequate water treatment system.
- To collect residue of oils, lubricating oil in drums, then send it to authorized agency or to be treated.

### **4) Noise and Vibration Disturbance**

Loading and unloading materials and mobilization in/out the base camp will lead increasing noise disturbance. The following mitigations are recommended:

- To use least noisy equipments.
- To make routine maintenance of vehicles and heavy equipments.
- To set screens around the base camp, especially at the loading/unloading area.
- To arrange mobilization and loading/unloading schedule to avoid night times.

### **5) Air Pollution**

The impact to ambient air quality is generated not only in/around project sites but also along the mobilization route.

- To select environmental friendly equipment, for example gasoline-powered machines generate less air pollutant than diesel-powered. In case of using diesel-powered machine, black smoke shall be reduced by appropriate purification attachment.
- To maintain the construction equipment properly to minimize exhaust gas in accordance with the related regulations.
- To use covering sheet on bulk construction material during transportation.
- To place construction materials and demolition waste properly in the construction land

area.

- To spray water to prevent dust spread during mobilization.

### **(3) Operation Phase**

#### **1) Noise and Vibration Disturbance**

Increasing train operation will accelerate noise/vibration. Recommended mitigation procedures are:

- To construct sound barrier to reduce noise disturbance adjacent to the residential zone, Mosque, school etc.
- To install least noisy equipment and train.
- To install or coat the ground surface around the railway with gravel to muffle the vibration from the railroad.

#### **2) Risk on the Railway Accidents**

- To build over-pass and/or underground level crossings.
- To improve railroad operational management.
- To disseminate and educate people about railway safety program in order to instruct not to cross railway at inadequate crossing point, and to follow traffic rules.

#### **3) Water Pollution**

To prevent negative impact, the following plans are recommendable:

- To install adequate water treatment facility.
- To collect used oil and lubrication in a drum, that shall be sent to the authorized agency in waste treatment based on Pertamina recommendation. The storage shall be set up at adequate location to be protected from rain and water inundation.
- To provide trashcans at the appropriate areas of railway service.
- To install a warning sticker to prohibit the railway service users and station staff from disposing the waste/garbage to non-designated areas.
- To maintain public facilities (mushala, toilet, public telephone, etc) and to appoint cleaning service staff who are well trained.

### 8.3.5 Phasing of Project

Considering economic, technical and environmental aspects, phasing of projects can be proposed as follows (See Table 8.3.17). Short (2010-2014), middle (2015-2019) and long (2020-2030) projects are shown in Figure 8.3.14, Figure 8.3.15 and Figure 8.3.16 respectively.

**Table 8.3.17 Project Phasing of the Central Java Region**

Unit: million USD in 2008 price

Project Packages	Route (km)	Project (km)	Capital Cost	Cost per km
<b>Short Term Projects</b>				
1-1 Semarang Commuter	43	34	106.2	3.1
1-3 Yogya Commuter	58	58	129.5	2.2
Sub Total	101	92	235.7	2.6
<b>Middle Term Projects</b>				
1-2 Solo Commuter	58	58	143.9	2.5
3-1 Semarang Airport Link	9	4	32.7	8.2
4-1 Semarang – Solo – Yogya Freight Corridor	115	101	121.6	1.2
4-3 Kendal SEZ Access	5	5	20.9	4.2
5-5 Semarang - Tegal Intercity	150	150	45.0	0.3
5-6 Semarang - Cepu Intercity	140	140	36.0	0.3
Sub Total	477	458	400.1	0.9
<b>Long Term Projects</b>				
2-1 Semarang Monorail	12	12	181.0	15.1
2-2 Solo Tramway	6	6	51.9	8.6
2-3 Bantul Tramway	15	15	111.1	7.4
3-2 Solo Airport Link	7	8	69.3	8.7
4-2 Wonogiri – Solo Freight Corridor	36	36	25.8	0.7
5-1 Yogya – Magelang Intercity	47	47	177.7	3.8
5-2 Borobudur Access	7	7	11.7	1.7
5-3 Magelang – Ambarawa Intercity	37	37	125.4	3.4
5-4 Ambarawa – Kedungjati Intercity	37	37	76.3	2.1
5-7 Semarang – Demak – Rembang Intercity	110	107	360.3	3.4
Sub Total	314	312	1190.4	3.8
Grand Total	892	862	1826.1	2.1

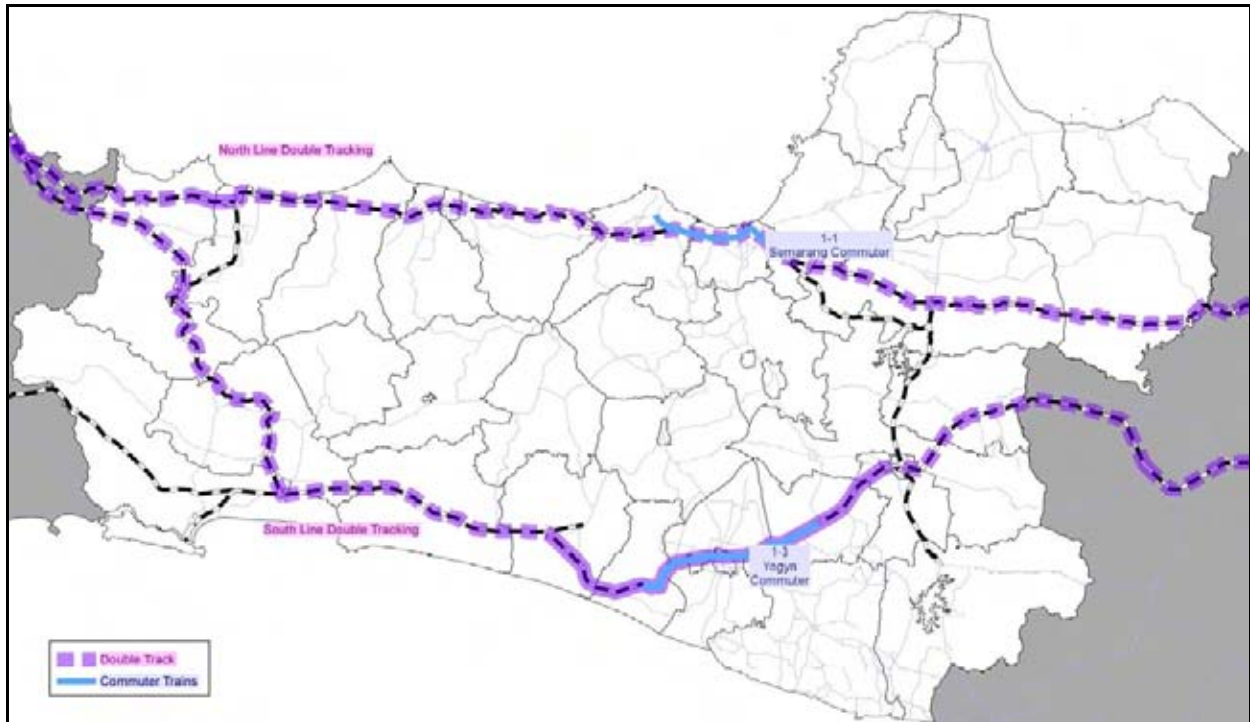


Figure 8.3.14 Short Term (2010-2014) Railway Development Projects in the Central Java Region

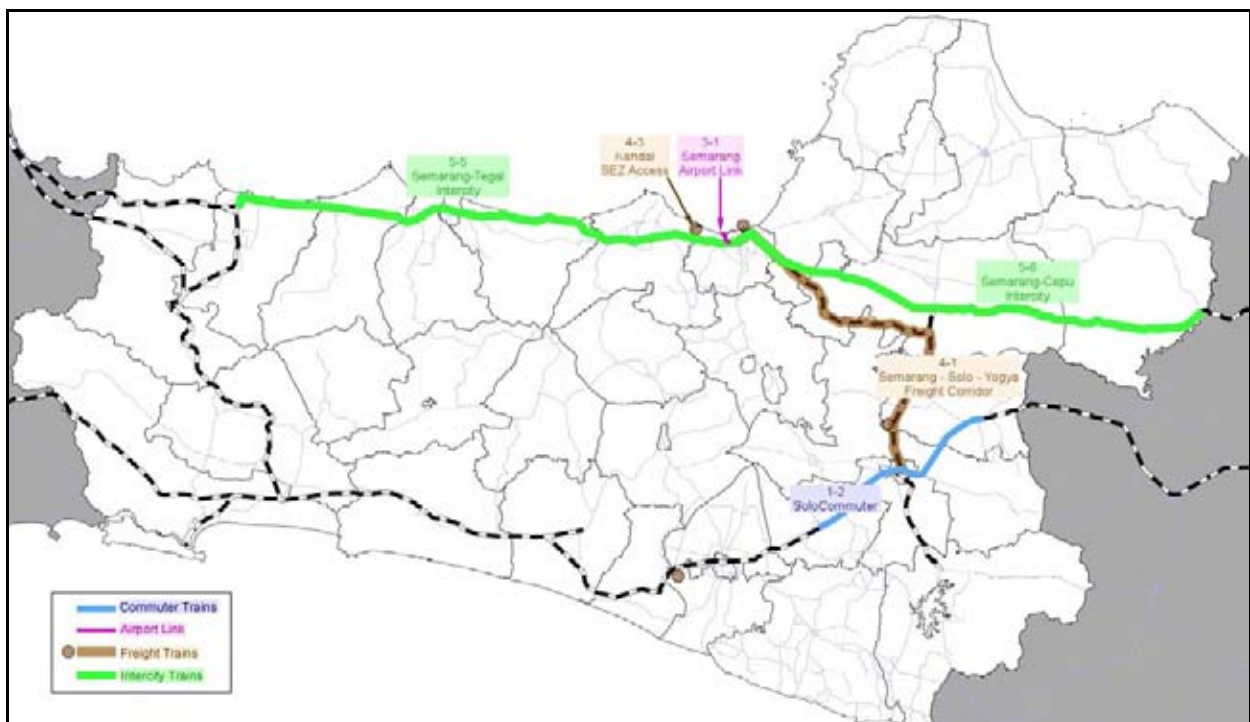


Figure 8.3.15 Middle Term (2015-2019) Railway Development Projects in the Central Java Region

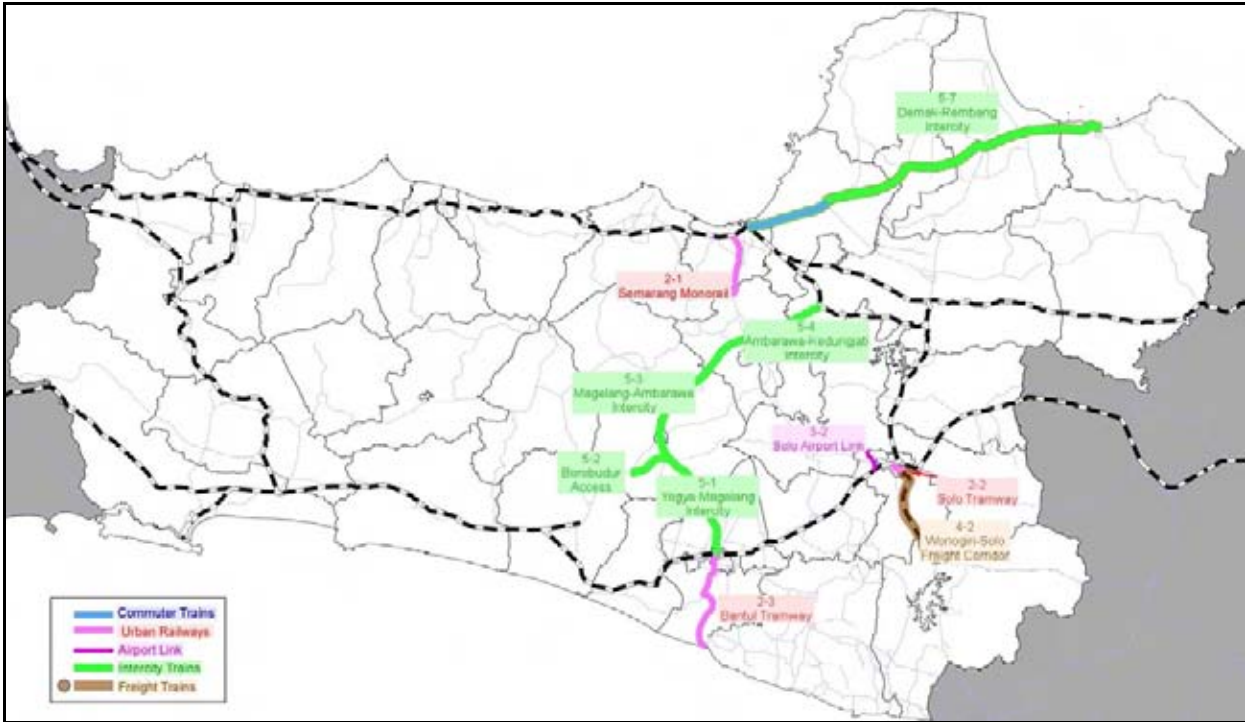


Figure 8.3.16 Long Term (2020-2030) Railway Development Projects in the Central Java Region

## **8.4 Institutional Setup for Regional Railway Company**

### **8.4.1 Types of Travel Flow and Responsibility of Central / Local Governments**

#### **(1) Inter-Regional Passenger Travel**

The Java north and south main lines, including Cirebon – Kroya section, serve inter-regional passengers and therefore the Central government should be responsible for these railway lines.

#### **(2) Intra-provincial Passenger Travel**

The majority of passengers traveling the Semarang - Solo corridor are the residents of Central Java Province and so the benefits of railway service improvement on this line will go to the residents of the province. The Central Java provincial government should be responsible for the development and improvement of the railway infrastructure and facilities.

#### **(3) Passenger Travel in Metropolitan Areas**

People commute from home to working place and school every morning and going home every afternoon. The major commuter flows are seen between the city center and the surrounding areas which are located not merely within cities of Semarang, Solo and Yogyakarta, but also outside of the cities. To serve commuter travel, commuter railway service is proposed and this railway service crossing kabupaten and kota boundaries should be the responsibility of the provincial government.

#### **(4) City Passenger Travel**

Railway services within the city area could be provided by Kota government. This includes Solo tramway and Semarang monorail since these railway systems serve travel demand in the city area.

### **8.4.2 Privatization of Railway Transportation Industry**

World-wide, there are many examples of the involvement of the private sector in the railway industry, resulting in more efficient rail services and reduced cost and administrative burden of the government. Some examples are described in this section, how they might be implemented in Indonesia, along with examples of how other countries have adopted these efficiency improvements.

The following is a brief description of six different techniques/models for improving the

efficiency of railway operations; these range from minimal private sector involvement (improving the operating efficiency of freight trains by PT. KA) to total control over railway operations and maintenance (railway concessions). Some examples are described from around the world and the advantages and disadvantages of each model must be evaluated by policy makers. These techniques/models are summarized below and described in the following section; they are listed by increasing intensity of private sector involvement:

- Operation of more efficient freight trains
- Separation (“outsourcing”) of non-core activities from the national railway
- Private companies (typically freight forwarders) contracting trains operated by the national railway
- Private trains operating on infrastructure of the national railway (“Open Access”)
- Private sector operation of light density railway lines
- Railway operating concession

#### **(1) Operation of More Efficient Freight Trains**

Most railway systems in the world operate freight trains with the braking system of the locomotives connected with each wagon by means of a brake pressure pipe; when brakes are applied on the locomotive, brakes for the entire train apply at the same time; locomotives and wagons are all equipped with braking systems. On some railways, where long heavy trains are operated over long descending gradients, there is often the need to set up “brake retainers” on some wagons so as to retain braking pressure in the train line as a safety factor. On most trains, breaking only the locomotives is not sufficient to stop the entire train safely.

However in Indonesia, many freight trains operated by PT. KA use old 2-axle wagons that have no braking system connected with the locomotive; stopping the train must be accomplished with the assistance of brakemen riding on every 4<sup>th</sup> or 5<sup>th</sup> wagon in a train who manually apply brakes to each wagon); only the locomotive is equipped with brakes. Such trains must be short, typically between 8 and 15 wagons, resulting in very low productivity; a single freight train may carry only 200 or 300 net tons. On a railway where line capacity is utilized at close to (or exceeding) 100% on some lines, this is not good utilization of line capacity.

If PT. KA (or any private freight train operator) is serious about operating an efficient freight service, new wagons must be acquired to increase the net tons per train and eliminate this outdated practice of manual braking of freight trains. While there are constraints to operating



longer trains, such as length of passing sidings, yard tracks, lack of high capacity wagons, etc., these constraints can be overcome, and greater efforts need to be made to operate more efficient freight trains not only to provide better service to customers but to maximize the productivity of existing railway lines. In fact, it should be a condition that applies to any future track doubling projects, that the rail operator prepare and begin to implement a plan to eliminate the 2 axle wagons and the practice of manually braking freight trains.

### 1) Separation of Non- Core Functions from PT. KA

It has been the experience in many other countries that separation of non – core railway functions can result in service improvements as well as reducing the high fixed costs of supporting these facilities. It also allows railway management to focus on the important issues of providing efficient and effective railway services to customers. The following are examples of outsourcing of non – core railway functions in other countries.

- **Example: Privatization of locomotive and rolling stock workshops in Romania.** These facilities have been sold to private investors, from Romania as well as from other European countries. Work is performed on a contract basis for equipment of the Romanian Railways; quality of the work is satisfactory and the system resulted in significant manpower reductions from the Romanian Railways and decrease in the company's overheads.
- **Example: Privatization of Routing Track Inspection and Maintenance in Thailand.** The single track railway line of the State Railway of Thailand (SRT) in northern Thailand between Udon Thani and Nong Khai (border station with Laos) is maintained by private track maintenance forces. For any major repair or rehabilitation work, forces and machinery owned by SRT is utilized. This arrangement reduces the administrative burden of SRT as well as its own staff, and consequently the fixed cost burden.
- **Example: Privatization of Passenger Coach Cleaning at Nong Khai station in Thailand.** This practice results in similar benefits as the previous example of separation of functions from the SRT and moving to the private sector.

### 2) Separation of Branch Line Operation

One of the non – core functions of PT. KA that we specifically recommend be separated is the railway museum at Ambarawa, as well as the operation of the tourist railway line at the same location. A private organization, with some expertise in train operation and tourism would be well – suited to operate and manage this popular facility in the Central Java region. In addition, branch lines, such as the Solo – Wonogiri line, could also be candidates for private sector operation.

## **(2) Freight Forwarders Contracting for Unit Trains with Government-owned Railway**

This has been done successfully in many countries, including Thailand and South Africa. In these countries, a private sector organization has arranged freight train services for customers by contracting with the operating rail carrier.

- Thailand

Pro Freight Ltd. operates and Inland container depot (ICD) near Bangkok, contracts with the State Railway of Thailand and the Malaysian Railways for the operation of a container train several times per week between Bangkok and Kuala Lumpur, Malaysia. Railway locomotives and crew belong to the State Railway of Thailand (and the Malaysian Railways in Malaysian territory) but the containers belong to the Pro Freight, or shipping lines. Pro Freight has a contract with the Thai and Malaysian Railways to operate the train on the basis of a price per train kilometer. Pro Freight arranges for customers, receives all revenue from customers and just pays the railway operator to move the train between terminals.

While this arrangement is not perfect, on time operation and availability of locomotives is the responsibility of the railway, which does not always perform as desired. In addition, the condition of the track is only fair, with some sections in need of rehabilitation. However, it is an example where a private company, working with inefficient government railways, operating over track that is in need of rehabilitation, can provide satisfactory service to customers who otherwise would use very expensive road transport.

- South Africa

A service was organized in southern Africa in a very similar way as the example from Thailand/Malaysia. A freight forwarder (specializing in containers) Viamax, contracts with the South African Railways, the National Railways of Zimbabwe; the Zambian Railways and the TAZARA (Tanzania-Zambia Railway) to operate a container train between Johannesburg and the Indian Ocean port of Dar es Salaam in Tanzania. Similar to the Thailand/Malaysian example, this service uses the services of four government-operated railways; operates over some track that is in desperate need of repair and rehabilitation, changes locomotives and crew at all borders, but operates a good service for customers and profitable for the operator.

These examples demonstrate that a well-managed private organization can organize rail freight services, using locomotives and infrastructure of inefficient railways, over track that is in need of repair, and still offer a good service to customers. No change in legislation or railway management structure is necessary for implementation-only an innovative approach.

**(3) Privately Owned and Operated Freight Trains on Government-owned Infrastructure (“open access”)**

This is essentially the “open access” system used in the European Union countries. Under EU regulations, each country’s railway must allow the operation of trains belonging to any organization to operate over its lines, and the track access charges must be non-discriminatory. This means, for example, that track access charges cannot be higher for privately operated trains in order to give advantage to the trains of the government operator.

An example of how this open access arrangement can result in dramatic increases in efficiency can be found in Romania. Since the open access policy was implemented in 2002, more than 30 private operators have registered in the country. In fact, only about 7 or 8 operators operate significant numbers of trains; by 2007 an estimated 30% of the ton kilometers in the important freight corridors in the country are operated by private companies. Service improvements have been dramatic; on one route between the Black Sea port of Constanta and the destination near Brasov, a major city located about 200 km north of Bucharest, transit times for unit oil trains decreased from 3 or 4 days using trains belonging to the government owned carrier to less than 24 hours by privately operated services. These private companies are profitable and offering a higher standard of service compared with the government operator, and freight rates are generally lower.

In Romania, all railway infrastructure is owned by the government, with the national railway responsible for maintenance and dispatching and much of the track is in need of repair and/or rehabilitation. The private operators pay a track usage charge to the infrastructure operator (CFR Infrastructure, owned by the government) which performs all track maintenance and train dispatching functions. Locomotive and train crew are employees of the private operator; the locomotives, rolling stock and terminal facilities are also owned by the private operator. The government-owned railway (CFR Marfa, operating freight trains and CFR Calatori, passenger) also operates trains on the same lines.

**(4) Private Sector Operation of Light Density Railway Lines**

Government-operated as well as large private railways have high administrative overheads and fixed costs that make it difficult to operate and manage some light-density lines effectively. There have been many successful examples of governments offering the right to operate light-density railway branch lines to private organizations (United States and Romania, for example). In most cases, the use of the existing infrastructure is granted fee to these operators, with the stipulation they the private organization will maintain the line and to procure any necessary locomotives and rolling stock.

An example of private sector operation of light density lines was in the United States during the period of the 1970s when there were many unused lines made redundant by the merger of many parallel railway companies. Many individuals purchased rights to operate these lines and some were financially successful; a few even expanded to encompass several lines serving regions of the country not otherwise served by rail. The most significant advantage of these private operators of short line railways was the efficient use of a small number of employees to operate the line, compared with the large numbers of people that would be required under labor practices of major railway companies.

Romania's rail network has been classified into "interoperable lines" and "non-interoperable lines"; of the total of about 11,000 track km, 30% have been designated as non-interoperable. The "non interoperable" lines have been offered to the private sector to operate and maintain as operating concessions, in some cases without having to pay for track access, to encourage private sector participation and investment in rolling stock. While not all offers of these lines have been taken up by private operators, there are some examples where private operators have taken over some lines, invested in rolling stock and operate rail services (passenger and freight) without operating subsidy.

One possible candidate branch line in the Central Java region that could be operated by a private operator is the Wonogiri branch line from Solo. Traffic on the line is very small and future potential is limited to one or two companies that want to establish operations in Wonogiri. These companies could be offered the operating rights of the line, and jointly with a private rail operator could possibly acquire one or two locomotives, some rolling stock and limited maintenance and inspection capability. As an incentive the government may wish to allow a private operator the line without paying track access charges (or maybe only a minimal fee, to cover train control costs), only keeping the line in good and safe condition for operations. This same concept could be used for other branch lines throughout Java as a means to reduce total costs of PT. KA but maintaining service throughout the system.

#### **(5) Railway Operating Concessions**

Probably the most radical of railway efficiency improvements options is the offering of sole operating rights of a railway network for a specific period of time, typically 10 years or more. This has been done successfully in many countries, particularly in Africa and South America. Labor issues, however, typically make this option a difficult one to implement in many countries.

Usually, infrastructure is constructed and owned by the government and the operation,

maintenance and management of the line is the responsibility of the private sector concessionaire. The concessionaire also is responsible for purchase of locomotives and rolling stock as required for costs incurred for moving the traffic. Depending on the perception of the risk, the private sector railway operator may ask for guarantees from the government regarding traffic levels, restrictions on the construction of competing lines and other similar protection for the investment. But these are matters of negotiation between the bidders for the concession and the government.

The concession option usually has the most difficult labor issues to resolve. In the case of an African country (Malawi) the World Bank was a party to the structuring of the concession offer. After the concessionaire was selected, all former employees of the Malawi Railways were offered to the new concessionaire, the concessionaire had no obligation to take all of these employees. Those employees not taken up by the concessionaire were offered severance packages or retraining by the government, with financial support from the World Bank.

***Example from China: Improvement in Railway Efficiency, Local Railways and Provincial Participation***

China has been implementing a policy of railway efficiency improvements and establishment of provincial and joint venture railways for many years with proven success. Starting from the 1980's, the concept of improving railway efficiency through establishing local railways with strong participation from provincial governments has been implemented successfully in China. These early local railways were established at first as special – purpose lines to feed traffic to the main routes of the Ministry of Railways lines (MOR). By the end of 2004, there were 27 joint – venture railways in China, partnerships between the provinces and MOR with significant investments and management from private sector organizations.

The primary national rail network is constructed by the central government and managed by MOR; local railways are financed and constructed by MOR, provincial governments, municipalities, autonomous regions; and joint-venture railways are operated by enterprises independent of MOR, though much of their traffic is interchanged with MOR.

This concept of joint-venture railways has become more prevalent during the past 5 years as there has been the need to mobilize non-MOR financing not only for secondary lines but for the core main line network. In fact, the new high-speed passenger railway between Beijing and Shanghai is to be a joint-venture line with shareholders including MOR, provincial governments and other private investors. By 2004 there were a total of 13,385 km of local and joint-venture railways of the total route km of 74,400 for all railways in the country. The following

information box highlights some of these changes.

#### INFORMATION BOX

##### ***RAIL EFFICIENCY IMPROVEMENTS IN CHINA***

***Railway sector reforms have been implemented since 1978; transition from planned to market economy shifted focus to responding to needs of customers, improving service quality, increased financial accountability and increased efficiency. Dual Approach was followed: Local and joint venture railways have been created while MOR (Ministry of Railways) has become more productive***

##### **Local and Joint Venture Railways in China**

- Nearly 14,000 km of local and JV railways
- Ownership from provinces and MOR
- Operation/financing of rolling stock from private sources
- Tariffs are typically more than double those of MOR
- Two-thirds of these lines are reported to be profitable

##### **MOR is also undergoing reforms and restructuring**

- Non-core businesses being separated (construction, manufacturing, telecoms, design, education and social activities)
- Regional railway administrations accountable for return on capital, output, profitability and safety
- MOR labor productivity doubled since 1992
- Even with controlled tariffs, MOR profitable since 1998, paying \$1.5 billion in taxes during 2004
- 44 sub-region administrations of MOR removed resulting in more efficient train operations and separation of low-density branch lines
- Specialist companies formed to operate container services
- 18 expanded regional container hubs operated by joint ventures with foreign companies

***Example from Thailand/Malaysia/Southern Africa: Privately Contracted Container Trains***

In many countries, even within the environment of government-owned and operated railways, private sector companies (typically freight forwarders) have contracted with railways to operate container trains where the private company keeps all revenue from customers and pays a haulage charge (agreed payment for operation of the train) to the railway to operate the train from origin to destination. The private company performs all loading, unloading and other terminal tasks for the train. This has been a successful venture in Thailand, Malaysia and Southern Africa. The following information box summarizes main points of these operations. In fact, this type of private sector participation can be implemented in Indonesia now, with no change in transport regulations.

INFORMATION BOX

***Private Sector Container Trains***  
***Location: Thailand/Malaysia/Southern Africa***

In Thailand, Malaysia and South Africa,, private-sector freight forwarders have engaged in railway transport in the form of selling space on a container train, operated by government-owned railways but the responsibility of containers ownership, marketing the service and collection of revenue is done entirely by the benefit of the freight forwarder.

- Railways government-owned and operated
- Tracks in need of repair and rehabilitation
- Freight forwarder contracts with railways for train operation
- Forwarder markets the service and takes all revenue
- Disadvantage: reliable train operation subject to availability of locomotives of operating railway
- Service quality could be improved with private ownership of locomotives
- But, service is profitable to forwarders and
- Customers avoid high cost of alternative road transport
- Similar arrangements could be made in Indonesia

### ***Lessons for Indonesia***

The World Bank has undertaken many projects directed towards improving the efficiency of PT. KA-while they have no active rail projects at this time, they recently made an assessment of the Railway Sector in Indonesia:

***“Given the diversity of markets and circumstances, economic development is unlikely to be best served by having one company exclusively responsible for all railway transport services in Indonesia. ...international experience suggests that privately run rail service providers will be more likely to successfully compete with increasingly deregulated and privately-owned competitors in offering transport services...”***

***The rationale that led to the establishment of PT. KA as a Persero has as its next stage a commercially-oriented management structure.....Java Freight Services, which could also be established as a separate company with the necessary management, resources and responsibility to develop the freight business on Java. This would (a) focus a dedicated management team on freight transport customers; (b) counteract the current locomotive and operating priorities given to passenger services and (c) ensure proper separation of the financial accounts. <sup>1</sup>***

There are many examples of railway improvement initiatives that would result in improved efficiency of the railways in Indonesia; the World Bank recommended the separation of freight services on Java and transforming that organization into a commercial entity. While this result may be desirable, it is extremely difficult and time-consuming to transform such an organization. We therefore have presented some alternatives to commercialization of a part of PT. KA, several of which can be implemented now, without the need for additional legislation. These could be seen as “first steps” toward eventual commercialization of rail freight services throughout Java. We have also recommended the creation of a regional railway company and the creation of an infrastructure management company and a rail regulator.

As part of the World Bank’s assessment of the railway sector in Indonesia<sup>2</sup>, there were identified two primary areas of private sector participation: (i) using the new Railway Law as a basis to introduce a Track Access regime enabling organizations other than PT. KA to operate trains; and (ii) privatize or concession existing operations and services of PT. KA. Both of these

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<sup>1</sup> Overview of Railway Sector in Indonesia; World Bank Discussion Paper; May 2006

<sup>2</sup> Ibid



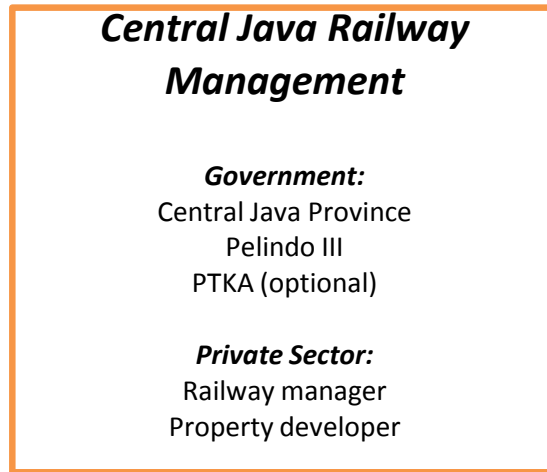
have been included in our recommendations regarding the appropriate role of potential private sector involvement in railways. **The Bank’s report goes on to say, however, that “it is unlikely that the private sector will wish to invest on a risk – taking basis in railway infrastructure in Java...the opportunities for private sector investment in Java are likely to be restricted to train operations”**

### **8.4.3 Establishment of Regional Railway Company**

A Central Java Railway (CJR) is proposed to be established responsible for railway operations over regional lines in the Central Java region on the corridor Semarang – Solo – Yogyakarta.. With a strong and aggressive rail operator, the railway sector can increase its market share, particularly for freight traffic, reducing the tonnage of goods that are now carried by road transport. The regional railway may also be responsible for passenger train operations, depending on the timing of implementation of some of the other proposed projects.

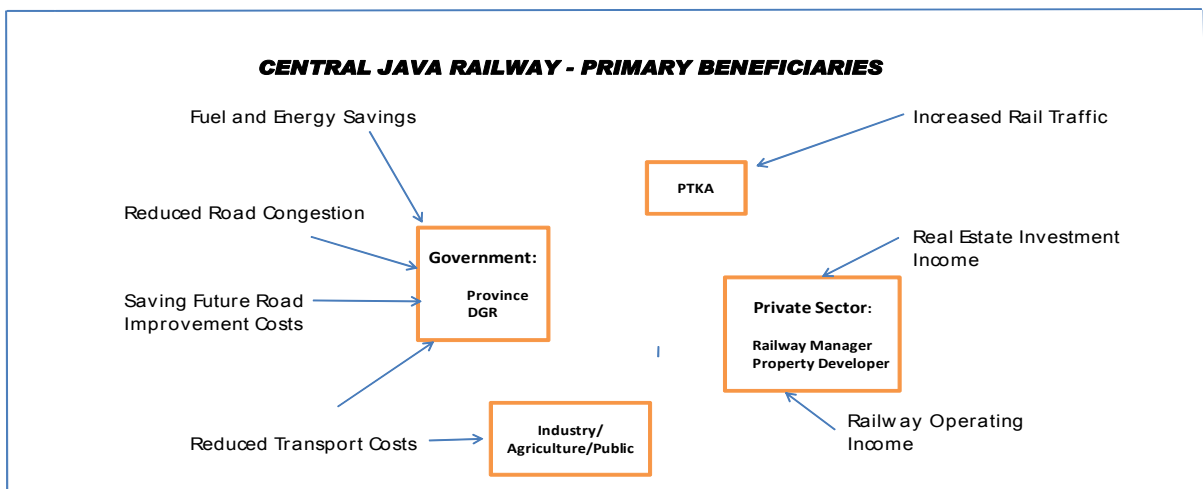
Should the freight project and one or more of the commuter projects be implemented simultaneously, the organizations might well be combined into one company responsible for freight and commuter operations. However, as the type of expertise would be different, it may be advantageous to keep the separate organizations (one organization for freight, another for passenger).

The Rail Operator of the CJR will be an Indonesian legal entity composed of a local freight forwarder and an overseas railway operator. Public sector oversight will be from the provincial government through a performance contract negotiated with the Rail Operator.anager; below is a proposed diagram of the organization. As the access to Semarang port is important in the development of freight business, it will be important to have Pelindo III along with the provincial government representatives providing oversight to railway operations. . In the case of commuter railways, a private sector partner will include a property developer in order to take advantage of the increase of land values due to the railway presence PT. KA will, of course, be involved as required to coordinate technical issues in interchanging of trains between CJR and PT. KA; it could be an active partner in the organization as one of the options that will be described further in this section. PT. KA will also continue to perform track maintenance and train dispatching functions along the CJR lines (Semarang – Solo – Yogyakarta). In the following section, benefits of establishing the CJR are identified for each participating party, and specific responsibilities of the CJR are described as well as the recommended distribution of source of financing of the investments required.



There will be many beneficiaries resulting from the creation of a regional railway, jointly managed by government and private sector entities. From the following diagram it can be seen that there are considerable benefits accruing to the society, represented by the central and local governments, including energy savings, reduced traffic congestion and savings in future road construction costs. The benefit of reduced transport costs will benefit both the public and private sectors as well as provide an incentive to increase agricultural and industrial growth in the region. The diagram includes property developers, which would apply only if the regional railway were responsible for commuter services.

The tasks of the CJR will be to operate trains over the lines designated and also to operate the dry ports in the vicinity of Solo and Yogyakarta. As the dry port operator, the railway can offer maximum coordination for container movements between these facilities and Semarang port. The port authority will also be a partner to assist in maximum coordination of rail access to the container port as well as bulk terminals in Semarang.



**Figure 8.4.1 Central Java Railway – Primary Beneficiaries**

Income to CJR will be from freight revenue, passenger revenue, operating subsidies from central/provincial governments and a management fee from the provincial government. The management fee will be linked to performance and achievement of minimum standards of on time operation and other standards of performance determined by the provincial government.

While there is a significant amount of rehabilitation work required to bring the existing railway infrastructure to an acceptable standard of safety and performance, we consider that it will also be important to bring a private sector railway manager into the CJR organization to lead a strong drive towards increasing the market share of the railway in the Central Java region through aggressive marketing of existing and potential railway customers and to explore and develop innovative operating arrangements with PT. KA that would enable CJR to deliver reliable and effective rail service to the shipping and traveling public.

The responsibilities of the CJR may include<sup>3</sup> operating existing regional passenger and freight trains, commuter rail services in the vicinity of Semarang, Solo and Yogyakarta, establishing rail access to dry ports in Solo and Yogyakarta as well as possibly to a new Special Economic Zone in the vicinity of Semarang and to undertake real estate development in the station areas of Semarang and Yogyakarta. The real estate developer would invest in attractive projects, likely including construction of station facilities in Yogyakarta and Semarang that would include other related facilities, such as shopping malls, and possibly an international convention center. The developer would be a partner in CJR and would enter into a profit-sharing agreement where payments to CJR would be made reflecting the value of rail passengers as potential consumers and the increase in the value of land due to the improved rail facilities. It may also be feasible to attract a real estate investor to develop high-density residential facilities along the railway line outside the center of the city. This would increase the attractiveness of the rail facility to potential passengers.

### **Recommended Approach to Improve Railway Efficiency**

We recommend a dual approach: *(i) begin the process to create the CJR by drafting the MOU between the Minister of Transport and the provinces of Central Java and Yogyakarta to create a regional railway organization;* and *(ii) establish the pro-rail policy in the Directorate General of Railways.*

This pro-rail transport policy by the Ministry of Transport will be designed to increase public awareness of the efficiencies of rail transport as well as to provide some financial incentives for

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<sup>3</sup> Further in this section we present the alternatives of the responsibilities and obligations of the CJR

companies to use rail transport to a greater extent. Suggestions for this policy were shown previously in this report and would enable the Ministry to apply several additional measures that would help develop a stronger and more effective railway network in the country.

*With regard to the operation of more efficient freight trains, this needs no changes in organization, laws or regulations. A joint task force should be established between DGR and PT. KA to investigate the steps that need to be taken to improve the efficiency of freight train operation. This task force could recommend new equipment acquisitions, rehabilitation of existing equipment as well as lengthening of some crossing loops on the single track sections, where this constraint limits train size.*

#### **8.4.4 Marketing in New Railway Business**

It will be necessary for CJR management to be innovative in pursuing future traffic opportunities. It is for this reason we have stressed the importance of bringing to the organization an experience railway manager from the private sector. In addition, there may be a shortfall in the capital funds available from the government to support the cost of infrastructure improvements. The real estate investor can be a potential partner to help support this capital expenditure program, as well as to share real estate profits in the form of annual payments to CJR.

It is envisaged that the CJR will be able to market rail services beyond its operating territory to include all of Java. For example, it may be feasible to organize block trains, possibly with motive power purchased/leased by CJR, to other locations in Java, such as Jakarta and Surabaya. For example, CJR could organize unit trains, operate them within CJR territory, negotiate running rights contracts with PT. KA for the remainder of the distance to final destination. CJR would keep all the revenue generated by this service and pay to PT. KA an agreed amount per train kilometer for use of PT. KA infrastructure and train control facilities. The information box shown previously describes examples of this type of arrangement which can be accomplished without any restructuring or reorganization of PT. KA. Of course there may be line capacity issues, but these are being resolved during the coming few years and this constraint should be reduced considerably.

Marketing will be important for passenger service also. It is envisioned that **the regional railway will operate passenger services on the basis of a performance contract with the provincial government**, the primary beneficiary of such services. One of the provisions of this performance contract could be incentive payments linked to increases in passenger ridership. This will provide the incentive for the operator to market rail passenger services, as well as to

offer the most attractive services possible, in order to maximize income for the operator as well as economic benefits accruing to society.

#### **8.4.5 Institutional Setup for Central Java Regional Railway Service**

The Central Java Regional Railway (CJR) is proposed to incorporate a strong private sector participation, strengthen railway service, make it more competitive, and provide an additional source of capital investment funds to grow the railway business in the Central Java region. The territory of operation would be Semarang – Solo – Yogyakarta over tracks owned by the central government, maintained and control of trains by PT. KA. The primary functions to be undertaken by CJR would be train operation (train and engine crews CJR employees), ticket sales for commuter services operated and promoting and selling improved freight transport services. Financing of needed capital improvements in the track and signaling systems (and electrification in the case of commuter transport) would be from a combination of central and provincial government sources. Funding for rolling stock and some minor infrastructure improvements would be from the railway operator (CJR). CJR would reimburse PT. KA for track maintenance and train dispatching through payment of a track access charge (maintenance and train control fee) and for the capital improvements to the infrastructure paid by the provincial government, a track access charge would be paid. To the extent commuter services operated by CJR are economy class trains, a PSO subsidy would be paid from central government, with a possible additional amount from the provincial government to cover any remaining shortfall.

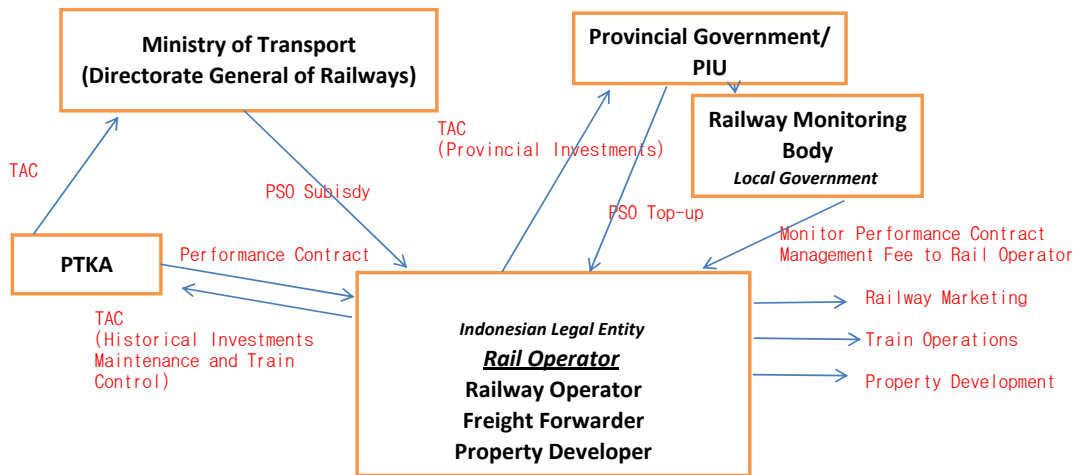
##### **(1) Alternatives of Organization Structure**

There are several alternative ways to structure this concept; these alternatives are described in the following.

- (i) Establish a Local Government Owned Enterprise (LOE) to develop and administer a performance based contract for the rail operator. The performance based contract would include the payment of a management fee to the operator, provided certain operational service standards are achieved. The railway operator would be granted a concession to operate the line for a period of twenty years, for example. Performance of the operator would be reviewed every five years, and if found to be suitable, the concession would be continued for another five years. During the start – up phase of the project a Project Implementation Unit (PIU) within the provincial government would be established to

develop and monitor the bidding and selection process of potential candidate companies to become the rail operator. After the rail operator is selected and begins operation, the PIU will fall away and be replaced by a LOE to administer the performance based contract. This LOE would be staffed by individuals familiar with railway operations, finance and management; possibly some of the same individuals as in the PIU. The rail operator would be an Indonesian legal entity, most likely a partnership of an Indonesian freight forwarder, a real estate developer and an overseas railway operator and would be selected through a competitive bidding process. The real estate developer would be essential if the CJR were to operate commuter services as the concept would be to develop high – density housing along the railway line in order to make the commuter services more attractive to potential users.

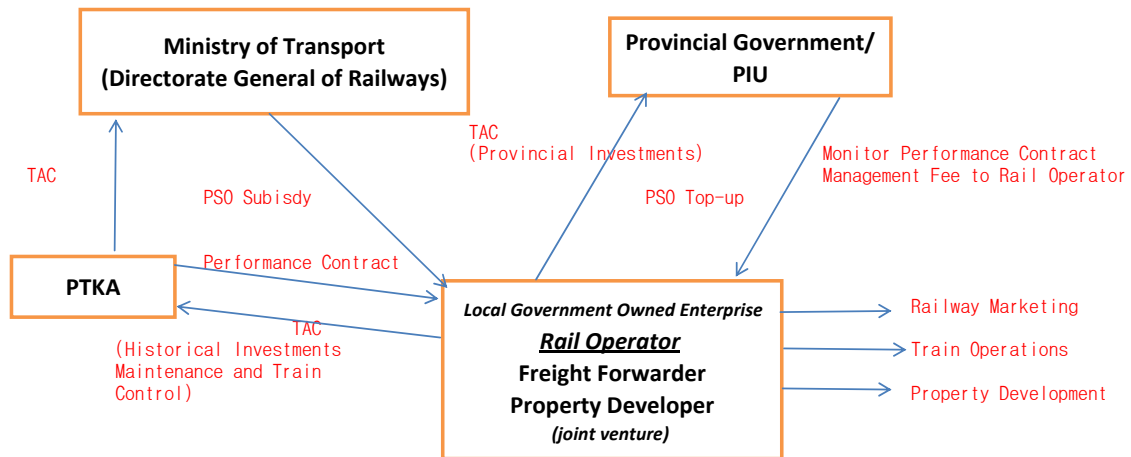
**Regional Railway Organization Option #1**



**Figure 8.4.2 Regional Railway Organization Option #1**

- (ii) The second alternative would be to establish a LOE responsible for train operations and would be a joint venture with the private sector rail operator. Composition of the rail operator would be similar as described in the first alternative. The performance based contract would be established between the LOE and the provincial government, monitored by the PIU. The PIU would monitor the standards of service provided by the operator with respect to this contract and would form the basis of payment of a management fee provided the standards of service are achieved.

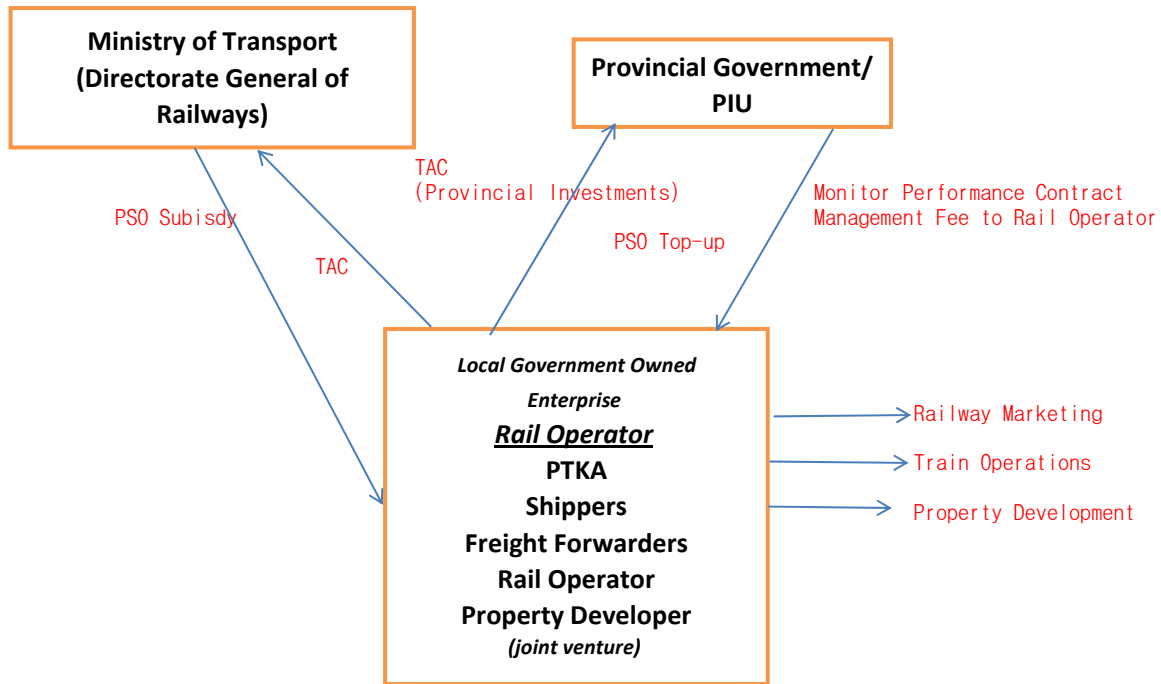
**Regional Railway Organization Option #2**



**Figure 8.4.3 Regional Railway Organization Option #2**

- (iii) A third alternative would be to establish a joint venture between PT. KA, individual shippers and the private sector rail operator. Possible shippers would include Holcim cement and freight forwarders handling container movements, as well as possibly other interested parties. In this case, PT. KA would operate all trains and the role of the private sector rail operator would be limited to marketing new services, procurement of new rolling stock where necessary and organizing block trains to be operated by PT. KA for individual shippers (primarily for cement, containers and coal traffic). Under this third alternative, there would be no change in the structure or manner in which track access fees are administered or paid.

**Regional Railway Organization Option #3**



**Figure 8.4.4 Regional Railway Organization Option #3**

**(2) The Bidding Process**

Then Central Java Railway operator will be selected from interested private companies through a process of competitive bidding. The criteria for selection would depend on whether the services to be provided included only freight transport or also the development of rail commuter services. At a minimum, the operator would be expected to provide sufficient rolling stock to operate the train service, as specified, as well as the cost of providing for routine maintenance and inspection of trains. In the bidding documents, the standards of service would be clearly identified in terms of number of trains operated, headways, composition of rolling stock, etc. If the service included providing commuter services, the selection criteria could include such items as any requirement for subsidy from the government (either central or provincial) to cover any shortfall in revenue to cover operating costs. Another option for the selection criteria is to allow the operator to establish fare levels; the operator that requires the lowest fare level, while maintaining the specified level of service, would be ranked high. The selection process would likely be a multiple criteria evaluation process, with a scoring system based on, for example, lowest passenger fare offered, highest track access charge as well as other criteria as identified in the bidding documents.

The bidding and selection process will be undertaken by the Project Implementation Unit of



provincial government, possibly with the assistance of outside consultants. Standards of service will be established at the provincial level, with consultation with MOT (Directorate of Land Transportation) and incorporated in the minimum requirements for evaluating bidders. In addition, there will be minimum financial criteria required for successful bidders and a proven track record of successful business ventures; this is normally part of the developing of the short list of qualified bidders.

### **Suggested Selection Criteria of Railway Operators' Bids**

#### Consultation

#### Establish Minimum Operation Standards

- 1. adherence to minimum operation standards*
- 2. maximum track access fee*
- 3. minimum subsidy requirement*
- 4. minimum management fee requirement*
- 5. proven track record of railway management and operations*
- 6. develop clear scoring system to select winning bid*

**Figure 8.4.5 Suggested Selection Criteria of Railway Operators' Bids**

### **(3) Recommended Institutional Alternative**

Three institutional alternatives were presented for the proposed Central Java Railway. While it is possible to establish the railway along the lines of any of these three, their impacts on the objectives of establishing this organization will likely be different. These objectives include creating an organization structure favorable for private sector involvement that would lead to increased freight traffic moving by rail through innovative rail operating and marketing practices as well as efficient operation of rail commuter systems in accordance with the performance contract with the provincial government. This private sector involvement would likely include an Indonesian freight forwarder and a rail operator from overseas. Involvement of the private sector would also provide an additional source of project finance for purchase of locomotives and rolling stock, as well as possibly some additional investments in the railway system. Perception of risk by the private sector company, will have a direct impact on their willingness to participate and to make these investments.

Alternative #1 provides for the maximum involvement of the private sector in the operation and management of the railway; Alternative #2 and #3 while still providing for the involvement of the private sector, the strength of the private sector operator is diminished and the likelihood of

the operator becoming a source of project finance is less likely. For example, in Alternative #2 the Rail Operator, while still composed of a private sector operator and a local freight forwarder, the organization would be a Local Government Owned Enterprise (LOE), while in Alternative #1 it would be an Indonesian legal entity. Under Alternative#3, the LOE would also include PT. KA. Under Alternative #2, the relationship between the rail operator, freight forwarder and property developer would be one of a joint venture, still a favorable structure for private sector investment, though less so compared with Alternative #1. Under Alternative #3, it is highly unlikely that a private sector operator from overseas would be interested in joining a partnership with PT. KA and would be willing to invest money in rolling stock and locomotives. Benefits of the innovation benefits of a private sector rail operator would be significantly diminished under Alternative #3, as the risk perceived by the prospective investor would be much greater than with Alternatives #1 and #2.

There are, however, some opportunities for improved rail freight operations under Alternative #3. For example, individual shippers could contract with PT. KA for operation of block trains, using wagons, and possibly locomotives, belonging to the shipper. This would provide some transport cost savings to transport users, though not as extensive as the potential benefits that could be obtained through implementation of Alternative #1, that would maximize the innovative strength. .

In summary, the likelihood of positive private sector influence and financial contribution would be greatest under Alternative #1 or #2; it is unlikely that Alternative #3 would produce a successful private sector contribution.